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VALUE PROPOSITION AND SOCIAL PROOF IN ONLINE DEALS: HOW TO PREDICT SALES AND PICK WINNERS ON GROUPON

In this paper, we examine the role of value proposition and social proof on the success of localized online deals that are made available in coupon form. We develop a model to understand what factors affect coupon sales of a deal and conduct an empirical validation study on Groupon.com, the leading localized daily deal website. We find that both the value proposition and the level of social proof play an important role in demand generation for deals, and that our model can successfully predict future coupon sales. Based on our findings, we describe the implications of our prediction model which can be used as a decision support system for managers at social commerce firms. Our model allows managers to determine very early on which deals are most likely to succeed and which are likely to perform poorly, and take appropriate remedial action.

INTRODUCTION

A key concept in the study of social commerce is the notion of social proof, which arises when consumers use the shared experiences and actions of other consumers to infer a course of action [Rao et al. 2001, Amblee and Bui 2012]. Social proof, or informational social influence, has been shown to be a powerful signal of credibility, and can be determined from the actions of both strong-tie and weak-tie members. While it is widely accepted that information from strong-ties such as close Facebook and Twitter friends will be more influential on the consumer's buying decisions, such information is not as widely available as information from extremely weak-tie connections such as strangers with similar interests [Levin et al. 2004]. Much research is needed on the role of extremely weak-tie sources of information such as customer reviews and ratings, and the anonymous purchase patterns of other consumers via system-generated recommendations and popularity indices, to better understand the role of social proof in social commerce.

Whereas ecommerce initially saw a migration of customers from the offline or physical world to the virtual world, we are now witnessing a new trend where consumers straddle both worlds, as a slew of emerging social technologies allow the virtual and physical worlds to connect. The ubiquitous nature of the Internet as well as advances in mobile Internet technology via extensive data networks and powerful geolocation techniques has allowed for this connection to take hold. Moviegoers can now purchase movie tickets online and enter the theatre by displaying their virtual tickets on the screens of their mobile phones, while airline passengers purchase tickets online, and complete the boarding process by scanning their mobile phone screen displaying a boarding pass. This linking of interoperable worlds is not limited to services alone. Websites such as CouponSherpa.com allow consumers to download coupons for tangible products and redeem them at participating stores. Over the next decade, we can expect to see an

increasingly seamless integration of the virtual and physical worlds of commerce, as consumer and vendor confidence in such transaction increases, leading to widespread adoption.

To better understand this phenomenon, we conduct an exploratory study to examine the role of "deal-of-the-day" websites and their important role in the connections being made between the virtual and physical worlds of social commerce. These websites distinguish themselves from other ecommerce vendors by offering large discounts in order to clear excess or slow moving inventory. The main attraction to vendors is to use this discount as a marketing approach to get new customers to the store.

While a vast majority of these daily deal sites focus primary on goods that are shipped to the customer in the manner of traditional online shopping, we are interested in an emerging but fast growing category of websites that focus on discounting locally available goods and services. These sites have gained considerable popularity over the past few years, and the best known and most popular website in this category is Groupon.com. The firm has a 2012 market capitalization of USD 2.4 billion, with annual revenues of over USD 1.6 billion. Other popular sites include dealster.com and livingsocial.com

Groupon.com, which is an amalgamation of the words "group" and "coupon", offers prepaid coupons or deals on its website, targeted at a local market. Although classified as a "deal-of-the-day" site, the deals are available for about three days, in most cases. Deals only become active after a certain minimum threshold is crossed in terms of coupon purchases. It is akin to a reserve price in an auction, although instead of a minimum price, a minimum quantity has to be purchased, usually by several different customers, thereby introducing a social aspect to the purchase. In practice, this number is often quite low as many vendors are just trying out the concept. Coupons which are purchased through Groupon.com can be redeemed on location by presenting the bar code or identification number listed on the deal. While a printout of the deal receipt can be taken to the local vendor, dedicated applications on smart phones and POS integration have made redemption an entertaining and exciting process for consumers.

However, very little is known about which deals are successful, and which ones are not. There are several drivers of demand for deals, of which one group includes the price, face value of the coupon, percentage of discount, validity period and ease of redemption. Another group includes the number of customers who have already purchased the deal and the speed at which the deal is taken up by customers. We refer to the first group as the "value proposition" of the deal, and the second group of drivers as the level of "social proof" of the deal. While the value proposition is determined jointly by Groupon and the vendor, and is static by nature during the transaction process, the nature of social proof is somehow dynamically determined by anonymous customers (extremely weak-ties) through their purchasing actions. Unlike other leading ecommerce websites, the number of other customers who have already prepaid and purchased the coupon or deal is made available, which acts as a powerful socially-generated signal of credibility that encourages more customers to join the bandwagon and purchase the coupon. In this study, we seek to understand how value proposition and social proof help facilitate deal making and why some

deals are more successful than others. Our empirical research suggests that both the value proposition and the level of social proof can be used to estimate and forecast demand for the deal. Our results show that, out of the two set of demand drivers, social proof seems to be the strongest indicator of future coupon sales.

This paper is organized into six sections. The second section contains the relevant literature review and proposes seven hypotheses. Section 3 outlines an empirical study conducted to test the hypotheses, and the Section 4 provides the result. Discussion and implications of the research are provided in section 5 and 6. We conclude the paper with a description of the limitations of the study and direction for further research.

THEORETICAL FOUNDATIONS

Value Proposition of Coupons

The value proposition of a daily deal site involves providing a very attractive deal in coupon form to the customer by placing emphasis on heavy discounting. Localized online deals are most commonly provided in the form of coupons or vouchers, which are then redeemed locally on site. Coupons are "one of the oldest, most effective, and most widely used tools" to generate sales [1]. Coupons give consumers opportunities to obtain promoted products at reduced price, and as such, consumers who are price conscious and have the need for savings should be coupon users [2]. While coupons traditionally have been distributed through print media such as newspapers, leaflets and snail mail, online coupon distribution is now becoming a more preferred promotion method [3]. Research has shown that consumers react a little differently to online coupons compared to offline coupons, as they shift from being passive recipients to actively searching and obtaining coupons [4]. Consumers can acquire e-coupons more conveniently by visiting coupon related websites, and can also request email alerts so they are notified when coupons become available that match certain criteria such as brand, category, face value, etc are met [4]. Therefore, the expected redemption rate for an e-coupon should be higher than a traditional coupon.

Customers respond to coupons or deals due to two different underlying phenomena. The first is coupon proneness, where customers respond to the reduced price being offered [5]. Such customers are said to be coupon prone or deal prone. Deal proneness is defined as a tendency to respond to promotions primarily because they are in deal or coupon form. The second is value consciousness, where the customer responds to the increase in value present in the offer. Value consciousness is the consumer's overall assessment of the utility provided by the deal [5, 6]. Coupon proneness and value consciousness are distinct determinants of coupon redemption behavior [5]. While a coupon prone consumer may purchase something just because he/she has a coupon, a value conscious consumer is more concerned about the tradeoffs between quality and price.

Users of coupons are more price elastic than nonusers of coupons [7], and as such we expect the pricing of coupons on daily deal sites to have a significant impact on coupon sales. This will be especially true for deal prone customers. However coupon redemption rates also increase with larger coupon face values relative to the product price [8]. According to Bawa and Shoemaker (1987), this is because consumers with lower prior probability of purchasing the couponed brand increased their redemption rates when the coupon face value was also increased [9]. This finding suggests that as the coupon face value increases, value conscious consumers will be attracted to redeem the coupon. Similarly, Shoemaker and Tibrewla (1985) discover that the coupon face value impacted non-buyers and infrequent buyer of the brand more than regular buyer [10]. This is also confirmed by also Krishna and Shoemaker (1992), who observe that at higher face values the redeemer profile shifted toward non-buyers [11]. The more non-buyers who redeem the coupon, the greater the incremental sales generated per redemption. The reason is that high face values lead to higher redemption rates and attract more non-buyers of the brand relative to buyers. In addition, Bawa et al. (1997) find that consumers have price thresholds for discounts. It means that a consumer will make purchase on promotion only if the discount is above a certain level [12]. Therefore, the question remains of the optimal price discount in order to motivate consumers to act. In short, these studies have indicated redemption rates are significantly related to the coupon face value. These are value conscious customers.

