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An empirical examination of the effects of design elements of email newsletters on consumers' email responses and their purchase

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ABSTRACT

In this research, we empirically explore the effects of various design elements of email newsletters on consumers' email responses and their purchases. We capture the consumers' email responses using three metrics, namely email open, email click, and email reopen. We operationalize consumers' purchases as their spending on product items that are featured in email newsletters. Using a novel email marketing database, first, we model the influence of design elements of email newsletter on consumers' email responses at the individual consumer level. The email design elements constitute several email attributes, situational factors, and integrated marketing communication. Second, we quantify the effects of these three email responses, open, click, and reopen, on consumers' purchases. Our empirical results suggest a significant influence of email attributes, situational factors, and marketing communications on consumers' email responses. Furthermore, among open, click, and reopen, we find clicks tend to have the highest impact on consumers' purchase, followed by email reopening and opening. However, email newsletters with higher opening probability are more effective in influencing purchases than those email newsletters with higher reopening probability. Furthermore, consumers who indulge in all three email responses, namely opening, clicking, and reopening, tend to purchase the most. Results from our study offer several critical insights for email marketing strategy helping managers improving the effectiveness of email campaigns by careful consideration for the design elements of email newsletters.

1. Introduction

There are 253.4 million people using email in 2018 that is expected to grow by 2.3%– to 269.7 million by 2022, making roughly 80% of the US population email users (eMarketer 2018a). Thus, despite the proliferation of several other forms of digital advertising tools, emails have never lost its charm in connecting with people given there are 281.1 billion emails sent and received daily worldwide (Radicati Group 2018). Furthermore, users are spending more time and paying attention to emails (Smallbizdaily, 2017), and they prefer receiving promotional messages via email (77%) than social networking sites (4%) (Optinmonster 2018). Given the above, email marketing is itself becoming more social with companies investing in related technologies. Thus, firms are integrating other forms of marketing communications with email newsletters. However, despite email being a ubiquitous form of communication, the research in this field still lacks (Ducheneaut and Watts 2005).

For example, quantifying the success of email newsletters is challenging. With only a quarter of email recipients responding to emails (eMarketer 2018a) and only 10.5% buying items shown in emails (eMarketer 2018b), getting users to check and open emails, and subsequently influence their purchases can be challenging. Specifically, to address such issues, several challenges need to be overcome. First, access to an extensive database of a firm's email marketing program needs to be obtained that tracks individual users' email responses. Second, various design elements of the email newsletters need to be coded to analyze their impact on users' email responses. Especially concerning email campaigns, factors such as timing, frequency, content design, personalization, and their effects on sales remain a dark art (Wall Street Journal 2012). Finally, the above should also be linked to actual purchases or sales data. An investigation with such rich data will lead to a better quantification of return on investment of email marketing (ROI-EM) considering emails are considered as top ROI drivers by the US marketers with 88% of them using emails to interact with their consumers (eMarketer 2018a).

Therefore, in this study, our objective is to quantify the success of email newsletters at the individual consumer level. In this regard, first, we capture the effects of email attributes, situational factors, and

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marketing communications on consumers' email responses constituting open, click, and reopen. Second, we estimate the relative impact of consumers' email responses, namely, email open, click, and reopen on their purchase of the product items shown in the email newsletters. Thus, our study disentangles the relationship between consumers' email responses and their purchases accounting for the effects of email attributes, situational factors, and marketing communications.

We use a novel email marketing database to achieve our objective. The email marketing database allows us to capture the consumers' email responses towards several email newsletters at the individual consumer level. Furthermore, we also have access to the actual email newsletters that allow us to code several design elements of email newsletters. Furthermore, we also extract product items that are featured in the email newsletters. Such extraction of featured product items allows us to combine extracted product items with the scanner panel data to capture the consumer purchases of those product items that are advertised in email newsletters. We employ two-stage empirical modeling approach. In the first stage, we use a multivariate probit model with a selectivity correction method to capture the effects of email design elements on consumers' email responses. In the second stage, we use tobit model that accounts for the modeling of zero-inflated data to capture the effects of consumers' email responses on their purchases.

