Purchase Now and Consume Later:

Do Online and Offline Environments Drive Online Social Interactions and Sales?

Abstract

For small local retailers, promoting social interactions on an online platform can be a cost-effective tool to both enhance immediate sales and nurture long-term relationships. This paper examines how online purchase and offline consumption environments affect the generation of social interactions as well as sales. Of many environmental variables, we focus mainly on the presence of other offers (online) and retailers (offline). We find that online and offline environmental factors have significant but different effects on the outcomes. Specifically, when more offers of the same kind are displayed in an online platform page, there are less sales and product discussion but more social referral. When a local retailer is in a region populated more by the same kind of service, sales and social interactions are both greater overall. The results suggest that these retailers should optimize their strategies according to their specific objectives when using such platforms.

Keywords: social interactions; online purchase environment; offline consumption environment; coupon sales.

Introduction

Social interactions among consumers have long been considered a crucial factor in purchase situations (e.g., Brooks, 1957; Dichter, 1966; Jung & Kim, 2016; Kim, Ko, & Kim, 2015; Woodside & Singer, 1994). Many successful referral campaigns, such as those by Dropbox.com and Airbnb.com, are a direct result of such phenomena (Patel, 2015). Businesses also find that interaction among users is linked to greater retention rates (Nitzan & Libai, 2011), higher involvement and higher engagement with the brand (Sashi, 2012). Manchanda, Packard, and Pattabhiramaiah (2015) show that customers participating in a brand community spend 20% more than those who do not, thereby quantifying the impact of such engagement. Finally, user-generated content of a social nature has become a business in itself, creating profits through advertising or affiliation programs.

Online platform-based tools that foster social interactions among users are particularly useful for small local retailers that have limited means for promoting their businesses. For example, a large platform such as Groupon that aggregates advance-sale discount coupons (hereafter, discount coupons) on behalf of local retailers provides a convenient way of selling products online. Such retailers, however, do not necessarily expect a large profit from discount coupon sales; rather, they attempt offering the coupons first to raise awareness of their retail brands and induce future repeat purchases, often giving deep discounts that may even hurt their short-term profits (Edelman, Jaffe, & Kominers, 2016; Kumar & Rajan, 2012). In this sense, social interactions which promote a retail brand and increase user involvement may be considered as important as or even more crucial than immediate sales per se. According to SimilarWeb in March 2019, such social aspect is in fact one of the key marketing strategies for Groupon to increase its traffic into the platform. Groupon also encourages its incoming users to engage in the

varied social interactions such as discussing the product on its offer page or sharing the information in other social platforms. As e-commerce continues to expand, small local retailers will be willing to leverage such social interactions for their marketing objectives.

For small local retailers, success in nurturing social interactions may depend not only on coupon features and offering conditions but also on the market environment that they happen to be in (Poon, 2000). The challenge is complicated by the fact that these retailers are subject to the conditions of multiple channels. For instance, in the online environment, the number of other retailers offering discount coupons at the same time may have a significant influence on a consumer's decision to either purchase or participate in social interactions regarding a particular offer (Belk, 1975). In the offline domain, the nature of a region where the retailer is physically located may affect whether the consumer is motivated to be involved in an online conversation.

This study investigates the effects of online and offline environmental factors, particularly the presence of other offers on the generation of online social interactions. To this end, we focus on the number (or size) of other coupons that are co-located with the focal retailer's coupon in the online environment. By co-located, we mean that the physical stores of the retailers are in the same geographical region, which is explicitly shown in the product description in an online web page. Following previous studies, we further include physical environmental factors (also called "atmospherics"; Kotler, 1973) in a single offline channel context (Belk, 1975). Notably, few-to-no studies investigate cross-channel influences of atmospherics on online performance as we do here. Previous works generally examine the relationship between the physical environment and business performance such as sales or adoption (e.g., Arentze, Oppewal, & Timmermans, 2005; Lee & Johnson, 2010; Park, Shin, & Ju, 2014). How the environment affects the generation of social interactions is a topic gradually being explored, but often limited to the effects of the

social environment (Hartmann et al., 2008; Shriver, Nair, & Hofstetter, 2013). The influence of the physical environment on social interactions is an area that requires more attention. Finally, we focus on two types of social interactions; product discussion which refers to posting queries and replies on the coupon page, and social referral which pertains to the act of introducing the coupon to other potential customers through other external social network platforms.

To this end, we obtain data from a large discount coupon site in Korea, who provides consumers with coupons for local retailers' products or services and encourages consumers to engage in product discussions or social referrals. Note that there are three major discount coupon sites in Korea, collectively occupying most of the industry. They started growing fast as of 2011 and, in 2018, accounted for 14% (i.e., 14.9 billion dollars) of the total amount of e-commerce business (i.e., 103.4 billion dollars).[1] The focal site was launched in mid-2010 as the first entrant into the industry and remained a market leader until the end of 2011. Our data capture 2011.

Our study addresses the issue of whether and how online and offline environments influence short-term sales and the amount of online social interactions generated by consumers and describes their relationships. Specifically, we focus on the presence of other retailers (i.e., coupons) in online and offline environments, and concurrently observe sales and two distinct types of social interactions: product discussion and social referral. To create the first type of social interactions requires higher immediate effort on the part of the consumer, and is both the cause and the consequence of higher involvement with the brand (Harrison-Walker, 2001); the latter requires less effort and has more to do with the informational and social utility of the offer (Chu & Kim, 2011).

In the remainder of the paper, we suggest previous findings on related topics and establish

[1] The references are in Korean and translations are available upon request.

the hypotheses. We then introduce our data and the model and present estimation results. After elaborating on the results of our hypotheses testing, we conclude with key findings and theoretical implications. We also highlight the managerial implications for practitioners.

Literature and Hypotheses

In this section, we review the related literature and discuss the dependent variables consisting of sales and two types of social interactions and environmental influencers consisting of the online purchase and offline consumption. As for describing the environmental influencers, we use the term own-channel influence to indicate online environmental elements affecting online consumer behavior, and cross-channel influence to indicate offline environmental elements affecting online consumer behavior. We describe our hypotheses in Figure 1.

[Insert Figure 1 about here]

Sales, Product Discussion and Social Referral

All else being equal, products and services that have high sales potential should also generate more social interactions around them (Godes & Mayzlin, 2004; Liu, 2006). We propose a framework in which the outcomes are determined concurrently and correlations are presumed, but the causality is only implied and is in a single direction (i.e., social interactions affect sales).

We focus on two types of social interactions: product discussion and social referral. Product discussion serves as a conversation tool in the online page that allows consumers to obtain information and resolve uncertainty. Social referral is used to share the information with other consumers using embedded buttons on the coupon page that allow the social network plugins to

link the information directly to the newsfeeds of users' social network pages (see Figure 2).[2] Their generation processes and their relationships with sales are distinct in several ways. Below we explain the main differences between the two types and summarize the argument in Table 1.

[Insert Table 1 and Figure 2 about here]

Product discussion is mainly driven by practical and self-interest motivations to resolve uncertainties about the product. Consumers with personal consumption in mind often engage in this type of social interactions. On the other hand, social referral is inherently other-focused (for a review, see Hennig-Thurau et al., 2004). There may be secondary motives in engaging in this type of social interaction but the action is clearly driven by intention to influence others.

The motivation is pitted against the cost that it takes to participate in each form of social interaction. Product discussion requires a somewhat high effort of composing a post that is 120 Korean characters (equivalent to about 270 characters in English) in length. In other words, product discussion is a high involvement activity that demands a substantial investment of time and attention (Harrison-Walker, 2001). However, social referral demands less effort, occurring generally when the product has some informational value (Chu & Kim, 2011).

