WILLING MIND MAKES A LIGHT FOOT:
THE EFFECTS OF THE DISTANCE ON THE PURCHASE AND REDEMPTION OF ONLINE DISCOUNT VOUCHER

Research-in-Progress

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Abstract

The discount online voucher initiated by Groupon has changed the way many online shoppers find bargains for local services. Will the distance influence the consumers' decision to purchase at the daily deal site? How far does a consumer travel to use her discount online voucher? In this paper, in particular, we empirically examine the micro level data of a Groupon-like daily deal web site to identify the effects of the distance on the purchase and redemption of coupons. We analyze the dataset extracted from the transactional database during the period between July 2010 and December 2010. The results show that the number of purchase increases as the stores get distant from the predefined consumers' local region. Whereas consumers redeem the coupons of the remote places later on average in that the coupon redemption rate decreases as the stores get distant.

Keywords: Electronic Commerce, Online discount voucher, Daily deal, Internet Retailing, Geography

Introduction

The daily deal industry initiated by Groupon has been said to bring more than 700 copycat businesses, attract huge amount investment from venture capitals, and change the way a number of online shoppers find bargains for local products such as restaurant coupons. (Business Week, 2011) For 2011, Groupon generated revenue of $1.6 billion, up 419% compared to 2010. Gross billings were $4.0 billion, up 437% from $745.3 million in 2010. Groupon's active customer base was more than 33 million, up 275% year-over-year. (Forbes, 2011) LivingSocial, the second-largest website devoted to daily coupons, is said to grow quickly as well to generate $1 billion in revenue in 2011. (Business Week, 2011) Numerous web sites similar to the original model are operational internationally. Groupon and LivingSocial have been leading a virtual land grab, with dozens of companies angling for a bigger share of the fast-growing market and swallowing start-ups at a rapid rate. (NewYork Times, 2011) Even though some raise an issue that it is unclear whether industry diversification, increasing competition, and larger revenue shares for merchants will disrupt the major players or cannibalize the industry as a whole, (Forbes, 2012) daily deal industry has showed positive growth figures.

"Deal of the day" web sites provide electronic commerce offering bargain deals per region typically for a period of 24 hours. Members of deal of the day websites receive online offers and invitations in email, SMS and social networks. They provide the daily deal information in the local region registered when consumers signed up. When consumers purchase an offer, the deal expires typically in 3 to 12 months. Some specialists in the consumer protection area raise issues that some of daily deal sites want to make money from the non-redemption (Marketwatch, 2011).

Our purpose of carrying out this study is to test empirically how the coupon purchase and redemption varies as the stores get distant from the predefined consumers' region. In this article, tests for the number of purchases and redemption rate over the distances have been performed with an analysis of micro level data which was received from a Groupon-like daily deal site. The results show that the number of purchase increases as the stores get distant from the predefined consumers' local region. Whereas consumers redeem the coupons of the remote places later on average in that the coupon redemption rate decreases as the stores get distant.

The remainder of this article is organized as follows. Following section presents a literature review related with discount online voucher, electronic commerce and location. Then we describe the research design and hypotheses. In the next sections we present econometric models and results, and discuss their implications.

Literature Review

Literature on daily deal industry is limited as the industry is relatively young. A survey study of small businesses partnering Groupon is performed (Dholakia, 2011). A couple of analytical models with descriptive statistics to explain the daily deal economics and marketing strategy are presented (Edelman et al, 2011; Byers et al., 2011; Kumar and Rajan, 2012).

Theoretical research on the competition between direct retailing and traditional brick-and-mortar retailing can be traced to Balasubramanian (1998). By analyzing a game-theoretic model that has a direct retailer and multiple brick-and-mortar stores, he suggests that the direct retailer competes with local stores. In a landmark paper, Bresnahan and Reiss (1991) show that as the number of competing firms in a local market increases, the competition becomes more intensified and firms' profit margins fall. However, these papers do not study how the competition varies across different products with different search costs.

Previous empirical research has found that Internet markets can improve consumer welfare and firms' profits through wider product selection (Brynjolfsson et al. 2003; Cachon et al. 2007), and that consumer's demand through the Internet channel is higher in local markets where local prices and sales tax rates are high (Goolsbee, 2001; Chiou, 2008). However, the impact of local market structures on consumers' Internet demand has not been much explored by previous literature.