Thus the value of a coupon is a tradeoff between the strength of the economic incentive offered by the coupon and the reduction in purchase intentions caused by a higher price [13]. Put differently, a higher coupon face value should provide a strong incentive to purchase the coupon by appealing to value conscious consumers, while a lower price should increase demand for the coupon from deal-prone customers. Most coupons offer price discounts, framed either in percentage or dollar amount terms [13], and either the higher the percentage discount or a higher the cents-off offered, the higher will be price expectation. We are interested in the role of value proposition on total sales of localized online coupons or deals. Therefore, we propose the following hypotheses:

H1: Coupon deals with a lower purchase price will lead to higher sales, and vice versa.

H2a: Coupon deals with a higher percentage face value will have higher sales, and vice versa.

H2b: Coupon deals with a cents-off higher face value will have higher sales, and vice versa.

An important factor in the value proposition of a coupon is the expiry date or validity period of the offer. It is understood that promotions are available only for a fix time period; otherwise such a promotion could be considered a price change. Inman and McAlister (1994) define the role of coupon expiration date as a means to limit their financial liability temporarily [14]. According to Inman et al. (1997), with a time limit on a promotion, marketers create a scarcity in the promotion which can potentially motivate consumer to

act [15]. By using regret theory, Inman and McAlister (1994) generate a prediction for the effect of an expiration date on coupon redemption [14]. They argue that if consumers anticipate their feelings of regret in missing an expired coupon's savings, the immediacy of anticipatory regret should increase as the coupon's expiration date get closer. Therefore, consumers may become increasingly likely to redeem the coupon when a coupon's expiration date gets close. This led Inman and McAlister (1994) to conclude that offers having a limited period of time for participation may have an increase in redemptions near the expiration date if consumers know about the expiration date. In addition, prior research has shown that coupon duration affects coupon profitability [16]. However, research on electronic coupons has shown that there is no significant effect of a coupon's expiry date on sales [17]. Unlike traditional coupons where the expiration date and validity period are the same, on localized daily deal sites, the two are distinct. The deal expiration date is the length of time that the coupon is available for purchase, while the validity period is the length of time by which the coupon can be redeemed on location by the customer. Therefore, we propose:

H3: Deals with longer expiry dates will have higher sales.

H4: As the expiry date approaches, there will be a spike in coupon sales.

H5: Coupons with longer validity periods will have higher sales.

The number of redemption locations might also affect the value proposition of the deal. Spikermann et al., (2011) found that the proximity of coupon delivery to the place of redemption has a significant impact on coupon success [18]. Chow-Wei (2004) argues that consumers may find it more costly and time consuming to redeem a coupon when the redemption location distance from the consumer's residence is longer [19]. In addition, Babakus et al. (1988) also posit that consumers whose time value is important are less likely to use coupon. Research on electronic coupons has shown that there is a significantly negative relationship between coupon redemption and the distance of consumers from the redemption location [17]. However, it is plausible to assume that having a larger number of redemption locations will help to abate the impact of distance, since an increase in locations also increases the chances of being closer to a redemption location. Therefore, we propose:

H6: A higher number of redemption locations will lead to higher sales.

We also expect the number of options or variations of the deal to increase overall demand for the deal, as an increase in the number of options will increase the likelihood of the potential customer finding an option that suits his or her wants. However, we also expect that the presence of an increasing number of options will reduce the sales of each individual option. Therefore we propose:

H7: A greater number of deal options will lead to higher sales.

The value proposition is static, in that the pricing and discounts available for a deal remain unchanged throughout the period that the deal is on offer. We now look at the role of social proof, which we expect to dynamically impact sales.

Social Ties and Social Proof

Social proof is the notion that people will be influenced by what others are doing and will mimic those actions as they tend to view the behavior as correct or appropriate for that situation, and an increase in the number of people engaging in a particular behavior, will cause decision makers to perceive the behavior or idea to be correct [20]. Therefore, social proof arises when consumers use information about the ways others have behaved to help them make a decision [21, 22]. According to Bonabeau (2004), people often imitate other rather than making decision by themselves when they face overwhelming information online, and the reasons for this include safety (risk reduction) and the belief that others know better [23]. Similarly, in Banerjee's (1992) model of herd behavior, each decision maker looks at the decisions made by previous decision makers in taking her own decision [24]. Herd behavior means that people will be doing what others are doing rather than using their own information. For example, when two restaurants are next to each other, customers often choose the one with more seats occupied [24]. Consistent with this view, Bikhchandani et al. (1992) also models the dynamics of imitative decision processes as informational cascades [25]. An informational cascade occurs when individuals observe the actions of those ahead and follow their behavior without regard to their own information. In the online context, Chen (2008) indicates that "the emergence of the Internet has made it important to understand the potential of online herd behavior in influencing consumer decisions" [26]. He examined herd behavior online book purchasing to improve understanding of how people make decision regarding online book purchases and found that the recommendations of other consumers was more influential on decision making recommendations of experts.

Social influence comes from two forms normative social influence (more commonly referred to as subjective norm) and informational social influence [27]. Normative social influence involves social pressure from colleagues, friends, etc. to conform to their expectations, while informational social influence involves accepting information from another person as evidence about reality [27, 28]. Bearden et al. (1989) indicates informational influence may occur in two ways [29]. Individuals may either search for information from knowledgeable others or make inferences based on the observation of the behavior of others. Additionally, in online environment, Lee et al. (2011) find that informational influence also affected consumer decision making and can be considered as process in which people determine the successful experience of their social group in using an innovation, before decide to adopt it [27]. In short, these types of social influences have been found to affect consumer decision making. The normative

social influence means that people are influenced by group compliance and the informational social influence indicated that people are influenced by knowledge and evidence.

The source of social proof can arise from actions of others who are well known to the customer (e.g., a trusted friend), or from the actions of complete strangers. The former is based on strong-tie relationships, while the latter is based on extremely weak-tie relationships. Tie strength is an indicator of the strength and quality of social relationships [30]. Strong ties are those which involve reciprocal behavior and emotional attachment, while extremely weak ties are those which have none of these characteristics [31]. Strong ties are considered to be trustworthy, while weak or extremely weak ties are usually considered less trustworthy, since the members of an extremely weak-tie network do not know one another. A weak social tie exists between two individuals who are not closely connected, such as casual acquaintances or even strangers loosely connected by some shared circumstance, while strong ties exists between family members or close friends who communicate frequently [32]. Granovetter (1973) finds that during purchasing, shoppers are much more influenced by individuals with whom they have strong ties [32]. Additionally, Brown and Reingen (1987) find that individual strong tie relationship interacts more frequently and exchange more information compared to those in a weak ties relationship and that information from strong ties (versus weak ties) are considered more influential on subsequent decision making [33]. However, Granovetter further posits that new information is mainly obtained from weak ties rather than strong ties and argues that since the actors of strong ties tend to interact frequently, a high share of the information circulating in this social system is redundant [32, 34]. Burt (1992) builds his argument on Granovetter's insight that weak ties are more likely than strong ties to act as bridges to novel or more timely information [35]. He indicates that weak ties will serve as conduits carrying more information that is likely to be unique and therefore more valuable because they tend to bridge to disconnected groups. Trustworthy sources are said to provide relational benefits in that they enable and enrich knowledge transfer. Tie strength on the other hand is a structural benefit allowing for the flow of knowledge. Strong-tie sources tend to be very trustworthy, but are not a good source of new information. Conversely, weak-ties are more likely to provide access to non-redundant information than strong-ties, but tend to be less trustworthy [36-38]. Thus, the most useful knowledge comes from trusted weak-ties, which provide both relational and structural benefits [38]. Social proof, especially in situations where payment has already been provided, such as prepaid coupons, carries both benefits, since it is usually comprised of a large weak-tie network that is trustworthy since members of this network have already paid for the product, which indicates full commitment to the course of action.

Research has shown that new mediums of communication that arise online allow previous unconnected members to communication and enhance weak-ties and weak-tie networks [39]. Thus we propose that localized daily deal sites that provide social proof information will generate a weak-tie network of customers who have purchased and are interesting in purchasing the same deal. Customers are expected to

be influenced by the purchasing decisions of others in the network, which should influence future purchases. Therefore we can use the level of social proof at a given time period to estimate total sales when the deal is closed. We expect both the number of deals purchased by past customers as well as the speed with which the purchases occur to influence potential customers. When the deal is launched and no sales have occurred, we expect the value proposition along with promotion to drive initial sales. Once initial sales have occurred and social proof has been generated, we expect social proof to become an increasingly important and dominant factor in driving additional sales till the deal is closed. As such we hypothesize:

H8: Initial sales acting as social proof will be positively correlated with final sales of the coupon deal.