Product discussion and social referral differ also in terms of how close to purchase the consumers are when they initiate the interaction. Because product discussion is a high-effort activity, it is used when consumers are serious about purchasing and are fairly close to finalizing the purchase (De Bruyn & Lilien, 2008). Meanwhile, social referral is a relatively low-effort activity that does not require much immediate input, and happens fairly early in the buying process, for instance, in the product search. This has implications on how closely each type of

[2] We label this as social referral and distinguish it from a traditional referral program in which the retailer directly awards the consumer for recommending the product to their acquaintances.

social interactions are coupled with the sales outcome.

The impact of social interactions on business outcome is determined by the nature of the media and the generation process. Largely product discussion is exposed only to the enquirer, the seller, and some potential users who visit the product page and thus are not necessarily seen by the public at large. The process of product discussion is associated with greater involvement and in turn leads to more discussions, resulting in a positive feedback loop. On the other hand, social referral reaches a larger audience base because it uses external social network platforms, and thus is effective in raising awareness among potential customers (Godes & Mayzlin, 2009). However, there is no clear evidence that social referral can increase customer involvement.

Absolute versus Relative Size of Online and Offline Environments

Our premise is that the online and offline environment affects sales and the generation of social interactions. We focus on two aspects of the business environments: the number of online and offline alternatives that are co-located with the focal retailer and the proportion of similar retailers, both online and offline. These constructs are relevant and interesting since they capture two distinct conditions; the absolute sizes portray how lively the marketplaces are, be they the online platform or offline region. The relative sizes of both the within-category coupons (online) and revenue (offline) capture (i) the competition within the given category, and (ii) the degree of agglomeration of the category. The number of alternatives may be directly observable, but the proportion of within-category coupons requires abstract processing of calculating ratios. We postulate that the two environmental constructs have different impacts in the context of an online purchase happening *now*, as opposed to the offline consumption that will happen *later*.

Construal Level Theory (CLT). When making decisions in our setting, consumers face two

environmental dimensions that give rise to the matching problem suggested by the scholars of mental construal level theory (Liberman & Trope, 1998; Trope & Liberman, 2010). On the one hand, the product environment has (i) the absolute size information that is immediately noticeable and low in abstraction, and (ii) the proportion of similar retailers, which needs more processing and is high in abstraction. On the other hand, consumers consider, at the same time, (a) the immediate online purchasing environment and (b) the future offline consumption environment. CLT predicts that when the construal levels (abstract vs. detailed, far vs. near) match, consumers are more likely to act upon the given task (Liberman & Trope, 1998). Following the theory, we posit that (i) the absolute size information matters when in (a) the online purchase situation (detailed-/ present-/ low-level construal), while (ii) the proportion of similar retailers matters when considering (b) the offline consumption situation (abstract-/ future-/ high-level construal).

In addition, our setting may lead the consumers to be somewhat indifferent to the similarity of the coupons when making purchase decisions online. Often in the discount coupon business, coupons from disparate categories are considered at the same time since the consumers are situational buyers drawn by promotional offers (Kukar-Kinney, Scheinbaum, & Schaefers, 2015; Turley & Milliman, 2000) rather than looking for a specific product. For example, one consumer can compare a restaurant and a massage coupon at the same time. This does not apply to the offline consumption environment since other local retailers do not offer discount coupons at the time of purchase. Thus, we hypothesize the following:

H_{1a}: In the online purchase environment, the number of co-located coupons (absolute quantity) has an impact but not the proportion of within-category coupons (relative quantity).

H_{1b}: When considering the offline consumption environment, the relative size of within-category revenue has an impact but not the absolute size of local retail revenue in a region.

Online Purchase Environment and Own-Channel Influence

Assortment in the online purchase environment. At the purchase stage, consumers are faced with a plethora of stimuli that vie for their attention (Kotler, 1973). From the consumers' perspective, a greater number of alternatives are generally considered desirable because larger assortment involves a better chance of encountering a coupon that closely aligns with their preferences (Wright & Barbour, 1975). It helps to maintain flexibility under the uncertainty of their own tastes (Oppewal & Koelemeijer, 2005), increasing an affinity toward the choice set itself (Kahn & Lehmann, 1991). Accordingly, the presence of many co-located coupons should positively impact consumer appreciation for the focal coupon. At the same time, the average probability of a consumer engaging in any particular coupon is lower due to budget constraints and a limited cognitive capacity (Tirole, 1988). Recent studies on the effect of the number of alternatives on purchase behavior reveal that offering too many brands concurrently leads to choice overload (Scheibehenne, Greifeneder, & Todd, 2010), resulting in delayed purchase due to confusion (Chernev, 2003; Diehl & Poynor, 2010). Other studies also show that retailers carrying smaller assortments enjoy a greater chance of individual items being sold, given that the options are attractive (Chernev & Hamilton, 2009). Thus, the presence of many co-located coupons may negatively impact a consumer's consideration of the focal coupon.

Sales, product discussion and social referral with assortment. In short, a greater number of co-located coupons promote an affinity for the choice set and the individual coupon, but tends to lower the probability of sales of one particular coupon. This duality is observed and well documented in the literature. Iyengar and Lepper (2000) reveal that while larger assortments

attract more customers to view the options, smaller assortments result in more sales. Chernev (2006) also notes that consumers prefer larger assortments in the earlier stage of purchase for flexibility, but when closer to the purchase stage, they prefer a smaller choice set for a simplified decision process. We therefore predict that a larger number of co-located coupons results in lower sales of the focal coupon.

Regarding the generation of social interactions around the focal coupon, the effect of the number of co-located coupons depends on the nature of the interactions. As discussed earlier, product discussion happens relatively later in the buying process and is driven by personal consumption motivation, while social referral happens relatively more often in the earlier steps such as in the product search, and is driven by social sharing motivation.

This duality of buying process and motivation allows us to predict distinct responses to the number of co-located coupons. Product discussion happens later in the buying process when larger choice sets are less attractive. Thus, a greater number of co-located coupons will tend to decrease this type of social interactions per coupon. Meanwhile, social referral is largely a show of interest and is not closely coupled with purchase. Considering that social referral is mainly motivated by the informational value signaled by environmental cues, this kind of social interaction will be promoted when the number of co-located coupons is larger. Our formal hypotheses regarding sales and the two types of social interactions (product discussion and social referral) are suggested accordingly.

H_{2a}: A greater number of co-located coupons is associated with lower sales of the focal coupon.

H_{2b}: A greater number of co-located coupons is associated with fewer product discussions of the focal coupon.

H_{2c}: A greater number of co-located coupons is associated with more social referrals of the focal coupon.

Offline Consumption Environment and Cross-Channel Influence

Agglomeration in the offline consumption environment. The influence of the offline environment on online coupon sales and the generation of online social interactions is interesting in two respects. Our setting, discount coupons websites, is a distinct channel from the one for consumption, the offline stores (cross-channel). In addition, as a typical advance-sale business, purchase and consumption are separated temporally (Shugan & Xie, 2000). Our study tackles the issue of whether own- and cross-channels due to the temporally complex environment affects the coupon sales and social interactions online. Earlier, we hypothesized that the relative size of similar retailers in the offline environment will matter, but not the total retail revenue of the region. When considering future offline consumption at the time of present online purchase, consumers often consider what a particular region is relatively known for (Porter, 2000).

Reviewing the effect of the retail environment on consumer decision making, there is sufficient evidence that retail agglomeration benefits both shoppers and retailers (Reimers & Clulow, 2004). This is true whether the retailers are similar or distinct. Studies find that similar retailers agglomerate, being aware of the benefits of clustering such as cumulative attraction or knowledge sharing (Brown, 1987; Capone & Lazzeretti, 2016). Agglomerations of dissimilar retailers encourage multipurpose shopping trips by allowing consumers to combine different consumption activities conveniently in one location (e.g., Arentze, Oppewal, & Timmermans, 2005). Accordingly, a greater ratio of similar businesses in a region should positively affect sales as well as the motivation to generate social interactions, everything else being equal.