Our empirical results suggest a significant influence of email design elements on consumers' email responses. Furthermore, among open, click, and reopen, we find clicks tend to have the highest impact on consumers' purchases. Furthermore, consumers who indulge in all three email responses, namely opening, clicking, and reopening, tend to purchase most. Results from our study offer several critical insights for email marketing strategy.

We organize the rest of the sections as follows. First, we review the relevant literature based upon which we build our conceptual framework. Then, we propose our hypotheses. Next, we describe our data and propose our empirical strategy. Subsequently, we present our results and managerial implications. Finally, we conclude with some of the limitations of our study.

2. Research background and conceptual framework

In marketing literature, there are two main streams of literature that propose solutions to issues relating to email marketing from two distinct perspectives. The first stream of literature has primarily focused on capturing the effects of email marketing on consumers' response behavior such as channel choice decisions, customer lifetime value (Kumar et al., 2008), response rate (Zviran, Te'eni, and Gross 2006), profitability (Zhang et al. 2017), and managing opt-in and opt-out (Kumar et al. 2014). While, the second stream of literature focuses on design aspects of email marketing such as investigating the real-time evaluation of emails (Bonfrer and Dreze 2009), customer relationship management through emails (Zhang et al. 2017), email customization (Algesheimer et al., 2010), the influence of spam on consumer behavior (Pavlov et al. 2008), and the role of attitudinal factors and design considerations in unsubscribing from newsletters (Cases et al., 2010). In this study, we position our contributions at the intersection of these two literature streams. In this regard, first, we capture the effects of email design elements on consumers' email responses. To this end, we account for factors such as email attributes, situational variables, and integrated marketing communication. Subsequently, we capture the relative impact of consumers' email responses on their purchase behavior. We empirically examine these issues at individual consumer and individual email newsletter level using novel databases of email marketing and scanner panel data that span over multiple years.

We develop our conceptual framework in Fig. 1. In this framework, we capture the consumers' email responses along three dimensions: open, click, and reopen. Furthermore, we quantify the effects of these three email responses on consumers' purchases of the products items advertised in the email newsletters.

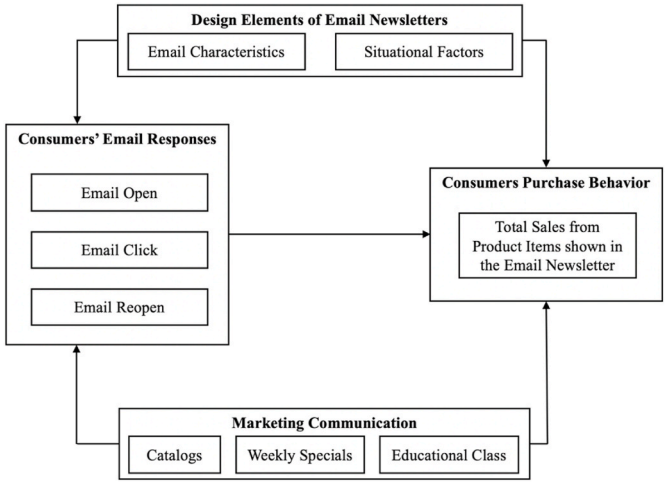


Fig. 1. Consumers' Email Responses and their Impact on Consumer Purchase.

In this framework, first, we capture the metrics that marketers use to measure the success of email newsletters. These metrics are divided into two categories: relational metrics and transactional metrics. Relational metrics capture the consumers' responses towards an email newsletter and constitute email open, email click, and email reopen. We note that while B2C firms have used these metrics to quantify the success of their email campaigns, these metrics are also well suited for B2B firms due to the lack of frequent transactions in the B2B business environment. Next, the transactional metric captures the consumers' purchase behavior that is more suited for B2C firms with frequent transactions (Kumar et al. 2008, 2016). In capturing the transactional measure, we use the purchase behavior of consumers that accounts for the revealed consumer spending on those products that are advertised via email newsletters. Second, our framework proposes factors affecting consumers' email responses and transactional behavior. In this regard, the first set of factors pertaining to the design elements of email newsletters that mostly constitute various characteristics of the email. The second set of factors include situational factors as the timing of email newsletters could influence consumers' responses towards them (Sahni et al. 2018). Finally, in an integrated marketing communication environment, exposure to firms' other forms of marketing communications could influence how consumers react to the firms' email marketing program as well as their purchases.