H9: The speed at which a deal receives initial sales will be positively correlated with total coupon sales for the deal.

H10: As the level of social proof increases, the impact of other factors will diminish and measures of social proof will get more strongly associated with total coupon sales.

EMPIRICAL STUDY

To test our hypotheses on the role of value proposition and social proof on sales of coupons from daily deal sites, we conducted an empirical study on coupon sales at Groupon.com. Specifically, this study focuses on Groupon's Honolulu division and the deals offered in the Honolulu region. By focusing on a single Groupon division, in a confined location, and where two of the authors are situated, we are better able to isolate and understand the underlying dynamics involved [40].

Research Setting and Data Collection

We conducted a longitudinal study of all the deals that were offered in Honolulu over a 6 month period, in order to understand the purchasing and growth patterns of the deals. We developed a custom software program to interface with the firm's API and collect data on all deals offered in the Honolulu location from February 2012 to August 2012. The data was collected on the hour, every hour, for a two-month period, providing us with a rich dataset on 654 deals. We only include deals for which we have complete data from the start of the deal to expiration. This eliminated approximately half of all the deals, owing to the fact that these were primary travel and online deals that spanned Groupon divisions across the United States. Since these deals often started before they were introduced in Honolulu, and involved a larger national market, we do not include these deals in our study. We then eliminate deals which were 48 hours or shorter in duration, since they represented a very small number of the deals and could have biased our model. We also remove deals for which the number of coupon sales after approximately 2 to 3 hours represent more than 10% of final sales, in order to test the usefulness of the model. Finally we remove

deals with data collection errors or a large number of missing values[1]. We end up with 269 deals which meet all our criteria for this study.

Measures

In the context of this research, and to the customer, the value proposition can be composed of all the benefits that the merchant promises. To measure the value proposition of the deal, we collect information on the price of the coupon (PRICE), and to measure the face value of the coupon, we measure the percentage of discount offered via the coupon (PERCENT), and the "cents off" value of the coupon – the dollars saved by redeeming the coupon (CENTSOFF). We also record the validity period to redeem the coupon (VALIDITY), the number of redemption locations (LOCATIONS), and the total number of coupons sold when the deal is closed (TOTALSALES). Many deals have more than one option – different coupons for variations of the same deal (see Figure 2), and we keep track of the number of options available per deal (NUMOPTIONS). We also record the duration that the deal is available before it expires (DEALEXPIRY). We perform a log transformation on the price (LNPRICE), the validity (LNVALIDITY), the face value of the coupon (LNPERCENT, LNCENTSOFF), the deal duration (LNDEALEXPIRY), and total sales (LNTOTALSALES).

We use Cialdini's principle of social proof: In consumers' minds, to determine what is correct is to find out what other people think is correct [41]. In this context, by observing that others have purchased a product or service, the customer assumes that she would be less likely to make a mistake. We thus measure social proof on the dimensions of quantity sold and the speed at which the deal is activated. To measure social proof on quantity, we record the number of coupons sold after a very 3 hours since the launch of the deal (EARLYSALES$_t$), for approximately 24 hours[2] from launch. We also calculate the total coupon sales remaining to be accounted for, by subtracting EARLYSALES$_t$ from TOTALSALES$_t$ to achieve REMAININGSALES$_t$. As mentioned earlier, Groupon uses a mechanism called a tipping point, whereby a deal is only active when a certain minimum number of coupon sales have been achieved, although this number is often quite low, usually requiring just a single sale. To measure social proof on the dimension of time, we record the amount of time in hours from the launch of the deal until it "tips over" (TIMETOTIP$_t$). We then perform a log transformation on the data (LNEARLYSALES$_t$, LNTIMETOTIP$_t$, LNREMAININGSALES).

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[1] We continue to include deals where although the API sometimes provides inconsistent or missing data, there is enough information for the deal to be included in our study.

[2] The Groupon database seems to update deal information every 24 hours, as we consistently get missing data from the API at exactly the 24 hour mark. Therefore in our study, instead of 24 hours we use data from 25 hours after deal launch.
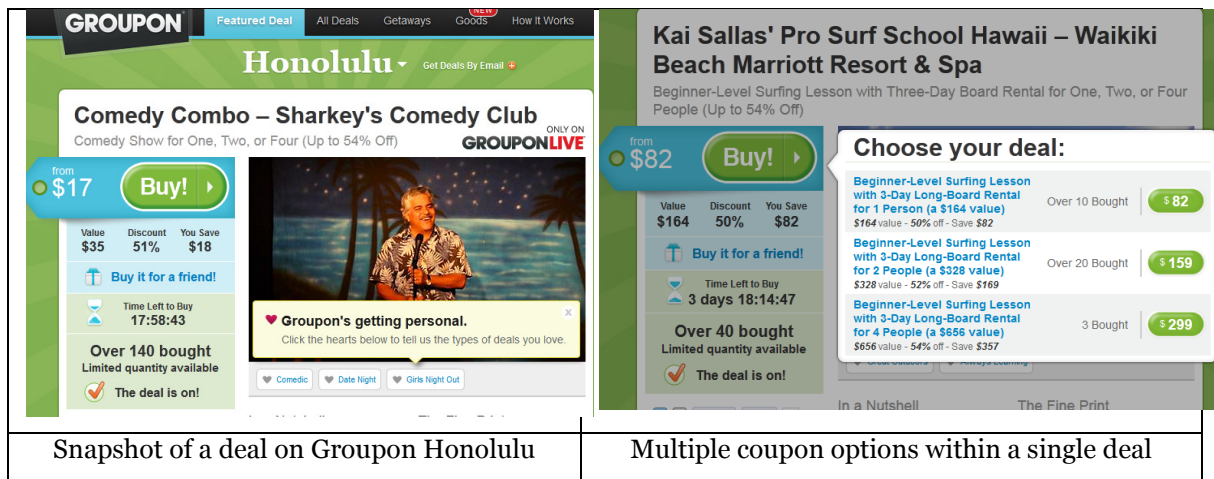
| Snapshot of a deal on Groupon Honolulu | Multiple coupon options within a single deal |

Figure 1:Groupon Deals

We also collect information on the competitive environment and the role of promotion of certain deals on the Groupon Honolulu website. Groupon places a selection of deals on the homepage of each division (Honolulu, San Francisco, Chicago, etc), and the selection size depends on the size of the local market. There is a degree of fluctuation in the size of the selection, which is expected to influence sales of each deal, as the level of competition that each deal faces from other deals in the same division will also fluctuate. Therefore we record the number of competing deals (selection size) that a deal faces upon launch (COMPETITION) and perform a log transformation on this data (LNCOMPETITION).

Table X. Legend of variables used in the analysis

Variable	Measure of:
LNTOTALSALES	Total coupon sales for a deal
LNPRICE	Price of the coupon in US dollars
LNCENTSOFF	Face value of the coupon in terms of cents-off
PERCENT	Percentage of discount provided by the coupon
DEALEXPIRY	Number of hours that the deal is active and available for purchase
LNVALIDITY	The validity period of the coupon measured in days
LOCATIONS	Number of redemption locations for the deal
$LNEARLYSALES_t$	Total number of coupons sold approximately every 2 hours after the deal is launched
$LNREMAININGSALES_t$	Total coupon sales remaining to be accounted for at any given point of time
$LNTIMETOTIP_t$	Number of hours for the deal to tip over, recalculated periodically at the same time as LNEARLYSALES
NUMOPTIONS	Number of options within the deal
PROMOTION	Ranking of the deal on the Groupon Honolulu homepage at launch
LNCOMPETITION	Number of competing deals on Groupon Honolulu

Groupon also promotes one deal prominently at a time, and this deal is provided with a disproportionately large amount of space on the homepage. The competing deals are listed on the side, and can be accessed with a click. To measure promotion, we rank the deals on prominence and order of appearance on the page. Thus the promoted deal receives a rank of 1, and the remaining deals are ranked from 2 to n. We then record this rank (PROMOTION) as a measure of promotion.

Finally we classify deals into their categories as defined by Groupon, by providing a dummy variable for each category. The deal categories include Arts & Entertainment, Automotive, Beauty & Spas, Education, Food & Drink, Home Services, Professional Services, Restaurants, Shopping and Travel. We subsumed the Nightlife category, which had only 3 deals, into the Arts & Entertainment and Restaurants categories.

