Evaluating the Effectiveness of Online Customer Touchpoints in Omni-channel Environments

Research-in-Progress

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Abstract

A critical challenge faced by omni-channel retailers is how to effectively manage customer touchpoints to influence customer demand. However, past studies have not examined the relative effectiveness, spillovers or interdependencies of customer touchpoints in omni-channel environments. To address these gaps, we aim to examine the relative effectiveness of different touchpoints in terms of owned, paid and earned media, the spillovers of touchpoint exposures from/to focal and rival brands, and the interdependencies among different omni-channel touchpoints. Using data from an international omni-channel retailer, we conducted empirical analyses with simultaneous estimations of customers’ purchase choice, quantity and expenditure. Our preliminary results show that (1) owned (paid) media touchpoint exposure is more effective than that of paid (earned) media in influencing purchases, (2) owned media touchpoint exposures of rival brands influence customers’ demand for focal brands, (3) owned and paid media touchpoint exposures have substitution relationships in affecting customers’ demand for focal brands.

Keywords: Customer touchpoints; omni-channel retailing; information channel; touchpoint interdependency; purchase behaviors
Introduction

An increasing number of brick-and-mortar retailers (e.g., Macy’s, Watsons, etc.) are transforming into omni-channel players over the past few years. They have integrated various online customer touchpoints (information channel), such as owned media (e.g., owned branded sites), paid media (e.g., paid advertising on Google and Facebook) and earned media (e.g., review sites such as Amazon and Yelp), through which they can undertake marketing campaigns, target and direct customers into their retail stores. Thus, these retailers can provide seamless customer experiences, improve customer relationship management and generate higher revenues than single-channel players. The popularity of omni-channel companies’ investment and management of multiple touchpoints can be observed from both companies’ and customers’ responses. For instance, nearly 95% of companies admit that using multiple touchpoints to target customers is beneficial (Episerver 2015). Besides, more than 80% of global consumers report that they are directed to shop online through multiple touchpoints (PWC 2012).

The popularity of going omni-channel makes it imperative for both practitioners and academics to understand the relative effectiveness of different touchpoints and their interdependencies (i.e., substitution or complementarity). However, these still remain unresolved questions. Four research gaps exist in previous multi- and omni-channel studies. First, prior studies focused more on retail distribution channels rather than information channels (e.g., customer touchpoints) (Ansari et al. 2008; Avery et al. 2012; Xu et al. 2014), but relatively few studies examined the effects of customer touchpoint exposures on customer behavior (e.g., search, purchase or retail channel selection). Second, most prior studies ignored the interdependencies among different information channels or touchpoints (Danaher and Dagger 2013; Li and Kannan 2014; Lovett and Staelin 2016). It is likely that a customer’s exposure to one touchpoint not only influences his/her search or purchase, but also affects the effectiveness of other touchpoints. Third, past studies were limited to a relatively narrow set of customer touchpoints (Demirci et al. 2014; Stephen and Galak 2012; Xie and Lee 2015), while they have not incorporated increasingly popular and new touchpoints (e.g., social owned media or social earned media). Fourth, past studies have primarily focused on the impact of exposure to information channel on category demand (e.g., category expansion) or on different products of the same brand (i.e., umbrella branding) (Balachander and Ghose 2003; Erdem and Sun 2002; Rutz and Bucklin 2011). None of the prior studies has considered the impact of touchpoint exposure promoting alternative rival brands on the focal brand in an omni-channel context. It is likely that customers’ demand for focal brands is affected by touchpoint exposures from both the focal brands and rival brands (Lopez et al. 2015). If such spillovers from rival brands are not trivial, it is necessary to both academics and practitioners to understand the direction and extent of the impacts of such information channel exposures from rival brands.

Assimilating the above gaps in the literature, we aim to address three research questions in the omni-channel context: (1) What is the relative effectiveness of different customer touchpoints (i.e., owned media, paid media and earned media) in affecting customers’ demand for focal brands? (2) Whether and to what extent do touchpoint exposures from rival brands influence customers’ demand for focal brands? (3) Whether and how does exposure to one customer touchpoint influence the effectiveness of another touchpoint in affecting customers’ demand for focal brands? To our knowledge, this study is the first one to unravel the relative impact and interdependencies of information channel exposures, as well as information channel spillovers in an omni-channel environment. Theoretically, this study bridges gaps by evaluating customer touchpoint effectiveness in multi- and omni-channel contexts. First, this study unravels detailed roles of owned, paid and earned touchpoint exposures in influencing customer demand by uncovering the relative effectiveness and substitution relationships of different touchpoint exposures.