Sales, product discussion and social referral with agglomeration. As per cross-channels, the

local retailers' agglomeration may affect online marketing outcomes. Many studies argue that such influence is carried across channels under certain conditions. For instance, offline brand conditions affect the online performance of brands with distinct niche attributes (Son et al., 2017) and minority preference of the local population affects the success of online specialty brands (Choi & Bell, 2011). As such, the offline consumption environment can affect online consumer activities including purchase and the generation of social interactions. Thus, we expect the offline environment to have positively proportionate effects on the online outcomes.

In sum, we postulate that the cross-channel influence of retailer agglomeration manifests in sales and social interactions; that is, when the offline region is populated more with types of retailers similar to the focal one, it results in more sales and more social interactions around the particular coupon that the focal retailer has offered. We formally hypothesize these as follows.

H_{3a}: A higher relative size of within-category revenue is associated with a greater amount of sales of the focal coupon.

H_{3b}: A higher relative size of within-category revenue is associated with a greater amount of online product discussions of the focal coupon.

H_{3c}: A higher relative size of within-category revenue is associated with a greater amount of online social referrals of the focal coupon.

Data, Measures and Model

Data

Our data set combines data from three sources. First, we obtained data on coupon sales and coupon characteristics for 2011 from a major discount coupon site in Korea.[3] We focus on

[3] Our goal is to examine the relationship between online social interactions (e.g., product discussion, social referral)

coupons that are to be used offline and are for services rather than goods in Seoul, Korea.[4] Notably, during the data period, the focal site did not engage in any promotional marketing activities targeting specific locations, for instance, to increase specific types of social interactions. Second, social interactions data and other coupon-related details were collected independently using a web crawler and manual searches. The discount coupon site archives all the pages of expired coupons and we conducted an exhaustive manual investigation of each web page to obtain retailer-specific details such as store addresses, whether the business was a franchise, and the number of participating stores. These data were then matched with the sales by using coupon identification numbers. Finally, local retailer revenue data from 2011 were obtained through the Korea National Statistical Office and then matched at the regional level by using postal addresses of the retailers. The final set contains 2,554 coupon-level observations.

The discount coupon site is an ideal setting for testing our hypotheses for several reasons. First, since many businesses using discount coupon platforms are small, relatively unknown, and operate mostly offline, we can observe the environmental factors influencing online activities in a relatively clean setup. Second, discount coupon platforms provide a stand-alone space for each coupon, which allows us to distinguish the effects of coupon-based factors in generating social interactions from the effects of environment-based factors. Finally, social interactions precede actual consumption and thus social interactions rarely contain experience-based reviews and instead serves as a means to clarify or propagate the coupons. This helps prevent the simultaneity

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and online and offline market environments in which small local retailers offer their products and services. Consumers now engage in these types of social interactions no less than or even greater than before and local retailers also continue to exploit the online and offline environments for their business strategies. Thus, we believe that our data and setting provides conservative results in support of our main findings.

[4] We limit our attention to local retailers and focus on location-based coupons in this study. Discount coupons are categorized as either location-based or location-independent. Location-based coupons are provided by local retailers targeting local consumers in geographically-defined trading areas. Location-independent coupons have nearly no geographical association and include products that are delivered to one's home, the same as those by e-retailers.

problem between sales and social interactions.[5]

The measures are introduced below and their brief descriptions are provided in Table 2.

[Insert Table 2 about here]

Measures

Dependent measures. We create three dependent measures from the coupon sales and the social interactions generated directly on the discount coupon pages. Discount coupon sites actively encourage two types of social interactions, product discussion and social referral. For each coupon, we count all the comments posted on coupon-specific discussion boards, and construct the measure *product discussion* as the number of threads.[6] Consumers were also allowed to export the coupon page information to external social media sites through the use of social network plugin buttons; during the data period, Facebook was by far the most favored destination for social referral. Thus, we compile the number of clicks that the Facebook plugin received and construct the measure *social referral*.

The occurrence of social referrals is much less frequent than that of product discussions (see Table 3); however, social referral may be much more effective in raising awareness of the business among uninformed consumers because of the viral property of the news feeds and status updates on social network sites (Allsop, Bassett, & Hoskins, 2007).

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[5] Many studies on social interactions, especially word-of-mouth, are subject to the simultaneity problem (Duan, Gu, & Whinston, 2008; Sonnier, Mcalister, & Rutz, 2011). Our setting and data show that social interactions are generated during the sales period of the coupons, and stop after the purchases are realized. Thus, we claim that while social interactions may affect sales, they are not affected by sales, which makes the simultaneity problem unlikely.

[6] We use thread count rather than the number of posts because it is a unit of meaningful interactions. Moreover, the two measures have a correlation coefficient close to one; thus, they provide qualitatively identical empirical findings (also see Online Appendix for robustness checks). Measures popularly used in word-of-mouth studies are valence, volume, and dispersion (Dellarocas, Zhang, & Awad, 2007), but we only consider volume-based measures. The two types of social interactions take place on a single site (either the focal discount coupon site or Facebook), so a dispersion measure is unnecessary. Additionally, social interactions happen before consumption, and thus, is more likely to contain value-neutral information rather than experience-based valence.

A preliminary look at the dependent measures by region in Figure 3 shows that significant geographic variations appear among the measures. Patterns between the coupon sales and the two types of social interactions show that sales and product discussion display highly similar geographical patterns, while social referral is somewhat distinct. Moreover, although both types of social interactions are positively correlated over space, there are most likely additional explanations other than geography driving the amount of interactions. The model-based estimation suggests that this initial observation can be formally corroborated. We also include control variables to rule out possible alternative explanations affecting such variations.

[Insert Table 3 and Figure 3 about here]

Hypothesis-testing variables. We have two sets of environment variables, one related to the online environment (*the number of co-located coupons* and *the proportion of within-category coupons*), and the other to the offline environment (*the absolute size of local retail revenue* and *the relative size of within-category revenue*), which are used to test our hypotheses. By co-located, we mean the physical stores of the retailers are in the same commercial district, a feature that is explicitly shown in the online page. The district refers to a relatively large commercial territory, each of which includes about 70 regions. We use districts in determining co-location of the online coupons, because when the users first approach the platform, the coupon sites ask them to choose one particular commercial district they belong to, and suggest coupons by district. We consider only the co-located coupons to constitute the immediate purchase environment because discount coupon sites require all site users to first select a physical locality. Specifically, the number of co-located coupons is measured as the number of co-located coupons that overlap with the focal coupon for at least one day in terms of sales, adjusted for days sold.[7]

[7] We also test robustness of the measure by varying the days of overlap from two to three, and the results remained

The proportion of within-category coupons is computed by dividing the number of co-located coupons in the same category by the total number of co-located coupons.

The absolute size of local retail revenue is a measure capturing the total revenue by retailers in related categories in a region where the retailer is physically located. We construct this variable by combining the total annual revenue of related categories, which include retailers and wholesalers, educational services, and medical services, along with the three categories to which all the coupons belong (i.e., food and accommodation, entertainment and recreation, and personal services). In cases where a coupon involves several store branches across multiple regions, revenues of all the related regions are accumulated. The unit is in the local currency.

Figure 4 shows the geographic variation of the independent variables of interest, aggregated over time and region. The patterns of the number of co-located coupons, the proportion of within-category coupons, the absolute size of local retail revenue, and the relative size of within-category revenue show substantial differences, indicating significant variations in terms of the online and offline environments. Our analysis that follows reveals the relationship among these measures and the outcome variables.