RESULTS AND ANALYSIS

Summary Statistics

Table 2 displays the summary statistics for the sample data used in this study. The median for total coupon sales per deal is 120 coupons, and deals were priced at a median price of $39, being discounted at a median rate of 52%. The most expensive deal was priced at $2799 and the highest discount rate was 95%. The average revenue per deal was $9678.58. The number of redemption locations varied from 0 to 7, with 0 representing an online only deal. The median number of options per deal is 2, although some deals have as many as 6 options. The median length of time that a coupon was available for purchase is 96 hours, and the deals were on average valid for 183 days (6 months). On average each deal went up against 12[3] other competing deals at any given time, and most deal were promoted in turn by Groupon on the homepage (median=1). The deals took on average of about four and a half hours to "tip over" and become active, and early sales were on average quite low after a few hours (average of less than 2 in the first 3 hours), but increased rapidly as the deal aged (average of 35 after about 9 hours and 113 in about one day after launch).

Table X. Key summary statistics for sample of deals

	N	Mean	Median	SD	Min	Max
TOTALSALES	269	$237.88	$120.00	$274.77	$0.00	$1000.00
TOTALREVENUE	269	$9678.58	$4900.00	$15689.15	$0.00	$139950.00
PRICE	269	$98.03	$39.00	$322.70	$1.00	$2799.00
CENTSOFF	269	$239.32	$100.00	$709.10	$10.00	$5955.00
PERCENT	269	57.53	52.00	10.70	36.00	95.00
LOCATIONS	269	0.91	1.00	0.70	0.00	7.00
NUMOPTIONS	269	2.00	2.00	0.88	1.00	6.00
DEALEXPIRY	269	102.16	96.00	27.63	72.00	192.00
VALIDITY	269	190.10	183.00	119.77	1.00	1637.00
EARLYSALES$_3$	269	1.66	1.00	1.98	0.00	11.00
EARLYSALES$_6$	269	5.54	1.00	11.70	0.00	110.00
EARLYSALES$_9$	267	35.09	10.00	72.20	0.00	480.00
EARLYSALES$_{12}$	269	65.29	20.00	125.01	0.00	860.00
EARLYSALES$_{15}$	269	81.31	30.00	148.39	0.00	1000.00
EARLYSALES$_{18}$	268	94.21	35.00	163.41	0.00	1000.00

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[3] We subtract 1 from COMPETITION which measures the competition set, and includes the deal in question.

EARLYSALES₂₁	269	103.59	40.00	173.10	0.00	1000.00
EARLYSALES₂₅	268	112.91	50.00	187.54	0.00	1000.00
TIMETOTIP₃	269	60.35	72.00	57.07	0.02	192.00
TIMETOTIP₆	269	30.81	4.32	50.76	0.02	192.00
TIMETOTIP₉	269	7.98	4.32	22.63	0.02	168.00
TIMETOTIP₁₂	269	6.17	4.32	16.12	0.02	144.00
TIMETOTIP₁₅	269	6.17	4.32	16.12	0.02	144.00
TIMETOTIP₁₈	268	6.17	4.28	16.15	0.02	144.00
TIMETOTIP₂₁	268	6.17	4.28	16.15	0.02	144.00
TIMETOTIP₂₅	268	6.17	4.28	16.15	0.02	144.00
TIMETOTIP_TRUE	269	4.54	4.25	7.40	0.02	72.00
PROMOTION	269	2.00	1.00	2.24	1.00	14.00
COMPETITION	269	13.36	13.00	2.14	8.00	19.00

Model Testing

To examine the impact of value proposition and social proof on total coupon sales, we estimate the following model:

$$LNTOTALSALES_{(t)} = CONST + b_1 LNPRICE + b_2 LNCENTSOFF + b_3 LNPERCENT + b_4 LOCATIONS$$
$$+ b_5 NUMOPTIONS + b_6 LNDEALEXPIRY + b_7 LNVALIDITY + b_8 LNEARLYSALES_{(t)} +$$
$$b_9 LNTIMETOTIP_{(t)} + b_{10} PROMOTION + b_{11} LNCOMPETITION + DEALCATEGORY + ERROR$$

We test the model using social proof data from various points in time of the duration of the deal, and find that with the passage of time, the model rapidly increases its explanatory power. We test for t=3, 6, 9, 12, 15, 18, 21 and 25 hours. (We use 25 hours instead of 24 since we have missing data at the 24 hour interval period.) The results of the regressions are shown in Table 3. When we test the model at the launch of a deal, when measures of social proof are non-existent, our model shows that price is inversely correlated with total coupon sales, thereby confirming hypothesis H1. We do not include both measures of face value along with the price in our model, since we find an almost perfect correlation between the price and the cents-off face value of the coupon (r=0.94), and including both simultaneously would lead to severe multicollinearity issues. We include the percentage-off value of the coupon and find that there is no significant relationship between the advertised discount percentage (PERCENT) and the total number of coupons sold. When we run a variation of the model excluding price and including the cents-off face value (CENTSOFF), we find that the advertised discount percentage has the expected positive relationship with total coupon sales. We only display the results of this model for t=0,3,12,25 hours for the sake of brevity. The cents-off amount also shows a strong inverse relationship with coupon sales, which is the opposite of what is hypothesized. We attribute this to the near perfect correlation between LNPRICE and CENTSOFF. A closer inspection shows that there is very limited variance in the discount

percentage across deals (see Figure 3). Nearly half of all deals are discounted at 50% or 51%, and nearly two-thirds discounted between 50% and 57%. Thus while the rate of discount is almost certainly a significant factor in the consumer's decision, it is not a factor in differentiating sales *between* deals, which are all heavily and similarly discounted. This occurs because Groupon handpicks their deals, leading to a certain level of conformity. This also explains why the cents-off value of the coupon shows an inverse relationship, and establishes that price a much more important factor than the face-value of the coupon. Thus we accept hypothesis H2a and reject hypothesis H2b.

We find a positive relationship between the length of time that a deal is available for purchase (LNDEALEXPIRY) and total coupon sales. The result holds consistently as the deal ages, and suggests that the longer a deal is available online, the greater the total number of coupons sold, confirming hypothesis H3. This is an intuitive result, as it gives potential customers more time to evaluate and purchase the deal. To determine if there is a spike in coupon sales towards the end of the deal purchase period, we compare average sales over the last 4 hours with the overall hourly coupon sales rate. After conducting a paired-samples t-test, we find no significant difference between the average hourly rate of coupon sales over the deal period ($\mu=2.30$, $\sigma=2.82$) and over the last 4 hours before the deal expires ($\mu=2.34$, $\sigma=4.23$). We conclude that there is no spike in coupon sales when the deal is close to expiry, and we reject hypothesis H4. To better understand this finding, we chart the fraction of overall sales at a given point it time against the average sales at that point in time. We chart this relationship for various deal availability periods (3, 4, 5, 6, 7 and 8-day deals), and the charts are shown in Figure X. The charts clearly show that towards the end of the deal availability period there is little difference between the overall fraction of sales and the average fraction of sales as the two lines overlap. This indicates that there is no spike or drop in sales towards the very end of a deal's availability period. The only exception to this is the chart for coupon deals that are available for 8 days on the website. Here we see an initial spike in sales followed by a long lull, after which sales picks up again before the deal closes. However, in our sample set, there are only 4 deals that fall into this category, and as such we do not find any statistically significant results.

We do not find a relationship between the validity and redemption period of the coupon (LNVALIDITY) and total coupon sales when all coupons are included. Further analysis shows that coupons are valid for an average of 6 months and over 90% of all coupons are valid for at least 3 months, which likely gives interested deal seekers enough time to redeem the coupon at the time of their choosing, thereby leading to a non-significant relationship between the coupon validity period and total sales. To test this explanation, we select coupons with validity periods of fewer than 6 months (180 days or less) and test our regression model (excluding social proof factors). We now find a modest positive relationship between the validity period and total coupon sales (ß=0.183, p<0.10), thereby lending support to our explanation. Therefore we partially accept hypothesis H4 with the caveat that it holds for coupons with shorter validity periods.

However as the deal ages, we see an interesting effect. Regardless of the length of the validity period, we see that after about 12 hours from launch, total coupon sales (both overall and remaining sales) start to show a negative relationship between the validity period and coupon sales. This implies that deals that are valid for a shorter period of time, and should theoretically be valued less by the customer, actual sell better after a few hours. We explore this result further in the discussion section.