1 Omni-channel is incubated from multi-channel, but a slight extension or progress of multi-channel. In omni-channel retailing, companies exploit almost all of available information channels in a customer’s shopping experience, so that omni-channel retailers can provide seamless and unified customer experiences which multi-channel players cannot provide (Forbes 2015; Verhoef et al. 2015).

2 Both marketers and academics adopt a typology classifying customer touchpoints into owned media (i.e., media that are owned by companies), paid media (i.e., media that are paid by companies to boost their campaigns) and earned media (i.e., media that are not controlled by companies and activities are generated mainly by customers or fans) (Stephen and Galak 2012).
in an omni-channel context. These greatly contribute to the multi- and omni-channel literature on information channel integration and information channel interdependencies. Second, this study delves into the impact of touchpoint exposures of rival brands on focal brands, which are overlooked in prior multi- and omni-channel related literature. This is a significant theoretical contribution to information channel spillovers in omni-channel settings. For practitioners, our preliminary results suggest that investing and managing more available touchpoints (i.e., going omni-channel) may not be always beneficial. Some touchpoints may be more effective than others, and the combined effectiveness of different touchpoints may be smaller than the sum of their individual effectiveness. Companies with limited budgets are advised to evaluate trade-offs among different touchpoint options and strategically exploit more effective ones to target customers, in order to achieve optimal information channel strategies.

**Related Literature and Hypotheses**

In the omni-channel environment, a retailer usually relies on all available customer touchpoints to conduct marketing campaigns for all its products of different brands, in order to direct and target customers into its online and offline stores. Unlike the previous mono- and multi-channel related studies, it may be insufficient for academics or practitioners to merely study the main impact of (one or more) customer touchpoints. In fact, it is highly likely that (1) a focal brand is affected by touchpoint exposures promoting both the focal brand and rival brands; (2) different touchpoint media exert differentiated effectiveness; (3) a customer’s exposure to one touchpoint may also affect the effectiveness of other touchpoints. Therefore, in order to delve deeper into the influence of customer touchpoint exposures in omni-channel environments, it is necessary to form an integrated view in theorizing (1) the relative impact of touchpoints, (2) spillovers of touchpoint exposures from rival brands and (3) interdependencies among touchpoint exposures.

**Relative Effectiveness of Touchpoint Exposure**

Different customer touchpoints exert influence on customer demand or purchase behaviors to different extents. We put forward two major dimensions here to evaluate the relative effectiveness of different customer touchpoints, specifically in terms of (1) media credibility and (2) communication capability.

First, media credibility (i.e., perceived truthfulness or honesty of vehicles for marketing information) is a necessary and important factor in determining customer responses to touchpoint exposures. Online shoppers frequently and inevitably make judgments of whether the vehicles providing the information are trustworthy or not. Customers tend to seek information from credible media vehicles with reliable messages (Choi and Rifon 2002). Marketing information from touchpoints with higher source credibility tends to be less discounted and less skeptical, thus being more persuasive and more influential in shaping customer decisions (Sarel 1991; Sparkman and Locander 1980). Previous studies have documented that media vehicle credibility exerts positive influence upon customers’ attitudes, evaluations, judgements, and ultimate purchase decisions (Choi and Rifon 2002; Drossos et al. 2013; Erdem and Swait 2004). We thus expect that customer touchpoints with a higher level of media credibility are more effective in encouraging customers’ search and/or purchase responses.

Second, media communication capability (i.e., ability to transmit and convey rich and vivid marketing information) is another important factor that determines the effectiveness of customer touchpoints. Customer touchpoint is basically a kind of communication medium (Pavlou and Stewart 2000; Stewart and Pavlou 2002). Past studies have identified several important aspects of media capability, including the capability of communication media to “present information across the senses” (i.e., sensory breadth of media), to “convey information of high quality” (i.e., sensory depth of media), as well as to “transmit and process rich and vivid information” (i.e., media richness) (Dennis et al. 2008; Dennis and Valacich 1999; Li et al. 2002). Media that can present information in multiple senses or formats (e.g., audio, graphical and subjective experiential cues rather than only textual messages) are more capable of improving customer understanding, based on cue summation theory and dual coding theory (Jiang and Benbasat 2007). In addition, media with embedded social communication tools allow for immediate feedback between marketers and customers, and facilitate building relationships between them (Jiang et al. 2010). These capabilities can thus positively affect customers’ intended purchase behavior. Therefore, customer touchpoints with a high level of communication capability (i.e., presenting information in multiple
senses/formats and with social communication tools) are likely more effective in eliciting customers’ search and/or purchase responses.