[Insert Figure 4 about here]

Control variables. We include control variables that may be associated with the generation of social interactions to capture the true effects of the environment. We construct control variables that capture other environmental factors related to coupon performance, and specific features of the coupon, as suggested in the related literature (Luo et al., 2014).

First, the performance of the online platform may influence consumer decision making. A platform is the online equivalent of a "store space," one of the most important factors in the

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qualitatively identical (see the robustness check section and the Online Appendix).

study of atmospherics and environments (e.g., Turley & Milliman, 2000). The number and the assortment of products are part of the store environment, but other elements of the store may affect sales and interactions. For instance, the discount coupon business was gaining popularity at the time of data collection, and thus, we find it necessary to include a control variable that captures this upward trend. We include the variable *the number of total coupons in other districts,* which is the total number of coupons across all but the focal district at the time the coupon was on sale (minus the co-located ones), to control for the changing size of the platform.

Second, past popularity of the unique combination of category and district can have a distinct and persistent influence on sales and the amount of social interaction. When certain types of coupons are successful in a retail district in the past, it can affect consumer motivation to participate in online interaction. This variable is conceptually similar to "deal popularity" from Luo et al. (2014), since it addresses the intrinsic and idiosyncratic attractiveness of the product (be it brand or category) that is not captured by other variables. The variable is the measure of the past one-month average performance of the coupons of a particular category-district combination, or *past sales in the same category-district* for short.

Additionally, we include other control variables that similar studies use, such as product features (coupon specifications), category and district dummies (see Table 2 for descriptions).

Model

Our model consists of three equations of identical structure, only differing in the dependent variables. We model the number of coupon sales as the first dependent variable, and the two types of social interactions, product discussion and social referral, as the other two. We use the above structure because the three outcomes are determined concurrently. Moreover, the

correlations among the three dependent variables (see Table 3.A) indicate a possibility of unobserved factors affecting sales and social interactions alike. We use a multivariate model to allow correlations among the error terms, controlling for the unobserved influencers.

Because all three dependent variables are non-negative integers, we model them in a Poisson framework. All measures have variances greater than the means, and thus, our empirical model needs to account for over-dispersion. The Poisson model is flexible enough to accommodate cross-sectional heterogeneity and the correlations. We assume that $y_{k,c}$, the amount of social interactions generated by process k for coupon c, is Poisson distributed:

$$(1) \qquad y_{k,c} \sim Poisson(\lambda_{k,c})$$

where $k = 1$ for coupon sales, k = 2 for product discussion, and k = 3 for social referral. The rate parameter $\lambda_{k,c}$ is modeled as a function of (1) online/offline environments, (2) platform performances controls, (3) other controls, and (4) coupon-level measurement errors:

$$(2) \qquad log(\lambda_{k,c}) = x'_{k,c}\beta_k + \varepsilon_{k,c} = \varphi_k \cdot Online/OfflineEnvironments_c + \Phi_k \cdot PlatformPerformancesControls_c + \psi_k \cdot OtherControls_c + \varepsilon_{k,c}$$

where $Online/OfflineEnvironments_c$ is a vector of four variables for the number of co-located coupons online, the proportion of within-category coupons online, the absolute size of local retail revenue, and the relative size of within-category revenue. φ_k is the corresponding parameter vector of process k. $PlatformPerformancesControls_c$ and $OtherControls_c$ are vectors containing platform performances controls, coupon-specific controls, category dummies and district dummies. Φ_k and ψ_k are the corresponding parameter vectors for the observed heterogeneity.

We account for potential specification error using the disturbance term $\varepsilon_{k,c}$, and this specification error also allows the variance of the dependent data to be larger than the mean. Since three generation processes emerge from the same coupon c, the three specification errors

follow a tri-variate normal distribution:

$$(3) \qquad \begin{pmatrix} \varepsilon_{PD,c} \\ \varepsilon_{SR,c} \\ \varepsilon_{SALES,c} \end{pmatrix} \sim \text{i.i.d.} MVN\left(\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_1^2 & r_{1,2}\sigma_1\sigma_2 & r_{1,3}\sigma_1\sigma_3 \\ r_{1,2}\sigma_1\sigma_2 & \sigma_2^2 & r_{2,3}\sigma_2\sigma_3 \\ r_{1,3}\sigma_1\sigma_3 & r_{2,3}\sigma_2\sigma_3 & \sigma_3^2 \end{pmatrix}\right).$$

Because the parameters are jointly estimated through the multivariate error structure, parameter estimates are generated efficiently. Moreover, we can compare the different effects of one specific variable across the three processes.

Empirical Findings

Table 4 shows the estimation results of the multivariate Poisson-Lognormal model in which all variables except for category and district dummies are standardized. Estimation was done using SAS NLMIXED procedure. The error terms of three equations have statistically significant correlation coefficients ($r_{1,2}$ = 0.727, $r_{1,3}$ = 0.403, $r_{2,3}$ = 0.364). This justifies using a correlated error structure to control for unobserved factors affecting three outcomes.

[Insert Table 4 about here]

Hypothesis-Testing Variables

Absolute versus relative size of online and offline environments (H_1). In the online purchase situation, we predicted that the number of co-located coupons should matter but not the proportion of within-category coupons. Indeed, all coefficients of the number of co-located coupons are significant ($\varphi_{SALES,1}$ = -0.231, $p < 0.01$; $\varphi_{PD,1}$ = -0.213, $p < 0.01$; $\varphi_{SR,1}$ = 0.532, $p < 0.01$), while all coefficients of the proportion of within-category coupons are not, supporting our hypothesis. When purchasing, consumers are influenced by the number of online coupons that are concurrently offered since co-located coupons influence the consumer decision to purchase

and generate social interactions. The percentage of coupons similar to the focal coupon is not important because consumers consider products from disparate categories at the same time.

In considering the offline consumption situation, the relative size of within-category revenue affects consumers' decisions to purchase and to generate social interactions, as hypothesized in H_2 ($\varphi_{SALES,4} = 0.077$, $p < 0.01$; $\varphi_{PD,4} = 0.069$, $p < 0.01$; $\varphi_{SR,4} = 0.199$, $p < 0.01$). When consumers imagine the future consumption event at the time of purchase, they associate the region with a particular type of category. The absolute size of local retail revenue did not have a significant effect on sales or social referrals, as hypothesized, but did influence the generation of product discussions ($\varphi_{PD,3} = 0.056$, $p < 0.01$). Thus, the second part of H_2 is partially supported.

We explain this discrepancy by focusing on the nature of product discussion. The consumers engaging in such costly activity must have high involvement and strong motivation when considering the consumption situation, including the size of local retail revenue. The offline retail environment provides a consumption context when consumers combine one consumption activity with another. Because the consumers who are highly involved in purchasing often consider a variety of aspects of their consumption situation, it is important for them to have an extensive choice of various retail outlets in a relatively small area (Arentze, Oppewal, & Timmermans, 2005). Thus, abundance of complementary services in the vicinity makes the focal service more attractive and increases the amount of product discussions. However, this does not lead to a significant lift in sales because all those who purchase do not necessarily have sufficiently high involvement to consider consumption situations that are temporally and physically distant (Zhao & Xie, 2011). Consistent with this explanation, the average number of threads per coupon was about 47, while the average number of coupon sales was 817, suggesting that only a small portion of the consumers actually participated in the discussions. Social referral,

for a similar reason, was not affected by the absolute size of local retail revenue.

Online purchase environment and its own-channel influence (H_2). Previously, we predicted that the number of co-located coupons that are posted simultaneously with the focal coupon will have a negative effect on coupon sales and have contrasting effects on the two types of social interactions: a negative influence on product discussion and a positive influence on social referral. The results show that a greater number of co-located coupons has a negative effect on sales (H_{2a}: $\varphi_{SALES,1} = -0.231$, $p < 0.01$), supporting our conjecture. The abundance of co-located coupons inevitably harms the average performance of individual coupons due to the greater competition for a limited consumer resource.