We find a positive relationship between the number of redemption locations for a deal (LOCATIONS) and total coupon sales. However on further analysis we find that the LOCATIONS effect arises from the presence of some online only deals which do not include a redemption location. When online deals are excluded, we do not find a significant relationship between the number of locations and sales when price is included, but we do find a weaker relationship when the cents-off face value is included. We attribute this erratic finding to the fact that there is limited variability in the number of redemption locations (only about 5% of deals have more than one redemption location), owing to the fact that the research setting – Groupon Honolulu – inherently involves fewer redemption spots owing to its location on an isolated island archipelago. In addition, Honolulu is a concentrated metropolitan area located on a relative compact island, and as such, a very small number of redemption locations will still reach a majority of local customers. As the deal ages, the impact of the number of locations diminishes quickly and becomes non-significant in predicting total sales. Therefore we partially accept hypothesis H6.

To test hypothesis H7 we look at the role of the number of options contained within the deal (NUMOPTIONS), and find an inverse relationship between NUMOPTIONS and total coupon sales, leading us to speculate that rather than stimulating demand for coupons, an increasing number of options might have caused the number of coupons sold to spread over the various options, and within these options, reduced the social proof of each individual option, thereby harming sales.

Table X. Regression Results (LNTOTALSALES)

	INITIAL	INITIAL	3 HR T	3HR T	6 HR T	9 HR T	12 HR T	12 HR T	15 HR T	18 HR T	21 HR T	25 HR T	25 HR T
LNPRICE	-.567***		-.373***		-.257***	-.137***	-.087***		-.057**	-.053*	-.040	-.034	
LNCENTSOFF		-.622***		-.412***				-.105***					-.045*
LNPERCENT	-.033	.174***	-.033	.104**	-.026	.008	.031	.065**	.041*	.039*	.037*	.024	.039*
LOCATIONS	.113**	.129**	.111**	.121***	.082**	.028	.015	.019	.013	.012	.010	.003	.005
NUMOPTIONS	-.127**	-.139***	-.109**	-.117**	-.068*	-.050*	-.053**	-.056**	-.026	-.024	-.014	-.015	-.017
LNDEALEXPIRY	.216***	.216***	.172***	.173***	.108**	.136***	.121***	.123***	.104***	.106***	.097***	.108***	.111***
LNVALIDITY	.022	.017	-.023	-.026	-.022	-.035	-.050**	-.050**	-.048**	-.054***	-.048***	-.053***	-.053***
PROMOTION	-.290***	-.297***	-.205***	-.211***	-.102**	-.070*	.026	.022	.007	.004	.010	.006	.004
LNCOMPETITION	.000	-.001	.014	.013	-.041	.019	.021	.020	.009	.026	.034*	.029*	.029*
Automotive	-.012	-.017	.001	-.003	.039	-.023	-.039*	-.040*	-.035	-.033	-.035*	-.034*	-.035*
Beauty & Spas	.023	.012	-.046	-.052	.031	-.035	-.084***	-.084***	-.071***	-.070***	-.073***	-.065***	-.064***
Education	-.137**	-.122**	-.092*	-.082*	-.013	.013	-.006	-.003	-.018	.003	-.005	-.007	-.006
Food & Drink	-.011	-.011	.021	.021	.024	.012	-.036	-.036	-.038*	-.031	-.028	-.029	-.029
Health & Fitness	-.063	-.075	-.039	-.046	.039	-.029	-.074**	-.074***	-.072***	-.066***	-.063***	-.061***	-.061***
Home Services	-.094*	-.092*	-.057	-.056	-.013	-.032	-.054**	-.054**	-.039*	-.030	-.027	-.029	-.029
Professional Services	-.122**	-.130**	-.124**	-.129***	-.047	-.055*	-.060**	-.061**	-.053**	-.039*	-.039*	-.036*	-.036*
Restaurants	.068	.064	-.170***	-.171***	-.138***	-.144***	-.147***	-.148***	-.128***	-.122***	-.118***	-.111***	-.111***
Shopping	-.126**	-.129**	-.105**	-.107**	-.050	-.110***	-.103***	-.104***	-.069***	-.066***	-.058***	-.048**	-.049**
Travel	-.029	-.023	-.061	-.057	-.029	-.037	.006	.008	.017	.012	-.024	-.031*	-.030*
LNEARLYSALES$_t$			.368***	.364***	.539***	.831***	.959***	.956***	.965***	.978***	.978***	.985***	.982***
LNTIMETOTIP$_t$			-.262***	-.261***	-.244***	-.074*	-.020	-.018	-.021	-.018	-.031	-.022	-.021
Model Fit F-value	9.82	10.06	16.98	17.17	25.99	54.41	96.74	95.59	111.53	123.67	151.65	158.90	159.50
Adjusted R²	0.372	0.378	0.544	0.547	0.651	0.799	0.877	0.878	0.892	0.902	0.919	0.922	0.922
% of overall sales			0.018	0.018	0.029	0.113	0.212	0.212	0.267	0.316	0.354	0.387	0.387
N	269	269	269	269	269	269	269	269	269	268	268	268	268

Social proof, as measured by the number of coupons sold over several time periods following the launch of the deal (LNEARLYSALES$_t$), is strongly related to total coupon sales when the deal is closed. As the deal ages and social proof builds in the form of increased coupon sales, the association between early sales and final sales increases at a rapid pace, until it quickly overwhelms all other predictors in the model. The strong link between early sales and final sales allows us to predict final sales very quickly to a very high degree of accuracy. Within 3 hours of the deal being launched, our model can explain half the variance in final coupon sales, and two-thirds of the variance in 6 hours. In 9 hours time, the explanatory power of the model rises to 0.80, and in about 24 hours, the model R^2 rises to over 90%. Therefore we accept hypothesis H8. We also find a strong inverse relationship between the time for a deal to "tip over" or activate (LNTIMETOTIP) and total coupon sales, although this effect starts to diminish and disappears after about 9 hours following the deal launch. Deals tend to tip quickly, taking on average of about 4.5 hours to activate. The sooner a deal is activated, the greater the total coupon sales for that deal, supporting hypothesis H9.

As social proof mounts with the passage of time, the impact of the remaining factors on future sales starts to vary, and the measures of the value proposition generally start to lose their explanatory power within the overall model. When there is no social proof, the price is negatively related to final sales. However as social proof indicated by early sales increases as the deal ages, the impact of price on final sales diminishes. The impact of the number of locations, number of options, deal duration, and promotion all dip and become nonexistent after about 10 to 15 hours following the launch of the deal. While these factors no doubt continue to influence consumers' decisions, their role in explaining total sales diminishes as this role is taken up the indicators of social proof. To see if the influence of these factors is indeed diminished, we remove early coupon sales from total coupon sales, which could otherwise be confounding the results[4]. Thus, we substitute total coupon sales with remaining coupon sales and test the following model:

LNREMAININGSALES$_t$ = CONST + b$_1$LNPRICE + b$_2$LNCENTSOFF + b$_3$LNPERCENT + b$_4$LOCATIONS +b$_5$NUMOPTIONS + b$_6$LNDEALEXPIRY + b$_7$LNVALIDITY + b$_8$LNEARLYSALES$_{(t)}$ + b$_9$LNTIMETOTIP$_{(t)}$ + b$_{10}$PROMOTION + b$_{11}$LNCOMPETITION + DEALCATEGORY + ERROR

The results for the second model show that indicators of social proof continue to be able to explain a significant portion of later sales and the impact of the measures of value proposition continue to diminish with time. Thus hypothesis H10 is supported. The explanatory power of both models are charted in Figure X. We see that there is a consistent and stable relationship between both models, and this lends further support to our findings.

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[4] We use LNREMAININGSALES since an ever greater portion of the dependent variable LNTOTALSALES is comprised of a single independent variable EARLYSALES$_t$ as the deal ages.