Integrating the above perspectives on media credibility and communication capability, we hereby compare the relative effectiveness of different types of customer touchpoints. First, these three media share a similar set of presentation formats. However, different from paid media and earned media, owned media are fully owned and controlled by companies or brands themselves, so companies/brands can freely and flexibly provide social communications tools to allow for communication and establishment of relationships between customers and companies. Hence, owned media (with social communication tools) score better on the dimension of communication capability (Baetzgen and Tropp 2015; Jiang et al. 2010). Besides, owned media generally score higher than paid media in credibility (Baetzgen and Tropp 2015; Demirci et al. 2014). Marketing reports also show that young customers tend to have higher perceived trust in owned or earned media touchpoints, but have relatively lower perceived trust in paid media touchpoints (Nielsen 2015). Hence, we expect that owned media touchpoint exposures are more effective in generating customers’ demand than earned and paid media touchpoint exposures. Additionally, earned media generally involve user-generated content (UGC) while paid media are vehicles of marketer-generated content (MGC). There are convincing empirical evidences documenting that MGC are more effective than UGC, because (1) customers may prefer to gain product-related information through marketers’ media, and (2) customers searching for MGC may incur lower search costs or cognitive costs (Goh et al. 2013; Lin 2014). Hence, we expect that paid media touchpoint exposures are more effective in generating customer demand than earned media touchpoint exposures. Thus, we propose:

_Hypothesis 1A (H1A):_ Owned media touchpoint exposures for a focal product have a larger impact on an individual’s demand for the product compared to those of paid media and earned media touchpoint exposures.

_Hypothesis 1B (H1B):_ Paid media touchpoint exposures for a focal product have a larger impact on an individual’s demand for the product compared to that of earned media touchpoint exposures.

**Spillovers from Rival Brands**

Moreover, customers’ demand for the focal product may also be affected by touchpoint exposures with marketing campaigns of rival brands. Customers may be exposed to marketing campaigns of one rival brand’s product and then are directed to retail or online stores to search, but they may be motivated to buy the focal brand. Some past non omni-channel studies have documented advertising spillovers of rival brands (Anderson and Simester 2013; Sahni 2015; Shapiro 2014). There are several reasons for this phenomenon. First, as long as online search is accessible and inexpensive, a customer exposed to competitors’ advertisements may also have an easy access to or improved recognition of the focal brand (Nakata 2011). Second, rival brands (i.e., same-category alternatives to the focal brand with similar attributes) with salient advertisements can facilitate customers’ recall of the focal brand that has similar attributes (Balachander and Ghose 2003). Due to the association of rival brands and the focal brand in customers’ memories, the exposure to rival brands’ advertising may motivate customers to choose the focal brand (Balachander and Ghose 2003; Morrin 1999). Third, more exposures to rival brands’ advertising (reflecting higher perceived advertising expense) improve customers’ quality perceptions of rival brands by informing customers of rival brands’ attributes to reduce product uncertainties, and increasing customers’ familiarities with rival brands (Moorthy and Hawkins 2005; Moorthy and Zhao 2000). Improved quality perceptions of rival brands may make customers feel more confident about the quality of the focal brand that has similar attributes, thereby motivating customers to purchase the focal brand (Janakiraman et al. 2009). Fourth, customers may exhibit high brand loyalty and low demand for novelty or variety (Oliver 1999). Although a brand-loyal customer using the focal brand might switch to rival brands because of the first-time exposure to rival brands’ advertising, we expect that s/he may feel satiated on these brands and is more likely to switch back to the focal brand even if s/he receives more touchpoint exposures from rival brands. Therefore, we propose:

_Hypothesis 2A (H2A):_ The number of owned media touchpoint exposures for rival brands is positively related to an individual’s demand for the focal brand’s product.