Product discussions also decrease when offered alongside many co-located coupons, corroborating the hypothesis (H_{2b}: $\varphi_{PD,1} = -0.213$, $p < 0.01$). Because product discussion mainly happens at the end of the buying process, the online environment has an influence on such activity in a manner similar to its influence on the actual sales. That is, a larger number of co-located coupons causes a resource allocation problem for creating a high-effort social interactions, and reduces the amount of attention each coupon receives (Jones, Ravid, & Rafaeli, 2004). Moreover, the effect size of the standardized variables is almost the same, further suggesting the similarities between sales and product discussion.

Regarding social referral, our results again support the initial conjecture. The coefficient is positive and significant (H_{2c}: $\varphi_{SR,1} = 0.532$, $p < 0.01$), indicating that a larger number of co-located coupons results in a greater amount of social referrals. Because social referral often occurs relatively earlier in the buying process such as in the search stage, a large number of choices is appealing to consumers because it provides greater flexibility (Kahn & Lehmann, 1991; Oppewal & Koelemeijer, 2005). The attractiveness of the choice set leads to a higher

appeal for the individual coupons. A higher number of coupons also increase informational value due to social relevance and lead to a greater number of social referrals (Walsh, Gwinner, & Swanson, 2004).

Offline consumption environment and its cross-channel influence (H_3). We previously hypothesized that the proportion of within-category revenue in a region positively affects coupon sales online. Further, both types of social interactions, product discussion and social referral, are positively affected. The results show that, indeed, having similar retailers in the local area where the focal retailer is located helps generate more sales and social interactions (H_{3a}: $\varphi_{SALES,4} = 0.077$, $p < 0.01$; H_{3b}: $\varphi_{PD,4} = 0.069$, $p < 0.01$; H_{3c}: $\varphi_{SR,1} = 0.199$, $p < 0.01$). Unsurprisingly, when considering online coupons purchase, whether or not the offline consumption location is known for having similar retailers matters to consumers. This shows that the agglomeration effect (Tallman et al., 2004) dominates when consumers are considering future consumption, while competition among retailers in the offline location is largely irrelevant. At the time of online purchase, other similar retailers in the region may not be actively competing because, most likely, they are not offering online discount coupons at the same time on the same platform. Social interactions are similarly influenced. The agglomeration of similar types of retailers in a physical location encourages more product discussions and social referrals of online coupons, possibly due to higher credence and attractiveness of the service from the agglomeration effect.

Control Variables: Platform Performances Controls

We included platform performances controls that are specifically constructed to rule out possible alternative explanations of our environmental factors. First, platform performance measured by the number of total coupons in other districts may affect the outcome. The results

show that when there are more coupons across all retail districts but the focal one, social referrals are greater ($\phi_{SR,1} = 0.917$, $p < 0.01$), but coupon sales and product discussions are unaffected. Just as an attractive brick-and-mortar hypermarket encourages consumers' conversation over a brand displayed in the store (Sundaram, Mitra, & Webster, 1998), the number of coupons available on the platform across all but the focal district can affect users' motivation to interact online. In particular, the overall number of coupons may signal the success of the platform. This can be socially valuable information and thus it is likely to affect users' intentions to recommend (Walsh, Gwinner, & Swanson, 2004).

Second, past one-month performance of coupons in the same category-district combination as the focal coupon is included to control for idiosyncratic effects. The results show an interesting pattern. Historically, coupons of a certain category that have been successful in the past enjoy a greater amount of sales ($\phi_{SALES,2} = 0.045$, $p < 0.05$), but product discussions are not affected by past performance. Social referrals are greater for historically popular coupons ($\phi_{SR,2} = 0.269$, $p < 0.01$), presumably indicating that the popularity of a certain category-district combination is socially valuable information.

What-If: Magnitude of Environmental Influences on Sales and Social Interactions

We illustrate the practical impact of environmental conditions on sales and the generation of social interactions using the model estimation results in Table 4. For the baseline state, we hold all other variables at their means and set the intercepts of the models at the mean value of the dependent variables to suppose the "average" state of the market. At this state, about 8.7 co-located coupons are offered. We then vary the key variables, namely, the number of co-located coupons from the bottom 10% (one coupon) to the top 10% (18 coupons) of the observed data,

and the proportion of within-category revenue in the offline regions, from 10% (1% within-category revenue) to 90% (12.4% within-category revenue).

When the number of co-located coupons are at the top 10% level, sales are lower by 25% (i.e., dropping from 537 to 403), and product discussions have eight fewer threads on average (23% drop from the baseline). However, social referrals increase by 96%, indicating a greater practical impact. When the number of co-located coupons is at the bottom 10%, sales are 29% higher (from 537 to 693), product discussion boards have 26% more threads, and social network plugins are clicked 44% less. The influence of the online environment is symmetrical regarding sales and product discussions, but the positive impact of a greater number of co-located coupons is larger for social referrals.

Regarding the offline environment, the top 10% of the observed data for the relative size of within-category revenue is equivalent to the region being 12% dominated by retailers of a similar nature. The bottom 10% is equivalent to retailers of a similar nature representing 1% of local retail revenue. At the top 10% level, sales are 11% higher (59 more coupons), product discussion boards have 10% more threads, and social network plugins are clicked 30% more. At the bottom 10%, sales are lower by 6% (35 fewer coupons), product discussion boards have 4% fewer threads, and social network plugins are clicked 16% less. The relative size of within-category revenue affects all three constructs asymmetrically, wherein the positive impact of a higher agglomeration is greater than the negative impact of the scarcity of similar services.

Robustness Checks

We implement a number of robustness checks to demonstrate that the results are not sensitive to the particular way the analysis has been done. First, the results may be sensitive to the kind of

controls included in the model. We vary the kind of controls included, from a model with only the key variable to the most complete model with all controls (equivalent to Table 4), and the key results are qualitatively identical across all specifications (see Section 1 of the Online Appendix). Second, our model assumes correlation in the error terms of the three equations. We test whether using an alternative assumption, non-correlated errors, changes the result. Using three univariate equations, the significance and the signs of the main variables remain unchanged, but the effect sizes are slightly smaller for the alternative assumption (see Section 2 of Online Appendix).

Next, results may be sensitive to how the dependent variables are operationalized. We use the number of threads as the measure for product discussion. When we use the number of posts, the results for the main hypotheses testing variables do not change substantially in magnitude or levels of significance (see Section 3 of the Online Appendix). Finally, the main environmental constructs can be operationalized differently. For one, the number of co-located coupons online counts other coupons that had at least one-day overlap in the sales period with the focal coupon. We test whether making the definition more restrictive by counting only those that had at least a two-day or three-day overlap affected the results. In addition, we test another operationalization in which only coupons that share the same starting dates were considered. In all the alternatives, the results were practically the same (see Section 4 of Online Appendix). Overall, we conclude that our results are robust across different model assumptions and operationalization of dependent and independent variables.

Conclusion

While the influence of the purchasing environment on sales is a well-explored topic (Häubl & Trifts, 2000), its influence on the generation of social interactions has rarely been examined.

Our study contributes to this area of research by showing that environmental factors do impact social interactions, as well as the final purchase. In particular, we show that the different types of social interactions matter. One environmental factor may encourage product discussion but diminish social referral, for instance, as does the number of co-located coupons.

Moreover, little investigation has been done on the cross-channel influences of the environmental conditions on the motivation to generate online social interactions. In our setting, online social activities around discount coupons may be influenced by offline consumption conditions (Luo et al., 2014) and we investigate these cross-channel factors. The result shows that being located in a region where similar services are aggregated encourages sales and social interactions for the focal coupon on discount coupon sites, providing the empirical evidence that online shoppers consider offline environmental conditions in making purchase decisions for service consumption.