Table X. Regression Results (LNREMAININGSALES$_t$)

	INITIAL	INITIAL	3 HR	3 HR	6 HR	9 HR	12 HR	12 HR	15 HR	18 HR	21 HR	25 HR	25 HR
LNPRICE	-.567***		-.295***		-.173***	-.092**	-.069*		-.032	-.019	-.012	-.012	
LNCENTSOFF		-.622***		-.326***				-.081*					-.018
LNPERCENT	-.033	.174***	-.051	.061	-.046	-.007	.013	.040	.032	.029	.039	.021	.027
LOCATIONS	.113**	.129**	.114**	.123***	.086**	.034	.021	.023	.019	.014	.016	.006	.007
NUMOPTIONS	-.127**	-.139***	-.092**	-.099**	-.048	-.038	-.054*	-.056*	-.025	-.031	-.009	-.018	-.019
LNDEALEXPIRY	.216***	.216***	.106*	.108*	.037	.094**	.095**	.097**	.071*	.078*	.106***	.127***	.128***
LNVALIDITY	.022	.017	-.029	-.031	-.030	-.043	-.059**	-.059**	-.060**	-.078**	-.073**	-.083**	-.083**
PROMOTION	-.290***	-.297***	-.175***	-.180***	-.064	-.049	.051	.049	.036	.039	.038	.032	.030
LNCOMPETITION	.000	-.001	.003	.003	-.054	.015	.020	.020	.012	.015	.042	.033	.033
Automotive	-.012	-.017	-.002	-.006	.037	-.032	-.056*	-.056*	-.054*	-.050	-.060**	-.056*	-.056*
Beauty & Spas	.023	.012	-.059	-.064	.021	-.050	-.122***	-.122***	-.113***	-.119***	-.122***	-.109***	-.109***
Education	-.137**	-.122**	-.097**	-.090*	-.014	.010	-.017	-.015	-.033	.003	-.006	-.008	-.007
Food & Drink	-.011	-.011	.027	.027	.030	.015	-.044	-.044	-.054*	-.046	-.043	-.047	-.048
Health & Fitness	-.063	-.075	-.051	-.059	.029	-.044	-.098**	-.099***	-.109***	-.103***	-.100***	-.098**	-.098**
Home Services	-.094*	-.092*	-.061	-.060	-.015	-.039	-.088***	-.088***	-.079**	-.066**	-.061**	-.074**	-.074**
Professional Services	-.122**	-.130**	-.130**	-.135***	-.049	-.062*	-.076**	-.077**	-.075**	-.052	-.057*	-.051	-.051
Restaurants	.068	.064	-.128**	-.128**	-.104**	-.151***	-.226***	-.227***	-.220***	-.197***	-.172***	-.186***	-.186***
Shopping	-.126**	-.129**	-.103**	-.104**	-.046	-.126***	-.137***	-.137***	-.104***	-.101***	-.089**	-.073*	-.074*
Travel	-.029	-.023	-.016	-.017	.018	.000	.044	.044	.055*	.052*	.003	-.008	-.008
LNEARLYSALES$_t$			.366***	.363***	.551***	.833***	.932***	.930***	.932***	.939***	.942***	.922***	.921***
LNTIMETOTIP$_t$			-.282***	-.281***	-.259***	-.073*	-.038	-.037	-.023	-.025	-.034	-.026	-.025
Model Fit F-value	9.82	10.06	15.56	15.55	24.32	41.57	50.90	50.99	47.04	46.41	52.06	40.83	40.84
Adjusted R²	0.372	0.378	0.523	0.522	0.637	0.753	0.790	0.790	0.777	0.776	0.796	0.754	0.754
N	269	269	267	267	267	267	267	267	266	263	262	261	261

We find an inverse relationship between PROMOTION and total coupon sales. This suggests that being promoted prominently on the Groupon Honolulu homepage improves the overall sales of the deal[5]. Finally we do not find a relationship between COMPETITION and total coupon sales. One possible explanation for this lack of relationship is that there is limited variability in the number of deals running at any given time on the Groupon Honolulu site, which ranges from 8 to 19 deals, with an average of only 13 deals running at any given time in this division. Of these, two-thirds face a competition of between 11 and 14 other deals, reducing the likelihood of finding a competition effect.

Finally, the category that the deal belongs to is also very important as Bawa et al. (1997) argue, stating that a consumer may be inclined to use coupons but exhibit low coupon usage if she or he fails to find coupons that are sufficiently attractive. Thus, failure to include coupon attractiveness as a predictor of coupon usage can lead to an inaccurate assessment of coupon proneness and an inability to predict how the consumer would respond to coupons with different set of characteristics [12]. We keep track of the category of the deal and our results show that certain deal categories (DEALCATEGORY[6]) have more sales than other categories. We use the Arts and Entertainment category as the base against which to measure the success of other categories, as it has the most number of deals. We find that in general, deal in the Arts and Entertainment category fare a little better than deals in Beauty & Spas, Education, Health & Fitness, Home Services, Professional Services, Restaurants and Shopping categories.

DISCUSSION

We have successfully developed and tested a model to forecast coupon sales for localized online deals, using the deal's value proposition and the social proof generated by other customers. We were able to explain 40% of the variance in total coupon sales with our model using the value proposition alone. When social proof information does become available, it immediately starts to improve the explanatory power of the model. Within 3 hours of the deal being launched, the social proof information gained from early sales allows the model to explain half of the variance (adjusted $R^2=0.507$) in the final sales figures. After 6 hours, the increased social proof information increases the explanatory power significantly (adjusted $R^2=0.651$), and after one day, the adjusted R^2 rises to 0922. Thus within a few hours of the deal being launched on the website, the final sales of coupons of the deal can be predicted with a high level of accuracy. After 6 hours, the standardized beta score for LNEARLYSALES is also the highest among all the independent variables, and continues to increase in strength, implying that social proof strongly

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[5] The standardized beta is negative since PROMOTION is a rank order measure.

[6] DEALCATEGORY is measured by 10 binary-coded dummy variables.

influences consumer decisions. Given that the data was filtered to only include those deals for which sales after a few hours accounted for less than 10% of overall sales, our model demonstrates considerable predictive capabilities.

Our findings seem to indicate that the customers on Groupon.com are driven more by coupon-proneness (or deal-proneness) rather that value consciousness, as price shows a strong inverse relationship to total coupons sold, while the face value of the coupon does not show the expected relationship. This finding lends support to Groupon.com's marketing strategy to its suppliers or vendors. On Groupon's vendor information website (grouponworks.com/why-groupon), the leading daily deal website claims that "the subscribers are not looking for the perfect deal…but rather looking for the perfect excuse to try something new." Our finding seems to confirm this, since we find customers to be deal-prone but not value conscious. However, owing to the lack of variability in the discount percentage, and the almost perfect correlation between price and the face value of the coupon, we refrain from generalizing this lack of value consciousness to all daily deal sites. Indeed, the deals that are available for 8 days (192 hours) all have a high price and high cents-off face value, indicating that value consciousness drives sales of these coupons, although the number of deals (4) were too few to provide any statistically significant insights. Thus it is more probable that value consciousness exists, but that it is not discernable from our sample.

While we found that deals available for a longer period of time on the website did indeed receive greater sales, we did not find the expected spike in sales towards the end of the deal period. By visually examining the charts we found that there was a statistically non-significant spike for the 4 deals that were available for an 8-day period. Closer inspection of these 4 deals shows that these are the most expensive deals listed, with a price ranging from $1999 to $2799. The purchasers of these deals are almost certainly value conscious coupon buyers, since the prices are too high for sales to be driven purely by coupon proneness. These higher price ranges would explain the long lull, during which value conscious buyers likely evaluated the deal thoroughly before finally deciding to make the purchase, resulting in the visual spike in the chart towards the end of the deal (although not statistically significant, likely due to the small sample size).

We find that for deals with a validity period of 180 days or less, a longer validity period is associated with increased coupon sales. However, we examined a dual or split coupon redemption process where the coupon is purchased, akin to a voucher, and is then redeemed elsewhere within the validity period. Thus the deal expiry period and the coupon validity period are distinct factors impacting coupon sales. Our finding that a longer deal expiry or availability period leads to greater sales would imply that extending the deal duration for coupons. However, prolonging the deal availability period comes with a cost, in that it takes up the slot of another deal. A greater implication to managers is the positive association between

the validity period and total coupon sales for coupons whose validity period is less than 180 days. For these coupons, a longer validity period leads to greater sales, yet does not take up valuable space on the website once the deal has expired. Therefore management could increase sales by negotiating a longer redemption period (greater than 180 days), without hurting other deals on the site.

However we also had a counterintuitive result after about 12 hours, where the validity period of the deal shows a negative relationship with later coupon sales, regardless of the length of the validity period. The fact that this occurs when considerable social proof has built up, implies that at this point of the deal's life, there is a shift from one's own private valuation of the deal (where a longer validity period is preferred) to accepting the group or social valuation of the deal (measured by social proof), where a shorter validity period and increased demand implies scarcity and value. Thus at this stage, a deal that is becomes invalid sooner is perceived to have more value than one that has a longer validity period, since it is more scarce. We can also tentatively conclude that there is a shift from a rational value proposition based decision-making process to a more irrational herd mentality decision-making based on social proof. This effect is similar to those predicted by the models proposed by Banerjee (1992) and Bikhchandani et al. (1992) on herding and information cascades.