_Hypothesis 2B (H2B):_ The number of paid media touchpoint exposures for rival brands is positively related to an individual’s demand for the focal brand’s product.
Hypothesis 2C (H2C): The number of earned media touchpoint exposures for rival brands is positively related to an individual’s demand for the focal brand’s product.

Interdependencies among Touchpoint Exposures

Only a few multi- and omni-channel studies have investigated the relative effectiveness of different customer touchpoints, and even fewer have discussed the interdependencies among touchpoints (i.e., substitution and complementarity). Some prior studies merely examined the interdependencies among the same type of touchpoints (Dinner et al. 2014; Kireyev et al. 2013; Stephen and Galak 2012), but they did not investigate the interplay across different touchpoints, such as (1) paid media and owned media, or (2) paid media and earned media, or (3) owned media and earned media. We propose that the coexistence of owned media, paid media and earned media customer touchpoints in omni-channel contexts may generate substitution effects in driving customers’ demand. First, if a customer targeted by a brand’s marketing activities (i.e., paid media or owned media exposures) is also exposed to many of its UGC recommendations, she may be aware that this brand itself is conducting some planned or strategic marketing tricks or manipulations (Lin 2014). She may feel skeptical and reluctant to search or purchase this brand. Lu et al. (2013) documented a negative interaction between word-of-mouth volume and a retailer’s marketing efforts due to “overly explicit” exposures. Customers may believe that a reputable brand or product has no need to engage into much varied marketing activities (i.e., owned and paid media touchpoint exposures) and word-of-mouth referrals (i.e., earned media touchpoint exposures). Hence, the effectiveness of paid media or owned media touchpoint exposures is likely mitigated by the volume of earned media touchpoint exposures. Second, more exposures to owned media can reduce customers’ needs for a retailer’s marketing efforts through paid media, and vice versa. This “wear-out” phenomenon can be explained by modified two-factor theory (Cacioppo and Petty 1979; Stang 1975). If a customer has already been stimulated by an advertising exposure, repeated advertising exposures (from various sources) will eventually result in increasing boredom or satiation. The marginal effect of an earlier exposure will be discounted or mitigated by subsequently repeated exposures. So the effectiveness of owned media touchpoint exposures is likely mitigated by paid media touchpoint exposures, and vice versa. Therefore, we propose:

Hypothesis 3A (H3A): The positive effect of a focal product’s owned media touchpoint exposures on an individual’s demand for the product decreases with the number of earned media touchpoint exposures (i.e., substitution relationship).

Hypothesis 3B (H3B): The positive effect of a focal product’s paid media touchpoint exposures on an individual’s demand for the product decreases with the number of earned media touchpoint exposures (i.e., substitution relationship).

Hypothesis 3C (H3C): The positive effect of a focal product’s owned media touchpoint exposures on an individual’s demand for the product decreases with the number of paid media touchpoint exposures (i.e., substitution relationship).

Data

Data for this study were provided by a globally branded retailer selling cosmetic goods and fashion goods of different brands (including international brands and house brands by the same retailer) in China via online and mobile retail channels. This omni-channel retailer undertakes their marketing efforts, advertises or promotes new products and interacts with customers through multiple customer touchpoints, including phone messages, display ads, referral site ads, mobile app, email push, search engine marketing, social media platforms and so on. Both marketers and academics adopt a typology classifying customer touchpoints into owned media (media that are owned by companies), paid media (media that are paid by companies to boost their campaigns) and earned media (media that are not controlled by companies and activities are generated mainly by customers or fans) (Smartinsights 2012; Stephen and Galak 2012). According to the classifications of different touchpoint media based on prior empirical studies and industry practices (Smartinsights 2012; Stephen and Galak 2012), we classified available touchpoints in our dataset into owned media (e.g., branded website, retailer-owned pages/accounts in online social networks, email push, multimedia message, mobile app push), paid media (e.g., paid search, display ads) and earned media (e.g., user referrals in social media). This classification is
consistent with the classifications in prior studies and fits with conventions in the industry (Smartinsights 2012; Stephen and Galak 2012). We have a sample of 4,683 randomly selected customers with information about touchpoint exposures, clickstream records of browsing and searching, online purchase history and customer demographics. The time window of this dataset is from January 10, 2014 to August 29, 2014. Besides, we collected product characteristics by crawling its online store. The data used for analysis is an unbalanced customer-product-day level panel data with 54,038 observations, of which 7,381 are actual purchase incidences.