Our paper is closely related to two interesting papers that study how geographic variables have an impact on consumers' online behavior – Sinai and Waldfogel (2004) and Forman et al. (2009). A few papers in marketing have leveraged spatial data to understand consumers' behaviors (Bradlow et al. 2005). For example, Jank and Kannan (2005) show that including spatial dependence can help predict whether a consumer purchases an electronic copy or a print copy of the same book.

Complementarity between online and physical channel has been observed in services as well. Hitt and Frei (2002) show that the existence of dual channels can increase the retention rate of customers in the context of PC banking. Campbell and Frei (2010) find that introduction of online banking service leads to an increase in overall banking service consumption and upsurge in total transaction volume. Addition of an online channel to a traditional channel can also lead to negative demand effects (Geyskens et al. 2002). The Internet channel can lead to a demand shift for a company without any additional sales (Alba et al. 1997). Targeting the same customer segment and offering similar products, online stores and physical stores may face cross-channel competition (Brynjolfsson et al. 2009).

Our paper complements previous research and differentiates itself by analyzing micro-transaction data empirically and by focusing on the effect the distance on the purchase and redemption of online discount voucher in daily deal industry.

Research Design and Hypothesis

The company we study was once one of the global top 5 daily deal sites. It sells wide range of services product from restaurant, café, healthcare, and so forth. All of the products are sold exclusively through the company's the Internet channel (website) and mobile web services for smartphones (mobile web). The products for mobile web are differentiated from the ones for web site in that the coupons through mobile web are limited to the daily use only and account for a negligible percentage of overall sales during the period we examine. This limits our study to the Internet channel.

To investigate how varied the redemption rates are through the distance between predefined local region and stores, we extract the panel data from the transactional database during the period between July 2010 and December 2010. The transactions of 48 products and 17,058 customers were selected as the sample for our study.

We formulate our hypotheses on how many purchases happen and how varied redemption rates are with the change of the distance in the daily deal industry. Sinai and Waldfogel (2004) find that consumers connect to the Internet to overcome spatial isolation (e.g., distance to retail stores, racial isolation). Forman et al. (2009) find evidence that the existence of a discount store or a large bookstore in a geographic location decreases the likelihood that a popular book will appear in Amazon's list of top 10 bestselling books for that geographic location.

Hypothesis 1: The number of purchases will be influenced by how distant the stores get from the predefined consumers' local region.

Hypothesis 2: Redemption rate will be influenced by how distant the stores get from the predefined consumers' local region.

Econometric Model and Results

We investigate the effect of the distance on the number of purchases. Through OLS, Poisson and negative binomial regression, we clarify the correlation between the dependent and independent variables with the control of consumer and product characteristics.

$$y_i = \beta_0 + X_i\beta_1 + Distance\ dummy + Control + \varepsilon_i \qquad (1)$$

where y_i is the dependent variable of the number of purchases of product i. Independent variables in the model are distances of product i, To see the distance effects in details, we add the dummy variables to discretize the influences of distances on the number of purchases. The distances are classified into 5 groups with the milestones of 1 km, 3 km, 10 km, and 50 km. Additionally, control variables for product and consumer characteristics are included such as discounted prices, preferred region, e-mail or SMS notification options, gender and ages. Time control variables for day and week, are also inserted.

To analyze how varied the redemption rates are with the change of the distances, we have the panel regression model at the product and data level. The fixed effects model is appropriate than the random effects model in that it requires many more assumptions which are unlikely to hold in this setting. The fixed effects model can be described as

$$y_{ij} = \beta_0 + X_{ij}\beta + Z_i y + \alpha_i + \varepsilon_{ij} \qquad (2)$$

where y_{ij} is the dependent variable of redemption rate, observed for each product i at date j. Z_i is the time-invariant regressor, and α_i is the unobserved individual effect. This is based on an assumption that α_i is not independent of X_{ij}, Z_i in that the redemptions are somehow affected by daily specific situations as well as the specific context of the redemption. Independent variables are percentage of discount of product i at the date j, logged averaged distances of product i at the date j, and validity period in days of product i at the date j.

Results and Discussion

With the equation (1), β measures how many purchases of product i increase as the distance increases. We first estimate Equation (1) and report findings in the econometric model in Table 1.