The number of redemption locations has a mild positive relationship with overall sales, as a larger number of redemption locations increase the chance of a fit with the customers' localized needs and availability. "Online only" deals, which account for about 20% of all deals, were coded as having no local redemption locations, and these deals do not fare as well on account of the inability of a consumer to locally redeem the coupon at the time of their choosing. Thus we recommend that daily deal sites work with firms with a greater number of redemption locations, although this would reduce the novelty factor of the deal, since it is unlikely that boutique stores will have multiple locations.

The number of options or variations within a deal has an unexpected negative relationship with total coupon sales (across options). This implies that rather than helping overall coupon sales by finding a better fit between the customer's needs and availability, the number of deal options is reducing overall sales. We speculative that this is due to the impact of social proof being diluted, as the total number of coupons sold for each option is a fraction of overall sales, and the impact on the customer is reduced.

The most interesting findings are those pertaining to the role of social proof in creating demand for deals. By making sales information openly and prominently available, our findings indicate that Groupon is able to generate sales by providing social proof to potential customers. A deal that tips quickly and has good early sales is likely to instill confidence in others and lead to higher sales. Given the strength of the standardized coefficients for social proof, which are higher than those for price as well as active

promotion on the homepage after just a few hours, the implication is that social proof is a very significant factor in generating and sustaining online coupon sales.

The findings of this study indicate that coupon redemption behavior is being fundamentally altered with the introduction of social proof indicators, which did not exist in the case of traditional print media based coupons. When presented with coupons, the question that the customer asks herself has changed from "Do I think this coupon is a good deal?" to "Do others think this coupon is a good deal?", and this shift has significant implications for stakeholders in the coupon business.

LIMITATIONS AND FUTURE RESEARCH

Our study has several limitations and caveats that need to be taken into account before generalizing the findings. While Groupon.com is the largest and most popular daily deal site at the moment, it differs from other sites in that it lists only a relatively few daily deals at a time. We need to understand if this is indeed a deliberate choice based on the principle of scarcity, as scarcity of product or limited time offer could encourage deals; or simply indicates a limited supply of good deals from vendors [42]. Thus the findings may not be applicable to a daily deal site with hundreds or thousands of simultaneously running deals until this scarcity problem can be controlled for.

In obtaining our sample, we eliminated a large number of deals for not meeting our criteria. A preliminary examination shows that there is considerable difference in the characteristics of the excluded deals from the deals included in the sample. These were largely travel deals that were displayed across Groupon divisions. They were eliminated since we did not have information about these deals from start to finish. A future study will examine these excluded deals in more detail.

The pricing information for a deal refers to the price that is advertised, and only pertains to the first option, in the case of more than one option. Future studies should look into the role of the price of each option on total coupon sales.

Finally, our findings on the role of social proof in creating demand for coupons should be accepted tentatively until we or other researchers can follow up with an experiment to conclusively show that social proof stimulates demand. Until then, social proof can be used as an important input into the accurate forecasting model that we have developed.

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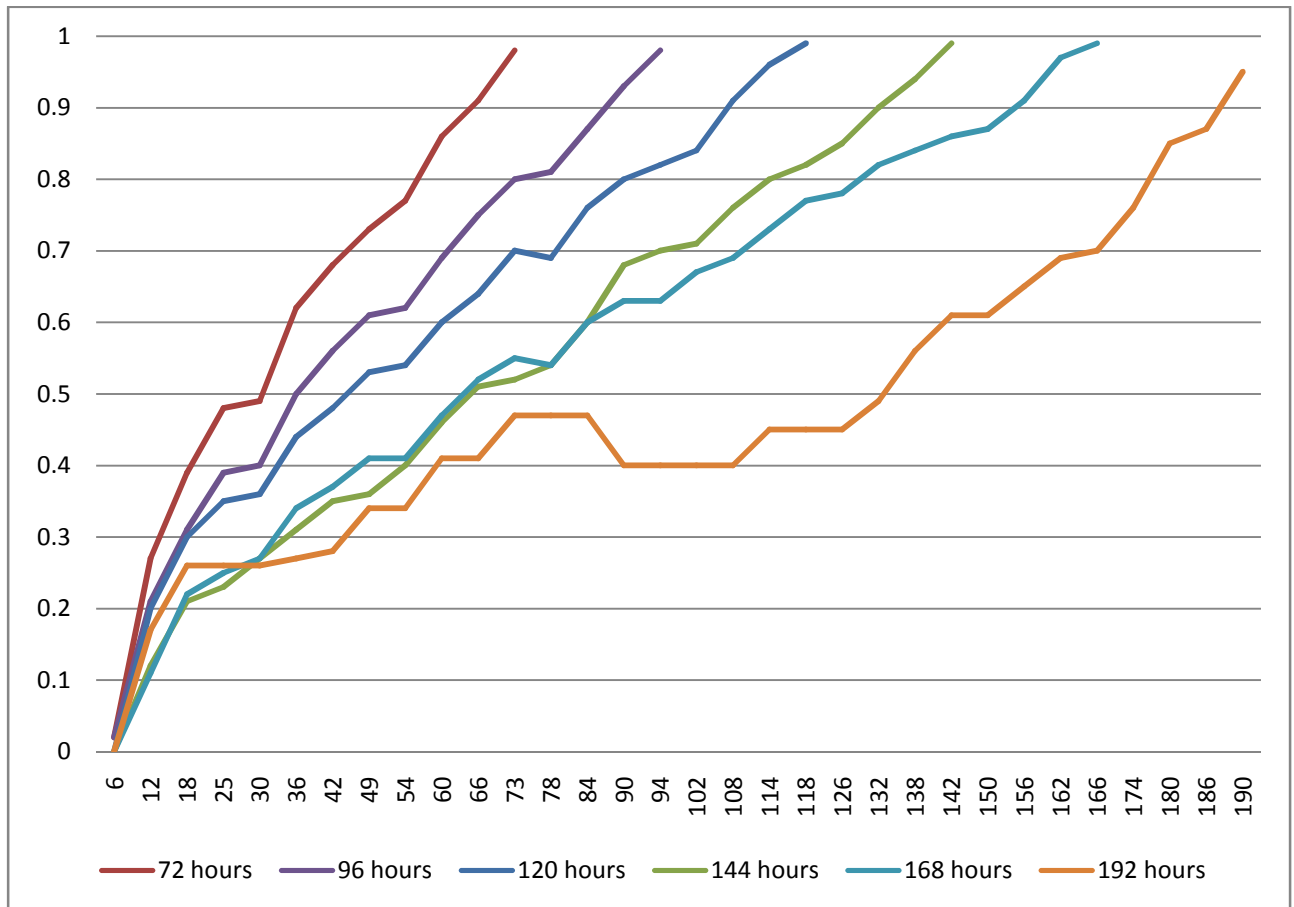
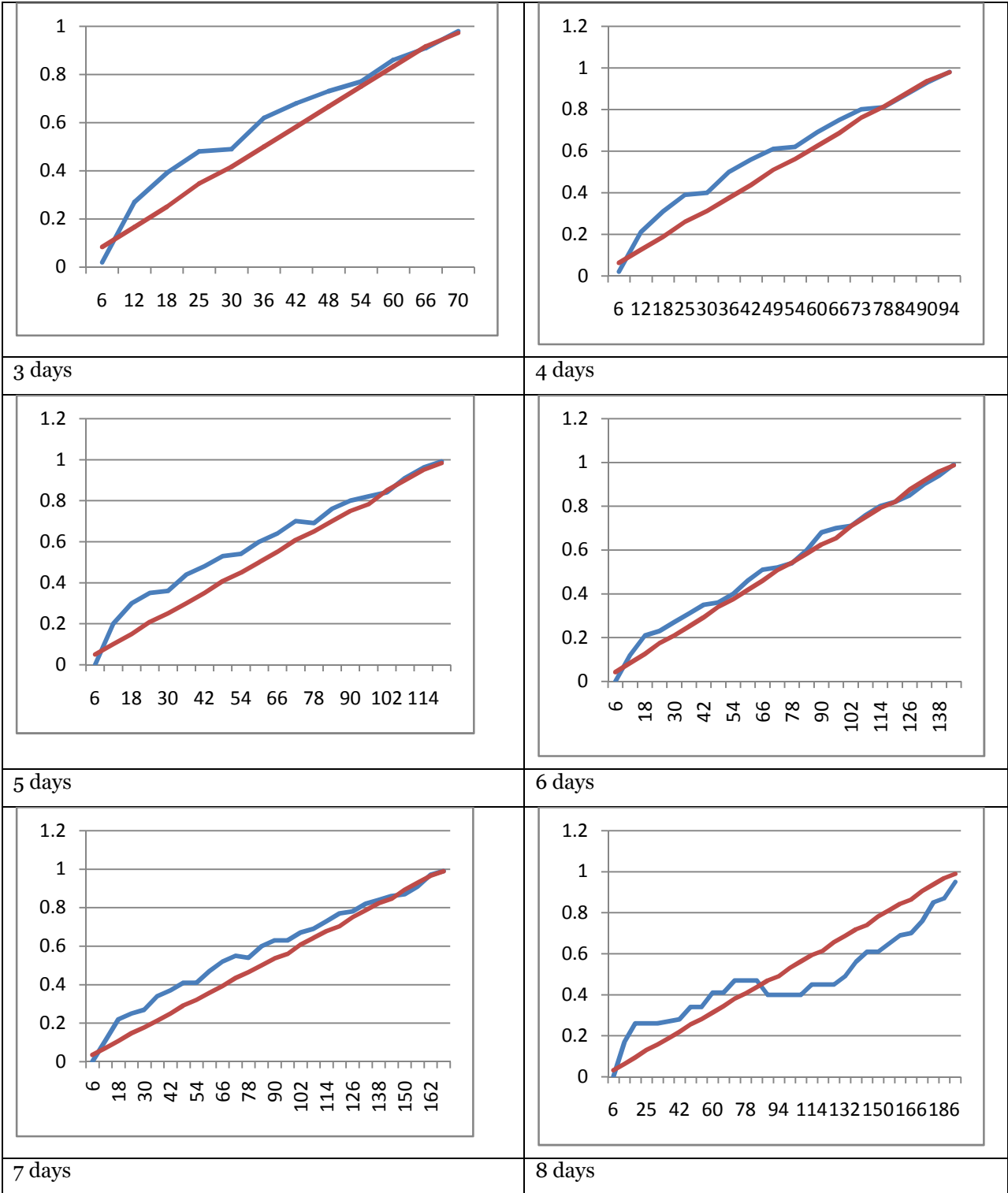Figure X. Fraction of overall sales over deal availability period.