Our main dependent variables are purchase quantity, purchase expenditure and purchase choice. In order to operationalize touchpoint exposures (focal independent variables), we adopted the metric used by Li and Kannan (2014). We considered all prior paths of touches or exposures that the customers have experienced. We attributed customers’ conversion decisions to all prior touches or exposures pertaining to the focal brand or product, rather than to merely the first exposure (i.e., first-click metric) or merely the last exposure (i.e., last-click metric). This approach encompasses the logic that a conversion decision is a result of “cumulative informational stocks” (Li and Kannan 2014). Thus, owned media touchpoint exposure Ownijt indicates the number of exposures for product j that customer i has received from owned media touchpoints before day t. Paid media touchpoint exposure Paidijt and earned media touchpoint exposure Earnijt are operationalized in the same way. Table 1 reports the definitions, operationalizations and summary statistics of our dependent variables (purchase expenditure, quantity and choice) and focal independent variables (touchpoint exposures). We included product attributes, customer demographics and product category dummies (for makeup, skincare, haircare, bodywash, perfume and accessories) in our empirical analysis but omitted listing them here in Table 1. Product attributes include Priceijt (price of product j), AvgRateijt (average rating score of product j at day t, scaling from 1 to 5), Newijt (whether product j is a newly released product promoted by the retailer at day t, =1 new =0 otherwise), Exclusiveijt (whether product j is sold exclusively at this retailer’s stores, =1 yes =0 otherwise), and OnlyOnlineijt (whether product j is only available via this retailer’s online official sales channel, =1 yes =0 otherwise). Customer demographics include Genderi (gender of customer i, =0 Female =1 otherwise), Ageit (age of customer i), Tenureit (number of months passed since customer i’s becoming member of this retailer until day t), BlackCardit (whether customer i is “black-card member” with medium level loyalty status, =1 black-card =0 otherwise) and GoldCardi (whether customer i is “gold-card” VIP member with high level loyalty status, =1 gold-card, =0 otherwise).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition and Operationalization</th>
<th>Mean</th>
<th>S.D.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expendijt</td>
<td>Purchase expenditure of customer i for product j at day t</td>
<td>377.555</td>
<td>321.879</td>
<td>11.6</td>
<td>5000</td>
</tr>
<tr>
<td>Qtyijt</td>
<td>Purchase quantity of customer i for product j at day t</td>
<td>0.133</td>
<td>0.421</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Choiceijt</td>
<td>Whether customer i chooses to buy product j at day t</td>
<td>0.137</td>
<td>0.343</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Ownijt</td>
<td>Number of prior owned media exposures for product j received by customer i when making purchase decision at day t</td>
<td>0.143</td>
<td>0.484</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Paidijt</td>
<td>Number of prior paid media exposures for product j received by customer i when making purchase decision at day t</td>
<td>0.076</td>
<td>0.385</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Earnijt</td>
<td>Number of prior earned media exposures for product j received by customer i when making purchase decision at day t</td>
<td>0.004</td>
<td>0.072</td>
<td>0</td>
<td>4</td>
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<tr>
<td>OwnRivalijt</td>
<td>Number of owned media exposures for product j’s rival brands received by customer i when making purchase decision at day t</td>
<td>0.140</td>
<td>0.712</td>
<td>0</td>
<td>17</td>
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<tr>
<td>PaidRivalijt</td>
<td>Number of paid media exposures for product j’s rival brands received by customer i when making purchase decision at day t</td>
<td>0.094</td>
<td>0.792</td>
<td>0</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 1. Summary of Variables
Effectiveness of Online Customer Touchpoints

### Methodology and Preliminary Results

We denoted customer $i$ purchases $Q_{ijt}$ items and spend $Exp_{ijt}$ (YRMB) on product $j$ on day $t$. Purchase quantity $Q_{ijt}$, purchase expenditure $Exp_{ijt}$ and purchase choice $Choice_{ijt}$ may be affected by (1) customer demographics $Customer_{ijt} (=\{Gender_i, Age_{it}, Tenure_{it}, BlackCard_{it}, GoldCard_{it}\}$), (2) product attributes $Product_{ijt} (=\{Price_{ij}, AvgRate_{ij}, New_{ij}, Exclusive_{ij}, OnlyOnline_{ij}\})$ and category dummies, (3) three focal customer touchpoint exposures for product $j$, (4) three touchpoint exposures for product $j$’s rival brands. 3 We specified purchase quantity $Q_{ijt}$ with a Poisson specification: 