Traditionally, open and click rates have been used to quantify the success of email newsletters (Drèze and Bonfrer 2008). However, we note that consumers' initial responses to email newsletters usually take place in a non-shopping mode. Therefore, when in shopping mode, consumers interested in the advertised products in the email newsletters are likely to reopen those email newsletters. Thus, we argue that email reopening is another crucial metric to capture the consumers' response with email newsletters, which is much neglected in both academic and business literature. Furthermore, emails positively influence consumer spending, profitability, and cross-buying (Kumar et al., 2016), and they help in building a customer-firm relationship (Kumar et al., 2008). Therefore, we quantify the impact of these three email responses on consumers' purchases of the products items advertised in the email newsletters. Finally, based on the research background, we capture the effects of email attributes, situational factors, and marketing communications on consumers' email responses and purchases.

3. Hypotheses development

In this section, we develop our hypotheses. First, we present arguments on the effects of email design elements on consumers' email responses and their purchase behavior. Subsequently, we present

arguments on how consumers' email responses affect their purchase behavior.

3.1. Effects of design elements of email newsletters on consumers' email responses and purchases

Drawing from the information processing theory (Chen and Berger 2016), when consumers receive information as against finding it themselves, they tend to process it more. In this regard, emails that happens to be a prominent medium for consumers to receive content, the design elements of the contents become important in further processing of information sent via email newsletter. Besides, in the context of a consumer-firm relationship, consumers interact or engage with firms to achieve greater efficiency in their decision making (Siqueira et al., 2020). Customers achieve such greater efficiency by reducing the task of information processing and perceived risks thereby achieving greater consistency in their decisions (Sheth and Parvatlyar 1995). However, such simplification in their decision-making comes from the email newsletters' content being entertaining, targeting the right consumers, nature of the offer, creativity, timing, volume of communication, processing of email content, devices used to access emails, and the intent of email (Barley et al. 2011; Shahni, Wheeler, and Chintagunta 2018). Thus, in general, we propose that email design elements such as email attributes and situational factors that simplify(complicates) consumers' information processing and help(hinder) in their purchase decisions will influence their email responses and purchases positively (negatively). In the following, we hypothesize the effect of some of the important email design elements on consumers' responses and their purchase behavior.

Miller and Charles (2016) find that the subject line of any email is one of the major factors that influence consumers' responses to either open or abandon an email. According to a survey by Schultz (2018), consumers want email subject lines to be linguistically correct that convey the gist of the email succinctly. Furthermore, to comply with the CAN-SPAM Act,[1] the Federal Trade Commission (FTC) recommends subject lines of emails to be accurate. Consumers can think of a deceptive subject line as "clickbait" that will reduce their responses. The subject line is the first impression made by the email on consumers that sets the tone for the subsequent reactions (Balakrishman and Parekh 2014). Thus, we conclude that a longer email subject line makes a deceptive impression on consumers, thereby lowering their subsequent responses including purchases of the advertised products. Thus, we hypothesize:

H1. Longer email subject line negatively influences consumers' email responses (open, click, and reopen) and their purchases.

In an online marketing environment, due to the information overload, consumers are unable to filter meaningful information from the plethora of information thrown at them by marketers (Koroleva et al. 2010). Information overload is often caused by the amount of information where the availability of more information leads to less cognitive responses (Sicilia and Ruiz 2009). Emails with larger sizes often carry more information, thereby creating information overload. The consequence of this information overload in larger size email newsletters is consumers' negative responses. Thus, we hypothesize the following:

H2. Size of the email newsletters negatively influence consumers' email responses (open, click, and reopen) and their purchases.