Another contribution of this work is that it provides a new perspective on marketing strategies involving social interactions. That is, businesses can now distinctly identify the effects their strategic decisions have on fostering social interactions versus meeting short-term sales goals. Our proposed modeling framework consists of three equations that share the same structure in terms of the independent variables, and we can simply compare the direction and significance of the coefficients to draw implications regarding the co-movement. Specifically, 20 out of 27 of the coefficients (74%) in the sales and product discussion equations share the same sign and significance, indicating high co-movement. Meanwhile, that number is only 13 (48%) between sales and social referral. This implies that what drives short-term sales also tends to drive product discussion, while the relationship between sales and social referral is not closely related. We can also gain insight into the process of making a purchase and generating social

interactions; a portion of users who end up purchasing engage in product discussion, and these users are most likely to be engaged with the retail brand. Social referral is a separate process in which the users are not necessarily interested in purchasing immediately.

Implications for Practitioners

The most important insight of our study for managers is that the business environment affects sales and the various types of social interactions in a distinct fashion. Thus, when making strategic marketing decisions such as whether to use an online discount coupon platform, the manager has to decide what the objective of the campaign is; that is, is the objective (1) to maximize immediate sales, (2) to engage users by involving them in a discussion around the retail brand, or (3) to maximize exposure in order to raise awareness by user referrals through social networking sites? While the first objective is aimed at a short-term gain, the last one is aimed at long-term benefits. The second objective may achieve both. Specifically, engaging users (product discussion) will increase involvement and promote repeat purchases (Kumar et al., 2010; Nitzan & Libai, 2011) as well as immediate sales, while raising awareness (social referral) can lead to greater future customer acquisitions (Keller, 1993; Stahl et al., 2012).

Once the manager prioritizes the objectives, the online and offline environments should be considered carefully. For a short-term gain, introducing the discount coupon is advantageous when the number of co-located coupons is the least. If the objective is to maximize awareness among a larger public, listing the coupon when there are many co-located coupons is a better course of action. Finally, when choosing an offline location, a retailer can take advantage of opening a shop in an area known for that business if the retailer aims to sell and promote through online platforms such as discount coupons sites.

While the retailers using discount coupon platforms are usually small and lesser-known

businesses, some parts of the findings can be generalized to bigger retail brands. In particular, results concerning product discussion, or user-generated content, in general, should reasonably apply to better known retail brands. When there is a smaller number of co-located coupons presented online, and when the offline store is located in a sizeable local region, the retail brands should enjoy a greater amount of discussions. However, consumer reaction in terms of social referral is not clear. Since the main reason users do social referral is because of the informational value of the coupon, a better-known brand may prompt an entirely different response from users.

Limitations and Further Research

There are many issues to be addressed in the area of social interactions generation. First, numerous other kinds of social interactions are worth investigating such as brand reviews, ratings, and "likings" (Cheung & Thadani, 2012). We tackle two popular types of social interactions, but future studies may reveal distinct processes through which others are generated. Second, while we believe that the competition across different platforms does not directly influence the generation of social interactions on one site, it may be interesting to see how platform competition shapes the strategic aspects of the coupon and, ultimately, key marketing outcome variables. Third, we assume a long-term impact based on the previous findings, but our dataset does not directly show this result. Future studies can focus on measuring and verifying actual long-term consequences of various types of social interactions. Finally, while the content of product discussion is not directly relevant to this study, richness of the content may reveal additional qualitative insights.

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Tables and Figures

Table 1. Comparison between Product Discussion and Social Referral

	Product Discussion	Social Referral
Motivation	Self-interest	Other-focused
Effort Required	High	Low
Audience Size	Small	Large
Buying Process	Generated close to the purchase stage	Generated throughout the buying process, including the search stage

Table 2. Variable Descriptions

Variables	Description
Dependent Variables	
Sales	Number of advance-sale discount coupons sold
Product discussion	Number of threads on a coupon-specific discussion board
Social referral	Number of social plugin clicks of the focal coupon
Key Variables	
Online purchase environment	
Number of co-located coupons	Number (kinds) of coupons co-located with the focal coupon
Proportion of within-category coupons	Proportion of co-located coupons of the same category
Offline consumption environment	
Absolute size of local retail revenue	Total annual revenue of all retailers in a region
Relative size of within-category revenue	Proportion of retail revenue of the same category
Control Variables	
Platform performances	
Number of total coupons in other districts	Total number of coupons in all but the focal district
Past sales in the same category-district	Average per-coupon sales of the same category in the district up to last month
No record for past sales	No record = 1 if there is no record for past coupon sales
Coupon specifications	
Duration of sales	Number of days from a coupon posting to a closing
Duration of validity	Number of days for which a coupon is valid for redemption
Selling price	Actual price paid by buyers, normalized by category
Discount rate	Percentage discount a coupon is offered at
Minimum quantity	Minimum number of coupons required to be sold
Maximum quantity	Maximum number of coupons that can be sold
Franchise	Franchise = 1 if there are other stores of the same brand
Number of participating stores	Number of stores participating if a brand is a franchise
Number of posts per thread	Average number of posts per thread.
Category dummies	
Category 1	Food and accommodation
Category 2	Entertainment and recreation
Category 3	Personal services
District dummies	
District 1	South-center
District 2	South-east
District 3	South-west
District 4	North-center
District 5	North-east
District 6	North-west

Table 3. Summary Statistics

(A) Dependent Variables

	Mean	Median	SD	Correlations	
				PD	SR
Sales (Sales)	816.839	499	1,109.332	0.530	0.172
Product discussion (PD)	47.314	32	50.556		0.109
Social referral (SR)	1.758	0	4.111		

(B) Independent Variables

	Mean	Median	SD
Key Variables			
Online purchase environment			
Number of co-located coupons	8.693	7	7.086
Proportion of within-category coupons	0.416	0.429	0.289
Offline consumption environment			
Absolute size of local retail revenue (in billion dollars)	5.063	2.773	5.108
Relative size of within-category revenue	0.058	0.047	0.051
Control Variables			
Platform performances			
Number of total coupons in other districts	223.911	204	201.876
Past sales in the same category-district	798.609	749.500	561.512
No record for past sales (1=no, 0=yes)	0.038	0	0.190
Coupon specifications			
Duration of sales	5.059	5	6.163
Duration of validity	88.253	91	35.804
Selling price (in dollars)	23.586	13.454	46.333
Discount rate (%)	56.508	51	11.967
Minimum quantity	52.282	50	41.815
Maximum quantity	1,979.752	1,250	2,657.207
Franchise (1=yes, 0=no)	0.268	0	0.443
Number of participating stores	1.071	1	0.589
Number of posts per thread	1.955	1.958	0.279
Category dummies			
Category 1: Food and accommodation	0.602	1	0.490
Category 2: Entertainment and recreation	0.164	0	0.371
Category 3: Personal services	0.234	0	0.423
District dummies			
District 1: South-center	0.256	0	0.436
District 2: South-east	0.118	0	0.323
District 3: South-west	0.126	0	0.332
District 4: North-center	0.212	0	0.409
District 5: North-east	0.165	0	0.372
District 6: North-west	0.122	0	0.327

Note: All the monetary values are converted from Korean won to US dollar. ($1 = KRW 1,107.503 as of 2011). Local retail revenues are in billion dollars and selling prices are in dollars.