$$Pr(Q_{ij} = q_{ij}) = \exp(-\lambda_{ij})(\lambda_{ij})^q / q!$$

where purchase rate $\lambda_{ij} = X'_{ij} \alpha$. We also specified expenditure $Exp_{ijt}$ (log-transformed) using a panel linear model: 

$$\ln(Exp_{ijt}) = X'_{ij} \beta$$

Besides, we specified purchase choice, the probability of customer $i$ chooses to buy product $j$ on day $t$, in Probit specification: 

$$Pr(Choice_{ijt} = 1) = \Phi(X'_{ijt} \alpha).$$

Note that $X_{ijt} \alpha$, $X_{ijt} \beta$ and $X_{ijt} \gamma$ are specified in the form as equation (1):

$$X'_{ijt} \alpha = \alpha_0 + \alpha_1 \text{Own}_{ijt} + \alpha_2 \text{Paid}_{ijt} + \alpha_3 \text{Earn}_{ijt} + \alpha_4 \text{Own}_{ijt} \ast \text{Paid}_{ijt} + \alpha_5 \text{Own}_{ijt} \ast \text{Earn}_{ijt} + \alpha_6 \text{Paid}_{ijt} \ast \text{Earn}_{ijt} + \alpha_7 \text{EarnRival}_{ijt} + \alpha_8 \text{PaidRival}_{ijt} + \alpha_9 \text{EarnRival}_{ijt} \ast \text{PaidRival}_{ijt} \ast \text{Product}_{ijt} (1)$$

$$+ \alpha_{10} \text{Customer}_{ijt} + \xi_i + \theta_t + \text{CategoryDummy}_j + \epsilon_{ijt}$$

where $\alpha_0$, $\alpha_2$ and $\alpha_3$ capture main effects of the three touchpoint exposures, $\alpha_4$, $\alpha_5$ and $\alpha_6$ capture pairwise interdependencies among the touchpoints, and $\alpha_7$, $\alpha_8$ and $\alpha_9$ capture the impacts of touchpoint exposures from rival brands on a focal brand.

We need to simultaneously estimate the models for purchase quantity, purchase expenditure and purchase choice. First, the same unobserved factors that encourage customers to purchase more items may also motivate customers to spend more money. Thus, we accounted for cross-model correlations in the error structures by a simultaneous estimation approach with seemingly unrelated regressions (SUR). In doing so, we used a log-linear specification for the purchase quantity rather than the Poisson specification, because of (1) the simultaneous model estimation by accounting for cross-model error structure and (2) better interpretability of results from quantity model. Second, we employed Heckman sample-selection correction to account for the selection in individual’s product purchase choice, because purchase quantity and expenditure can only be observed as long as they have chosen to purchase (Xie and Lee 2015). We estimated individual’s product purchase choice first, computed inverse Mills ratio, and then included it in the purchase quantity and expenditure models.

Preliminary results of SUR and Heckman two-step estimation are summarized in Table 2. First, owned and paid media touchpoint exposures exert positive and significant impacts on purchase choice, quantity and expenditure. This means conducting marketing campaigns through owned and paid media is still effective in omni-channel settings. Second, in order to compare the relative importance of touchpoint exposures, we employ the logarithmic ratio of standardized coefficients method for nonlinear Probit choice model, and dominance analysis for linear expenditure model and log-linear quantity model. We cannot naively and inappropriately compare coefficient sizes or significances (Johnson and Lebreton 2004; Silber et al. 1995). Log-ratio for owned media versus paid media is significantly larger than zero for

### Table 1. Summary of Variables

| EarnRival | Number of earned media exposures for product $j$’s rival brands received by customer $i$ when making purchase decision at day $t | 0.005 | 0.084 | 0 | 5 |