Links[2] in an email newsletter provide an option of additional action that consumers can take to gather further information, thereby reducing the information overload of emails. Kumar and Salo (2016) report that the link placements in an email newsletter affect the click-through rate. For nurturing customer-firm relationship, link are considered essential digital design elements to facilitate co-creation of value (Grant et al. 2010). Marketers can nurture such customer-firm relationships by providing information that is not always transactional. Furthermore, based on cognitive balance theory[3] (Heider 1946), studies have shown that links may influence the perception of relationships between communicating entities (Stewart 2003) that in turn could establish trust between the link sender and link recipient (Steward 2006). Such a trust often translates into further processing of information by the link recipient. Thus, in an online market environment, links in email newsletters act as a physical marker that tends to enhance the interaction between the sender and receiver (Stewart and Zhang 2003). In the Internet-based marketplace, such customer-firm interactions may reveal in the form of intention to buy (Jarvenpaa et al. 2000) and intention to trust (Mcknight et al., 2002). Furthermore, Stewart and Zhang (2003) find that the nature of such interactions depend on whether the links are used for partnership or advertisements. Firms use email marketing to communicate special information (such as new product launch, opening or closing hours, special events) to foster a partnership with consumers as well as to advertise products to sell. Moreover, in the context of email marketing, we note that the links in email newsletters are visible to customers only after opening the email. Therefore, links, both purchase and non-purchase, will influence consumers' subsequent responses towards the email newsletter as well as their purchase behavior only after email opening. Consequently, we hypothesize the following:

H3. The number of unique links (both purchase and non-purchase) in an email newsletter positively influence consumers' email responses (click and reopen) and their purchases.

Online advertising is dominated by the display, search, video, and mobile ads that increasingly make use of banners (Wall Street Journal, 2019). Furthermore, banner ads make a significant part of mobile advertising (Emarketer, 2017). Therefore, in email marketing, firms use banners to influence consumers' response behavior.[4] Studies in this area report that banner ads lead to an increase in consumers' response rates (Sherman and Deighton 2001), visit frequency (Rutz and Buckling 2012), brand awareness (Dahlen 2001), and customer purchase (Manchanda et al., 2006). Furthermore, incentives and emotional appeal used in banner ads increase their effectiveness via a higher click-through rate (Namin et al. 2020). Following these past studies, we conclude that the use of banners in the email newsletters may serve as the Internet atmospheric cues (Richard 2005) that could influence customers' response behavior. We note that banners are often visibly prominent display design elements in email newsletters that are often placed favorably at the top. Furthermore, often banners are also linked to external sites so that users can click on the banner to gather more information or make a purchase. Therefore, we argue that banners not only help in reducing the information overload by acting as Internet atmospheric cues but also helps in drawing consumer attention by linking the additional source of information thereby making consumers respond to emails and possibly help them purchase. Thus, we hypothesize the following:

H4. The number of banners in an email newsletter positively influence consumers' email responses (click and reopen) and their purchases.

[1] https://www.ftc.gov/enforcement/statutes/controlling-assault-non-solicited-pornography-marketing-act-2003-can-spam-act.

[2] By link, we actually mean Uniform Resource Locator (URL) link that allows consumers to take actions such as visiting a webpage, sending an email, or downloading a document.

[3] Cognitive balance theory (CBT) explains when the liking or disliking between entities are consistent based on two types of relationship between the entities: sentiment and unit formation. Sentiment refers to the evaluation of entities, whereas, unit formation refers to the perception of entities whether they belong together or not.

[4] Banners have become essential design elements of many email service providers that use them in creating email newsletters (Mailchimp, 2020; Campaign Monitor, 2019).

3.2. Effects of situational factors on consumers' email response and purchases

Situational factors are important considerations in retailing strategy (Lucia-Palacios et al. 2020). Therefore, in a retail setting, situational factors such as day of the week, special occasions, time of the launch, the time gap between email newsletters, and devices used in accessing the email newsletters can influence the consumers' responses toward the email newsletter. Situational factors such as time of the day (Kanuri et al. 2018), time of the week (Hanke and Hauser 2008), and holidays (DMD Intelligence 2018) have been found to have significant effects on consumers' advertising responses and their purchases. Also, for digital advertising, devices used by the consumers significantly influence their response towards them (Grewal et al., 2016). We note that these situational factors can be either controlled or better managed by the firms to increase the effectiveness of email newsletters. Therefore, we develop the following hypotheses.