Table 4. Estimation Results

	Sales		Product Discussion		Social Referral	
	Est	SE	Est	SE	Est	SE
Key Variables						
Online purchase environment						
Number of co-located coupons	-0.231**	0.030	-0.213**	0.026	0.532**	0.074
Proportion of within-category coupons	-0.040	0.025	-0.001	0.021	0.050	0.067
Offline consumption environment						
Absolute size of local retail revenue	0.029	0.025	0.056**	0.022	0.037	0.060
Relative size of within-category revenue	0.077**	0.023	0.069**	0.020	0.199**	0.067
Control Variables						
Platform performances						
Number of total coupons in other districts	-0.113	0.058	-0.094	0.050	0.917**	0.150
Past sales in the same category-district	0.045*	0.021	-0.017	0.018	0.269**	0.054
No record for past sales (1=no, 0=yes)	0.492**	0.104	0.055	0.089	-0.457	0.383
Coupon specifications						
Duration of sales	0.177**	0.054	0.191**	0.046	-0.487**	0.142
Duration of validity	0.043*	0.020	0.095**	0.017	0.031	0.050
Selling price	-0.282**	0.029	-0.016	0.025	-0.182*	0.071
Square term of selling price	0.493	0.276	-0.099	0.239	0.252	0.708
Discount rate	-0.388**	0.115	-0.305**	0.099	-0.830**	0.256
Square term of discount rate	0.321**	0.114	0.326**	0.099	0.768**	0.260
Minimum quantity	0.303**	0.024	0.195**	0.020	0.032	0.057
Maximum quantity	0.388**	0.021	0.164**	0.018	0.233**	0.052
Franchise (1=yes, 0=no)	0.171**	0.043	0.123**	0.037	0.272**	0.101

Number of participating stores	-0.022	0.021	0.009	0.018	-0.202**	0.069
Number of posts per thread	1.162**	0.192	1.280**	0.168	0.027	0.508
Category dummies (base: Food and accommodation)						
Category 2: Entertainment and recreation	-0.495**	0.073	-0.279**	0.063	-0.092	0.188
Category 3: Personal services	-0.609**	0.068	0.012	0.059	-0.450*	0.179
District dummies (base: South-center)						
District 2: South-east	-0.097	0.082	-0.124	0.071	0.359	0.209
District 3: South-west	-0.295**	0.079	-0.219**	0.068	0.108	0.212
District 4: North-center	-0.146*	0.061	-0.097	0.053	-0.109	0.152
District 5: North-east	0.012	0.077	0.051	0.067	0.033	0.190
District 6: North-west	-0.108	0.084	-0.071	0.073	1.049**	0.212
Intercept	6.286**	0.056	3.514**	0.048	-1.167**	0.152
Variance						
σ^2	0.853**	0.025	0.603**	0.018	2.619**	0.152
$r_{1,2}$ (Sales, PD)	0.727**	0.010				
$r_{1,3}$ (Sales, SR)			0.403**	0.026		
$r_{2,3}$ (PD, SR)					0.364**	0.026
-2LL	67,036					

Note: * and ** indicate significance at $p < 0.05$ and $p < 0.01$, respectively. All variables except dummy variables are standardized.