3 days

4 days

5 days

6 days

7 days

8 days

Figure X. Fraction of overall sales by availability period.
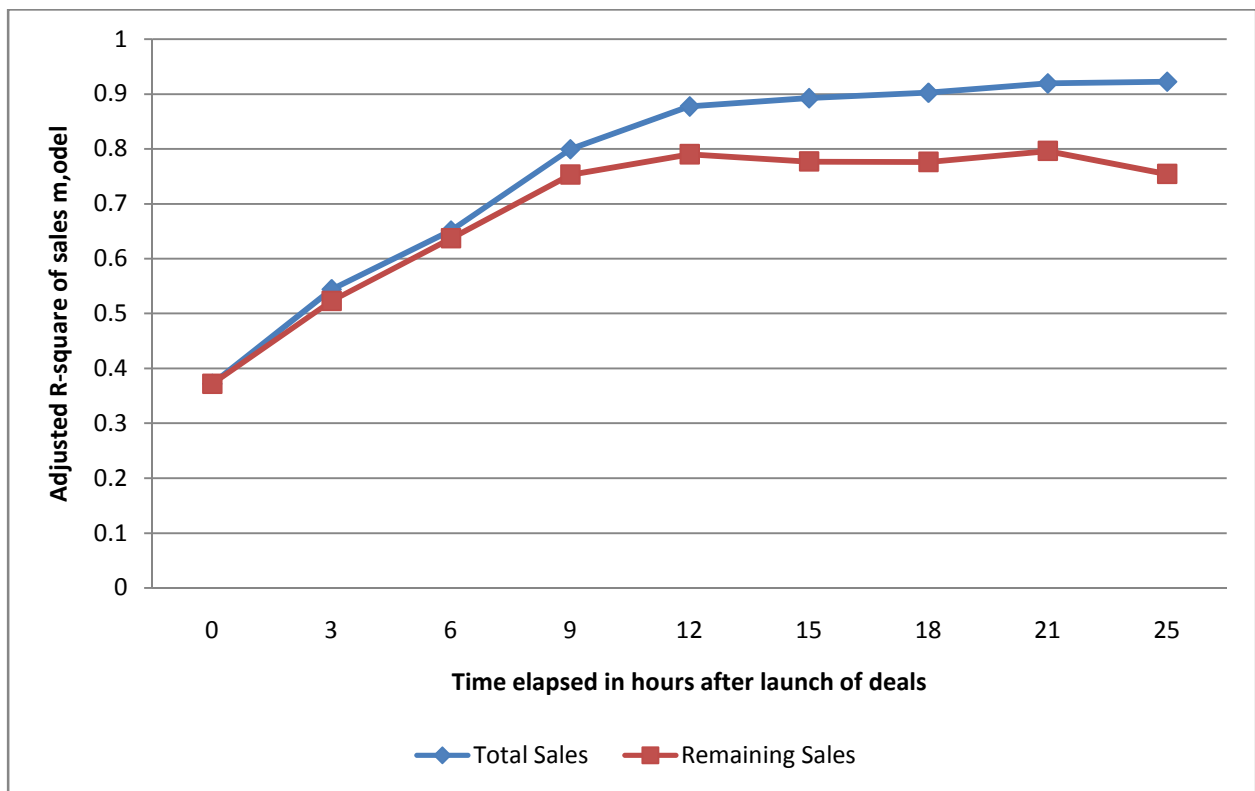
Figure X. Model explanatory power over time

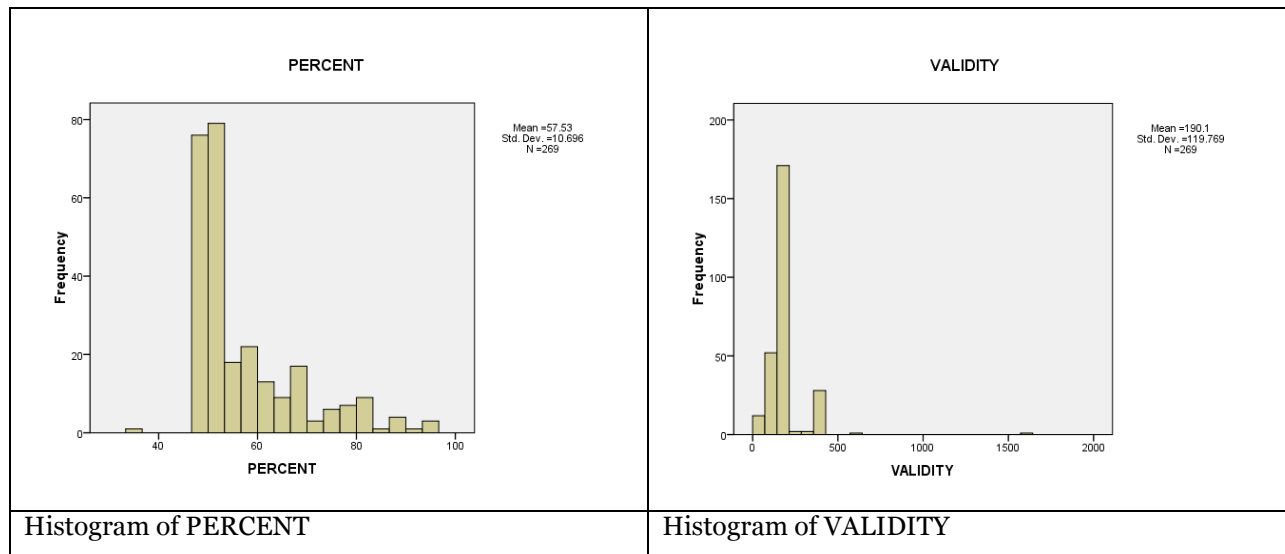| Histogram of PERCENT	Histogram of VALIDITY

Figure 3. Histograms of percentage of discount (PERCENT) and coupon validity period

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Abstract:

In this paper, we examine the role of value proposition and social proof on the success of localized online deals that are made available in coupon form. We develop a model to understand what factors affect coupon sales of a deal and conduct an empirical validation study on Groupon.com, the leading localized daily deal website. We find that both the value proposition and the level of social proof play an important role in demand generation for deals, and that our model can successfully predict future coupon sales. Based on our findings, we describe the implications of our prediction model which can be used as a decision support system for managers at social commerce firms. Our model allows managers to determine very early on which deals are most likely to succeed and which are likely to perform poorly, and take appropriate remedial action.

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