Seasonal factors such as weekend and holidays have been reported to cause economic anomalies (Thaler 1987). Thus, the seasonality of consumer demand is a common phenomenon in retailing (Soysal and Krishnamurthi 2012) where it is reported that the retailers' pricing decisions follow weekend effect (Scholten et al. 2009). Furthermore, in an online marketing environment, consumer behaviors such as the Internet search (Bhargava and Ramachandran 2011), channel usage (Ravula et al. 2020), electronic word of mouth (Trusov et al. 2009), and response to search ads (Rutz and Bucklin 2011; Narayanan and Kalyanam, 2015) exhibit weekend and holiday effects. Moreover, consumers' responses to marketing communications are affected by the time of the day and day of the week (Tellis et al. 2000). Also, consumers' purchase behavior will be influenced by marketing communication received during weekend and holiday as these periods represent leisure time that could be used for shopping (Ravula et al. 2020). Following these studies, we argue that email newsletters that are sent on weekend and holidays will lead to higher consumers responses both in terms of their responses towards email newsletters and purchases. Thus, we hypothesize the following:

H5. Email newsletters sent on weekends and holidays will positively influence consumers' email responses (open, click and reopen) and their purchases.

Which ads to send to which customers at what time is the critical decision in an effective management of the marketing communication (Reyck and Degraeve 2003). In this regard, the launch time of the ad is an important factor that influences its effectiveness (Tellis et al., 2005). In an online environment, consumers' attention is influenced by the time of the day where it can affect systematic, schema-based, and detailed processing of information that could in turn affect their purchase intention (Goodrich 2013). Various industry reports on best practices for email marketing strategy indicate that email newsletters sent in the morning time or before noon have higher response rates (Litmus 2019). Thus, we hypothesize the following:

H6. Email newsletters sent in the mornings will positively influence consumers' email responses (open, click, and reopen) and their purchases.

Length and frequency are two important factors that influence the effectiveness of advertising (Jeong et al. 2011). In this study, we capture the frequency of email newsletters as the time gap between the two subsequent newsletters sent by the firm to its consumers. Industry reports (Campaign Monitor, 2019) recommend sending out at least one newsletter a month, but preferably once a week. Therefore, considering email a very personalized form of marketing communication also used for customer relationship management (Zhang et al. 2017), we will assume firms send at least one email newsletter on a weekly basis. While advertising repetitions help in recall, thereby, enhancing consumers' attitude towards the firm (Schmidt and Eisend, 2015), at the same time, such repetitions at longer length may intrigue the consumers but may be inconsequential in deeper connection due to the wear-out effect (Pechmann and Stewart 1988). In the context of email marketing, longer email gap may lead to non-relevance (Micheaux 2011), thereby, diluting the customer engagement at deeper levels. Thus, we hypothesize the following[5]:

H7. Increase in the time gap between two subsequent email newsletters will lead to an increase in email open but a decrease in email click, email reopen, and purchase.

Consumers' Internet browsing behavior varies across devices types such as handheld devices (e.g., smartphones) vs. personal computers (Ghose et al. 2013). Furthermore, online shopping behavior has been greatly influenced by the penetration of mobile devices (De Haan et al., 2018). However, we note that due to the relatively smaller screen size of handheld devices, consumer engagement with email newsletters will take place at a higher level (such as email open). Additionally, deeper customer engagements (such as email click, email reopen, and purchase) may be hampered as email newsletter alone may not be able to satisfy the users' varied utilitarian and hedonic needs on mobile devices (Ström et al. 2014). Thus, we hypothesize the following:

H8. On handheld devices, consumers are more likely to open email newsletters. However, the likelihood of email clicks, email reopen, and the purchase will be lower on handheld devices.