Figure 1. Conceptual Framework

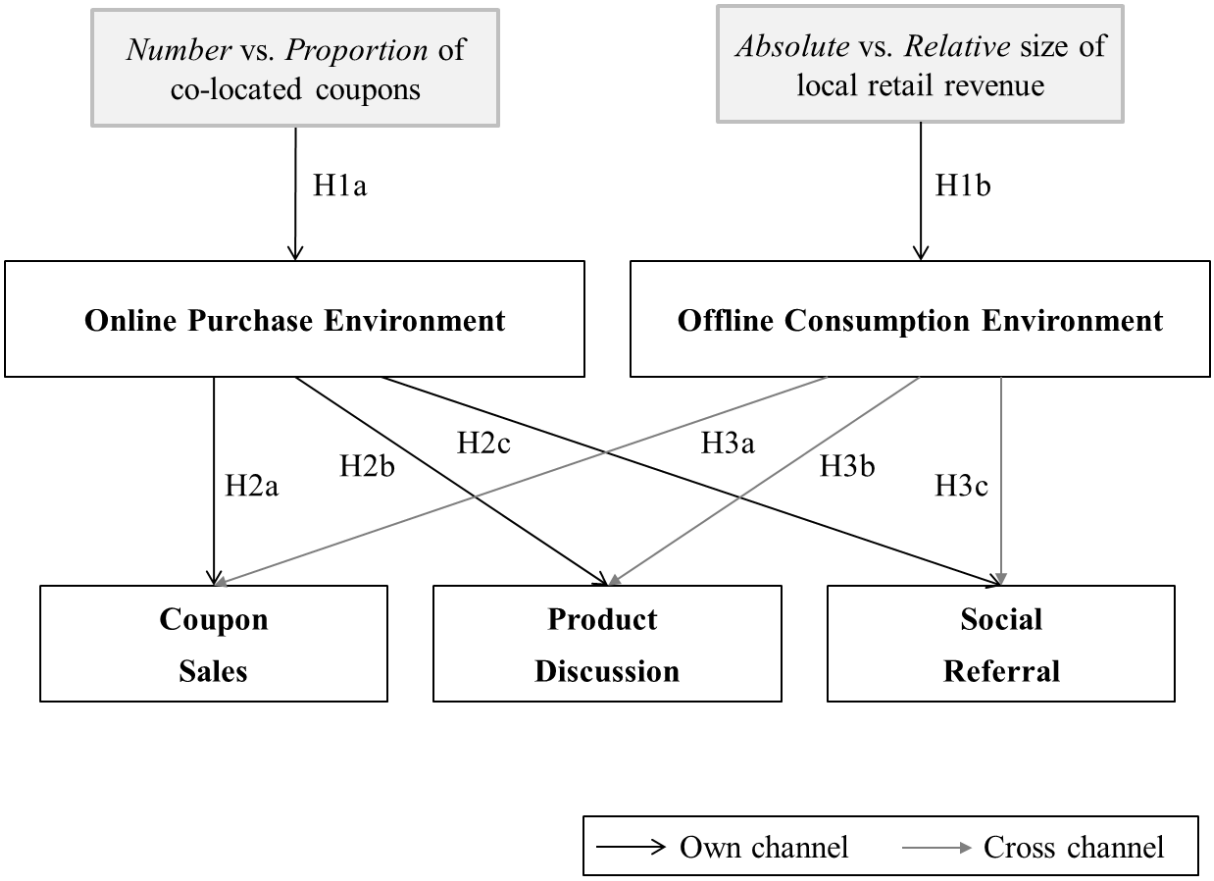


Figure 2. Pages on the Coupon Site and on Facebook

(A) A Coupon Page with a Product Discussion Board

(B) A Coupon on Facebook after Social Referral

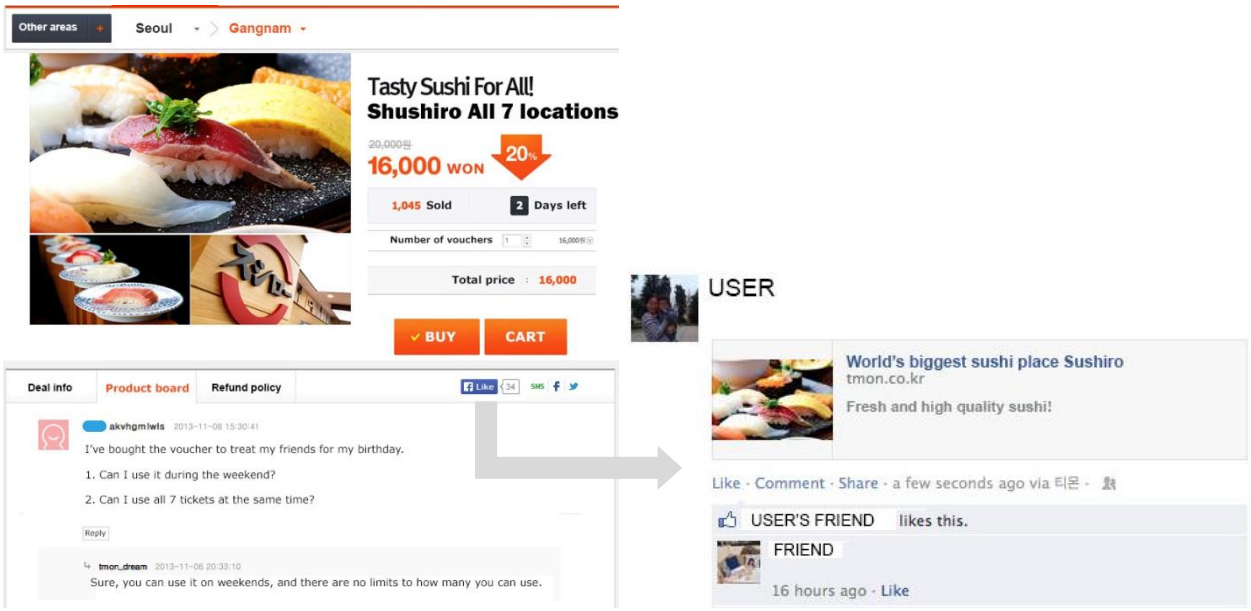
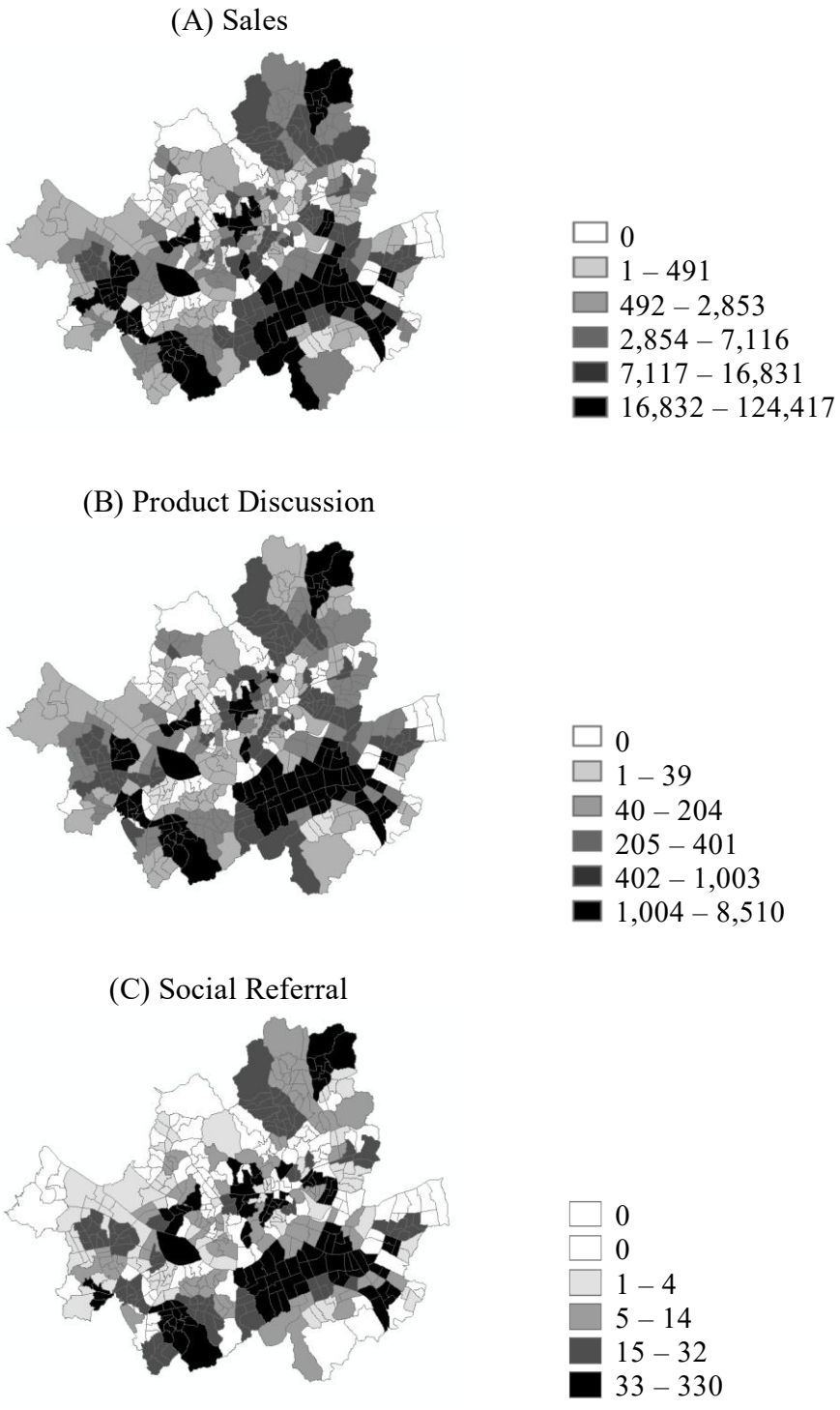


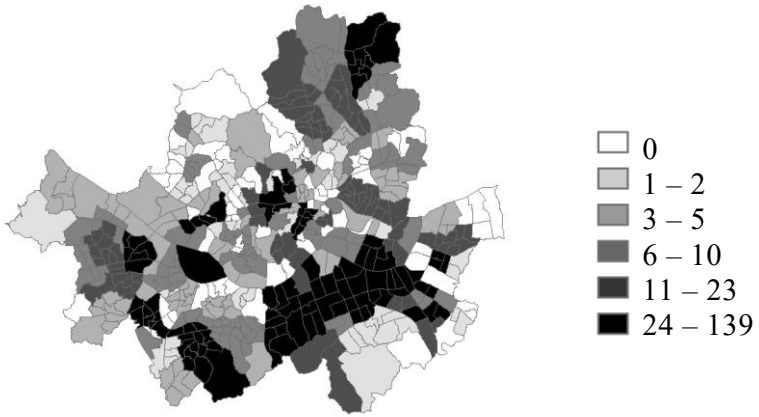
Figure 3. Geographic Variation in Sales and Social Interactions



Note: By region, we mean an administrative geographical unit which is locally called "dong" within Seoul. There are 423 regions in Seoul and the average population is about 23,300 per region.

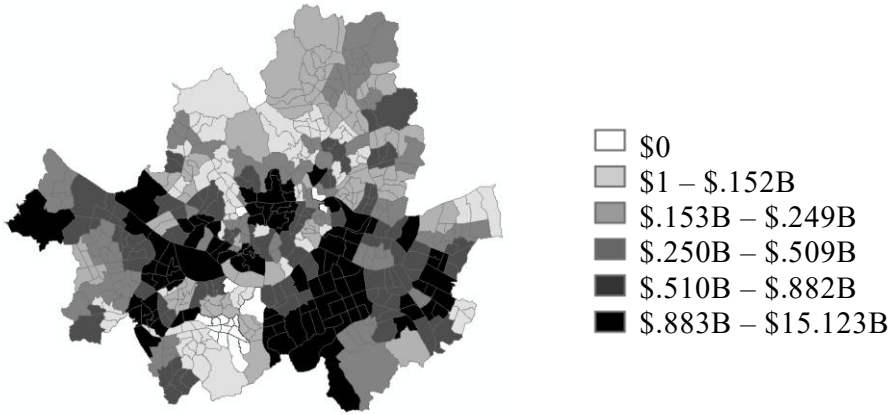
Figure 4. Geographic Variation in Online and Offline Market Environments

(A) Number of Co-located Coupons



(B) Proportion of Within-category Coupons

(C) Absolute Size of Local Retail Revenue



(D) Relative Size of Within-category Revenue