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3 Rival brand means the brand that is different from the focal brand in name, but is similar in attributes. In this study, we identified rival brands of a focal brand in a more rigorous way. In doing so, we crawled all web pages of products to get detailed product information. We have 6 broad product categories (e.g., makeup, skincare, haircare, bodywash, perfume and accessories), which include a total of 114 detailed subcategories (e.g., cleansing milk, lip balm, BB/CC cream, etc.) that can clearly and uniquely distinguish each product. We assume that if two products belong to the same subcategory, their attributes are similar. If focal product A and product B belong to the same subcategory (e.g., cleansing milk), but their brands are different, then it is apparent that product B is a rival brand to focal product A.
purchase choice model \(r=1.039,\ se=0.072\). Log-ratio for paid media versus earned media is significantly larger than zero for choice model \(r=2.705,\ se=1.142\). Dominance weight of owned media is 0.0029, paid media is 0.0008 and earned media is 0.0002 for expenditure model. Dominance weight of owned media is 0.0016, paid media is 0.0001, and earned media is 0.0006 for log-linear quantity model. Thus, owned media exposure is more effective than paid media exposure in affecting purchase choice and expenditure. Paid media exposure is more effective than earned media exposure in affecting purchase choice and expenditure. Hence, H1A and H1B are supported. Third, customer touchpoint exposures for rival brands’ campaigns discourage customers to purchase focal brands (i.e., H2A to H2C are not supported). We surprisingly found negative rather than positive spillovers of touchpoint media exposures from rival brands, meaning that touchpoint media exposures by competitors lower customer demand for a focal brand (Lopez et al. 2015). This result is contradictory to the findings of Sahni (2015) and Shapiro (2014), but is consistent with the findings of negative spillovers from rivals documented in other previous marketing studies (Darke and Robin 2007; Erdem and Sun 2002; Lopez et al. 2015; Roehm and Tybout 2006). More marketing campaigns conducted by rival companies through touchpoint media can dissuade customers from focal brands, possibly because (1) more customer touchpoint exposures from competitors increase customer awareness of rival brands, influencing customers’ click-through or ultimate conversions by increasing impressions or salience of rival brands/products (Ghose and Todri 2015; Ghose and Yang 2009; Hoban and Bucklin 2015; Lopez et al. 2015), or (2) customers might be variety-seeking rather than brand-loyal in omni-channel environments (McAlister and Pessemier 1982; Simonson 1990). Fourth, only paid and owned media touchpoint exposures have a significant substitution relationship. Thus, H3C is supported but H3A and H3B are not supported. Marketing campaigns conducted by retailers mostly utilize promotional price (e.g., price cuts or other pricing strategies) to attract customers through owned or paid media touchpoints. However, prior studies find that price may not significantly affect customers’ product quality perceptions when customers have already gained product knowledge or familiarity through other information sources (e.g., earned media touchpoint exposures carrying word-of-mouth content) (Lu et al. 2013; Rao and Monroe 1988). Thus, when customers gradually learn about the quality of a brand/product as they are exposed to more earned media touchpoint exposures, their sensitivities or responses toward retailers’ promotional marketing of the brand/product conducted through owned or paid media touchpoints might not change (since promotional price may not matter to these customers). This result is consistent with the findings of prior studies (Lu et al. 2013; Rao and Monroe 1988) and may explain why H3A and H3B are not supported.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) SUR Choice Probit</th>
<th>(2) SUR ln(Expend) Regression</th>
<th>(3) SUR ln(Qty) Regression</th>
<th>(4) Heckman ln(Expend) Regression</th>
<th>(5) Heckman ln(Qty) Poisson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Own</td>
<td>0.416***</td>
<td>0.638***</td>
<td>0.0872***</td>
<td>0.173***</td>
<td>0.386***</td>
</tr>
<tr>
<td>Paid</td>
<td>0.273***</td>
<td>0.375***</td>
<td>0.0530***</td>
<td>0.119***</td>
<td>0.266***</td>
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<td>Earn</td>
<td>0.0495</td>
<td>0.0330</td>
<td>0.000450</td>
<td>-0.0191</td>
<td>-0.0153</td>
</tr>
<tr>
<td>Own*Paid</td>
<td>-0.169***</td>
<td>-0.245***</td>
<td>-0.0339***</td>
<td>-0.0639***</td>
<td>-0.136***</td>
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<td>Own*Earn</td>
<td>0.200</td>
<td>0.0274</td>
<td>0.00373</td>
<td>0.0189</td>
<td>0.0594**</td>
</tr>
<tr>
<td>Paid*Earn</td>
<td>-0.107</td>
<td>-0.192</td>
<td>-0.0135</td>
<td>-0.0595</td>
<td>-0.126</td>
</tr>
<tr>
<td>OwnRival</td>
<td>-0.109***</td>
<td>-0.0097***</td>
<td>-0.0123***</td>
<td>-0.0384***</td>
<td>-0.0895**</td>
</tr>
<tr>
<td>PaidRival</td>
<td>-0.177***</td>
<td>-0.0946***</td>
<td>-0.0112***</td>
<td>-0.0538**</td>
<td>-0.119</td>
</tr>
<tr>
<td>EarnRival</td>
<td>-0.294***</td>
<td>-0.211***</td>
<td>-0.0224**</td>
<td>-0.133**</td>
<td>-0.298</td>
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<tr>
<td>InverseMillsRatio</td>
<td>0.509***</td>
<td>1.150**</td>
<td>(0.142)</td>
<td>(0.456)</td>
<td></td>
</tr>
<tr>
<td>Constantt</td>
<td>-0.252**</td>
<td>-0.0738</td>
<td>-0.468</td>
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</table>
Table 2. Preliminary Estimation Results