3.3. Effects of marketing communication on consumers' email responses and purchases

Firms take a conscious approach towards integrated marketing communication as consumers are using several touchpoints to interact with the firms, and many communication media have synergistic effects (Kumar et al. 2017). Notably, there exists a synergy between firms' email marketing and traditional marketing (Kumar et al., 2016). The effectiveness of emails can be attributed to two primary features of email marketing: permission-based marketing and facilitating two-way communication between firms and consumers. In this regard, Keller (2016) recommends maintaining an active email marketing program as a part of an integrated marketing campaign that combines emails with traditional marketing communication to facilitate consumer engagement and purchases. Therefore, we argue that integrating firms' other forms of marketing communications (such as a mention of catalogs, specials, and educational classes) into an email newsletter will increase the consumers' responses towards it and will spur purchases. We note that consumers will be aware of such information in an email newsletter only after opening the email. Thus, we hypothesize:

H9. : Integrating firms' other forms of marketing communications (such as catalog, specials, and educational classes) with email newsletters will positively influence consumers' email responses (click and reopen) and their purchases.

3.4. Effects of consumers' email responses on their purchases

Email newsletters have a positive impact on consumers' spending, profitability, and cross-buying (Kumar et al., 2016). Thus, sending regular email newsletters positively impacts consumers' attitudes towards the brand and their purchase intent (Müller et al., 2008). Furthermore, communication via emails are often personalized[6]; therefore, it is more

[5] We note that in hypothesizing the effect of time gap between two subsequent emails on consumers' response behavior we don't account for the carryover effect of email newsletters. Furthermore, such optimal frequency could also be determined by other factors such brand familiarity, message complexity, and message novelty.

[6] Even noninformative personalized content increases email responses (Sahni et al. 2018).

persuasive (PHELPS et al., 2004). Emails newsletters often simplify the buying and consuming process by reducing perceived risk, bringing cognitive consistency and psychological comfort, and simplifying information processing (Seth and Parvatiyar 1995). Furthermore, among other forms of digital marketing communication emails tends to empower consumers by enabling both consumers and firms to send and receive information anytime and anywhere, by facilitating the spread of information without the intervention of firms, and by supporting interactivity (Hartemo 2016). Such consumer empowerment in the communication process leads to a favorable consumer attitude towards the brand (Belanche et al. 2020). Therefore, we expect consumer who opens email newsletters will purchase more of the product items advertised in the email newsletter than those consumers who do not open them. Thus, we hypothesize the following:

H10. Consumers who open the email newsletter will purchase more of the product items advertised in the email newsletter than those who do not open it.

In an online marketing environment, there are eight factors, namely customization, contact interactivity, care, community, convenience, cultivation, choice, and character that foster loyalty (Srinivasana, Andersona, and Ponnavolu 2002). In this regard, emails being permission-based marketing has become an essential marketing medium to foster such customer loyalty (Kumar et al. 2014). Loyalty often leads to higher customer engagement and an increase in revenue (Umashankaret al., 2017). In the context of email newsletters, such customer engagement is often captured through users clicking on the links (either non-purchase links to gather and share information or purchase links to avail promotions or order products). Thus, email marketing helps firms to influence consumers' purchase and non-purchase behavior by providing links in the email newsletters (Schweidel et al. 2014). Thus, we hypothesize the following:

H11. Consumers who click on the email newsletter will purchase more of the product items shown in the email newsletter than those who do not click.

Finally, email marketing is permission-based marketing; therefore, it is highly personalized. Thus, there is a significant role of commitment and trust between the firm and consumers (Tran and Strutton 2020). If the content of newsletters is trustworthy and relevant, then consumers will reopen them again, leading to a long-lasting consumer relationship (Venkatesan and Kumar 2004), often translated into actual purchase behavior (Huntley 2006). Emails allow consumers to have a meaningful conversation asynchronously without the need for the sender and receive to face each other. Email reopening is one such act of meaningful communication. Emails being non-pervasive, consumers often engage with the relevant and interesting content at their comfort zone that leads to a sustained customer-firm relationship. Thus, we hypothesize the following:

H12. Consumers who reopen newsletter will purchase more of the product items shown in the email newsletter than those who do not reopen.

Concerning these hypotheses, we operationalize and code our data accordingly. In Table 1, we describe how we operationalize variables used in hypothesis development.

4. Data

The dataset for this study comes from a large retailer in the Northeast United States. The retailer specializes in selling wine and similar products through its stores and online channels. The retailer is one of the largest in the state and has received national recognition (e.g., Wine Spectator Retailer of the year). The retailer records the transaction data of consumers through a loyalty card relational marketing program. The scanner panel data spans over several years.