Table 1. Influence of Distance difference and Product and Consumer Characteristics on the Number of Purchases				
	OLS1	OLS2	Poisson	NBReg
Logged distance	7,430***		0.319***	0.294***
	(108)		(2.13E-05)	(0.002)
Dummy for 1 km to 3 km		1,574**		
		(753)		
Dummy for 3 km to 10 km		-8,185***		
		(708)		
Dummy for 10 km to 50 km		9,555***		
		(719)		
Dummy for farther than 50 km		33,640***		
		(805)		
Logged discounted price	-30,268***	-31,320***	-1.376***	-0.958***
	(198)	(197)	(0.001)	(0.001)
Days to the expiry date	-66.82***	-91.84***	0.00133***	0.00152***
	(3)	(3)	(0.001)	(0.001)
Discount rate	26,723***	26,434***	-0.554***	0.897***
	(2044)	(2022)	(0.001)	(0.001)
Age	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes
Area	Yes	Yes	Yes	Yes
Email/SMS notifications	Yes	Yes	Yes	Yes

Which day	Yes	Yes	Yes	Yes
Which week	Yes	Yes	Yes	Yes
Observations	117,548	117,548	117,548	117,548
R-squared	0.671	0.678		

Notes. Model 1 presents the coefficients from Equation (1) estimated using regression with control variables.
The dependent variable is the number of purchases observed for each product i. Standard errors are in parentheses.
**$p < 0.05$; ***$p < 0.01$.

With the result from the model 1, we cannot reject the hypothesis 1. The coefficients for logged distance are positively significant through the models. It can be inferred that consumers are less likely to care much about the distance to have good deals in daily deal site. Furthermore, consumers are willing to buy the coupons provided by the store farther than 50 km when we look at the coefficients for dummy variable in the (2) in table 1. The difference can be attributed to the likelihood that consumers in the daily deal web sites are willing to buy their coupons where they travel soon. Consumers may send the coupons to their remote parents and friends who are not able to access the daily deal site easily.

β in the equation (2) measures how quickly product i's redemption rate at the date j increases as the independent variables of distance difference and the number of days to expiry date increase. We report findings in the econometric model in Table 2.

Table 2. Influence of Distance difference and the Number of Days to Expiry Date on Redemption Rate		
	OLS	FE
Logged distance	-0.00904*** (0.001)	-0.00524*** (0.000)
Days to the expiry date	-0.00363*** (0.000)	-0.00815*** (0.001)
Gender	Yes	Yes
Which day	Yes	Yes
Which week	Yes	Yes
Observations	88,868	88,868
R-squared	0.534	0.815

Notes. Model 2 presents the coefficients from Equation (2) estimated using panel regression with fixed effects.
The dependent variable is redemption rate observed for each product i at date j. Standard errors are in parentheses.
**$p < 0.05$; ***$p < 0.01$.

The coefficients for logged distance and period to the expiry date in the OLS and the panel model with fixed effects are negative and statistically significant. With the result from the model 2, we can accept the hypothesis 2. The notable point for the negative coefficient for the distance is the sign in that the redemption rate decreases as the stores get distant from the predefined consumers' local region. Consumers may compete with a daily deal crowd when they redeem their daily deal coupons. It is also expected to be related with the situations that some of them should call many times before anyone picked up the phone to help schedule their reservations.

It is easily understood that the negative coefficient for period to the expiry date reflect the cases that consumers redeem online discount vouchers within the expiry date. For the expiry date, the legal issues arise as daily deal sites

create a sense of urgency among consumers to quickly purchase coupons for a short amount of time and consumers feel pressured and are rushed into buying the vouchers and become subject to the onerous sales conditions[1].

In this study, we find the evidence that consumers are less likely to care much about the distance to have good deal in daily deal site and consumers redeem the online discount vouchers of the remote places later on average. Our empirical results are significant and meaningful to understand new business model of daily deal web sites. There exist a number of other directions where this study could be extended. First, the data analysis can be expanded to cover longer period and wide range of products. Second, the extension to draw the managerial implications may well be explored. For instance, how different the redemptions are among the categories with the daily deal sites such as restaurant, café, travel services, beauty and spa and so forth? The impact of the communications through the mobile channel will be a nice area to explore in that the reminders through the mobile devices may help consumers decide to redeem their coupons.

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[1] Customers who bought Groupon vouchers before Dec. 1, 2011 can either redeem these past their expiration date or, if they are unable to do so, obtain a refund from the $8.5 million fund, according the proposed settlement filed March 29 in federal court in San Diego (Bloomberg, 2012).

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