We also conducted additional robustness checks to account for the potential endogeneity of touchpoint exposures. First, by conducting Granger causality test, we find that owned and paid media touchpoint exposures Granger-cause purchase quantity and expenditure. Second, we considered three touchpoint exposures as three treatments, and conducted propensity score matching (PSM) respectively. The basic logic of PSM strategy to identify the impact of owned media touchpoint exposure in our paper is as follows. Consider two customers with similar characteristics, if one customer is treated (i.e., has been exposed to owned media of the focal product beforehand) and another is not, and they exhibit different purchase outcomes (after controlling paid and earned media exposures of the focal product), then the difference in their purchase outcomes can be attributed to the owned media treatment effect. We can apply the same logic to understand the PSM strategy of paid and earned media touchpoint exposure treatments. There are several steps in conducting PSM strategy to identify the impact of owned media treatment. First, we need to model the propensity to be treated by owned media touchpoint exposure using a Probit specification with some observable covariates and controlling for the effect of the other two touchpoint media exposures (i.e., paid and earned media touchpoint exposures). The observable covariates we select include previous search or browsing behavior (e.g., number of URL clicks on the focal product \textit{PriorClick}, number of visit session on the focal product \textit{PriorSession}), and a set of customer demographic variables. Second, we then compute the propensity scores of the owned media treatment to match the control group with the treated group. Third, we calculate the average treatment effect by comparing purchase outcomes for each matched pair. We match customers who received owned media touchpoint exposures (i.e., treated) with other counterpart customers who did not (i.e., control), and then calculate average treatment effects (ATT) by comparing purchase outcome (purchase quantity or expenditure) differences between these two groups. The PSM procedures for the paid media treatment and earned media treatment follow those of the owned media treatment as described earlier. Using the radius matching algorithm, we find that (1) the impact of owned media touchpoint exposure is significant for expenditure (\textit{ATT}=58.232, \textit{se}=7.814) and quantity model (\textit{ATT}= 0.055, \textit{se}=0.016); (2) the impact of paid media touchpoint exposure is significant for expenditure (\textit{ATT}= 48.984, \textit{se}= 12.170) and slightly significant for quantity model (\textit{ATT}= 0.050, \textit{se}=0.027). However, we cannot find significant \textit{ATT} for earned media touchpoint exposure.

Discussion and Conclusion

In this study, we assess the effectiveness of different customer touchpoints in an omni-channel setting and examine the interdependencies among them. Preliminary results show (1) owned media are more effective than paid media, while paid media are more effective than earned media in driving customers’ demand, (2) owned and paid media touchpoint exposures have substitution relationships in affecting customers’ demand, and (3) owned media touchpoint exposures carrying rivals brands’ promotional campaigns influence customers’ demand for focal brands. This study fills gaps in extant multi- and omni-channel studies. This study confirms that different touchpoint exposures are still effective in omni-channel environments. This study unveils the relative effectiveness, substitution relationships of different touchpoint exposures and the spillovers of touchpoint exposures of rival brands that are overlooked in prior multi- and omni-channel literature. Thus, this study sheds light on the literature on omni-channel integration and interdependency, and omni-channel customer behaviors. This study also provides insights for practitioners to better allocate resources or investments among different available touchpoints, and strategically exploit them to accomplish optimal omni-channel strategies. In further work, we will (1) conduct more robustness checks of endogeneity (e.g., simultaneity issue, price endogeneity, etc.) and (2) test alternative model specifications (e.g., Bayesian vector autoregression, two/three-stage least squares model).
References