Table 1
Variable operationalization.

Variables	Operationalization
Open	A binary variable taking value 1 if a consumer opens[a] an email; otherwise, it is 0.
Click	A binary variable taking value 1 if a consumer clicks on an email; otherwise, it is 0.
Reopen	A binary variable taking value 1 if a consumer reopens[b] an email; otherwise, it is 0.
Purchase	Total purchase (in $) from a consumer of the product items shown in the email.
Email Attributes	
Subject Line Length	A total number of words in the subject line of each email newsletter.
Email Size	Size of the email newsletter in kilobytes (KB).
Purchase Links	A total number of links (hyperlinks) that directs consumers to the retailer's web page where they can order recommended products online.
Non-Purchase Links	A total number of links (hyperlinks) contained in an email campaign other than purchase links. This allows the user to navigate to other web pages.
Banner	A total number of banners contained in the email.
Situational Factors	
Weekend	A binary value of 1 if the campaign was sent during the weekend; otherwise, it is 0.
Holiday	We use Memorial Day, Independence Day, Labor Day, Halloween, Thanksgiving, Christmas, New Year, Valentine's Day, Easter, and Yom Kippur as holidays. This variable is 1 if an email newsletter was sent on those occasions; otherwise, it is 0.
Launch Time	This variable takes value 1 if a campaign was launched before noon. Otherwise, it is 0.
Time Gap	This variable is operationalized as time in days between two consecutive emails.
Device	A dummy variable taking value 1 if the open/reopen/click takes place on the handheld device. Otherwise, it is 0, which means personal computers were used.
Marketing Communications	
Catalog	A dummy variable that takes value 1 if the catalog sent by the retailer is mentioned in the email; otherwise, it is 0.
Weekly Specials	The retailer has weekly specials on certain products items. This dummy variable takes value 1 if weekly specials are mentioned in the email; otherwise, it is 0.
Educational Class	The retailer organizes educational wine classes that include sampling and tasting. This variable takes value 1 if events are mentioned in an email; otherwise, it is 0.
Consumer Characteristics	
Age	Age of the consumer in years.
Education	A total number of years spent in formal education by the consumer.

[a] Our definition of open captures the unique opening of an email newsletter for each consumer.
[b] Thus, for any consumer, if the number of opens is more than or equal to 2, reopen is 1.

Furthermore, the retailer adopts a blend of both traditional and online marketing communication to engage with its customers. As a part of its extensive marketing program, the retailer maintains an active email marketing program. Almost every week, the retailer sends email newsletters of various kinds to its consumers who have opted in to receive them. Consumers are encouraged to provide their emails to join the mailing list through in-store, online, and various other programs. Since most of the opt-in consumers are already purchasing from the retailer, they were tied to their loyalty card numbers, thus, enabling us to access their purchases. Note that no incentives were given to any consumers for opting in. The novelty of this data set is the ability to combine the email marketing database with the scanner panel data of customer purchase.

4.1. Email marketing database

Email marketing database contains actual email newsletters sent to the consumers and their email responses. We gather the following information from the email marketing database.

4.1.1. Consumers' email responses

We capture the consumers' email responses using open, click and reopen. Open, click, and reopen are binary variables that take value 1 for a consumer if an email newsletter is opened, clicked, and reopened by the consumer, respectively; otherwise, it is 0. We note that such responses are available at the individual consumer level for each of the email newsletters sent by the retailer over the study period.

4.1.2. Design elements of email newsletters

We include email attributes, situational factors, and marketing communication as email design characteristics. The database contains actual email newsletters that enable us to code their various features. The details of these attributes and how they are operationalized are given in Table 1. Furthermore, we also code the specific products featured in the newsletters that enable us to capture the sales generated from them.

4.2. Scanner panel data

Scanner panel data capture consumer purchases with detailed information on marketing mix variables and product information at the stock-keeping unit (SKU) level. Each email recipient can be tied back to the retailer's scanner panel data that allows us to capture her purchases of the product items shown in the email newsletters. Thereby, it becomes possible to tie consumers' email activities with their purchases. We note that promotional campaigns for most of the newsletter are valid for a week. Thus, we capture the sales attributed to an individual consumer's email responses to an email newsletter within a week from its launch time for the purchase of the product items shown in the email newsletter. The sales comprise of both online and offline purchases.

4.3. Data summary

The data descriptive of the variables are given in Table 2. Our sample constitutes data from January 2009 to December 2010, totaling 811 distinct email newsletters. In this sample, we randomly select 19678 individual consumers who have opened and clicked the newsletter at least once and have not unsubscribed during the study period. We find that only 2.39% of the opened email newsletters get clicked, whereas, for email reopening, this value stands at 23.09%. Email newsletters in the sample contain more non-purchase links (5.67) than purchase links (3.98). Most of the email newsletters are opened on non-handheld devices (56.39%), such as desktop computers or laptops. In our data sample, the time gap between two consecutive email newsletters is almost three days. However, during special occasions, the retailer tends to send email newsletters more frequently. As a part of the integrated marketing communication, most of the email campaigns contain the retailer's other forms of marketing communications such as reminding about a catalog (85.33%), weekly specials (21.95%), and educational classes (68.80%) for wine tasting and sampling.

Table 2
Data descriptive.

Variable	Mean	SD
Email Responses and Purchase		
Open (#/campaign)	635.24	611.14
Click (#/campaign)	15.21	34.17
Reopen (#/campaign)	146.73	163.07
Purchase ($/campaign)	16.14	42.26
Design Elements of Email Newsletters: Email Attributes		
Subject Line Length (words/campaign)	7.87	2.30
Email Size (KB/campaign)	51.05	11.19
Purchase Links (#/campaign)	3.98	2.69
Non-purchase links (#/campaign)	5.67	1.78
Banner (#/campaign)	4.81	2.51
Design Elements of Email Newsletters: Situational Factors		
	Percentage (%)	
Emails sent on weekends	2.10	
Emails sent on holidays	1.36	
Emails launched before noon	76.70	
The time gap between emails (in days)	2.87	
Email opened on handheld devices (#/campaign)	43.61	
Design Elements of Email Newsletters: Marketing Communications		
Emails containing Catalog reminders	85.33	
Emails containing Weekly Specials	21.95	
Emails containing Education Class	68.80	
Consumer Characteristics		
Age (years/customer)	34.28	
Education (years/customer)	14.78	

5. Empirical methods

Following our research framework, we propose our empirical strategy in two stages. In the first stage, we model the antecedents of consumers' email responses in terms of the design elements of the email newsletter. In the second stage, we model the consequences of consumers' email responses on their purchases. Such a two-stage modeling approach helps us to address the endogeneity due to customers' self-selection issues. The self-selection issue in email arises primarily due to the opt-in process, as email marketing is a form of permission-based marketing. We model all response variables at an individual consumer level.

5.1. The antecedents of consumers' email responses

Let $Open_{cet}$, $Click_{cet}$, and $Reopen_{cet}$ be binary variables that take value 1 if consumer c at time t has opened, clicked, and reopened newsletter e respectively, otherwise it is 0. Let $Open^{*}_{cet}$, $Click^{*}_{cet}$, and $Reopen^{*}_{cet}$ be the corresponding latent utilities associated with the observed binary variables. We model these latent utilities as a function of email attributes, situational factors, and marketing communications as follows:

$$Open^{*}_{cet} = \alpha_{1c} + \alpha_2 EAttr_{cet} + \alpha_3 SitFac_{cet} + \alpha_4 MktCom_{cet} + \varepsilon_{cet} \quad Open_{cet} = \left\{ \begin{array}{l} 1 \text{ if } Open^{*}_{cet} > 0 \\ 0 \text{ otherwise} \end{array} \right\} \tag{1}$$

$$Click^{*}_{cet} = \beta_{1c} + \beta_2 EAttr_{cet} + \beta_3 SitFac_{cet} + \beta_4 MktCom_{cet} + \xi_{cet} \quad Click_{cet} = \left\{ \begin{array}{l} 1 \text{ if } Click^{*}_{cet} > 0 \\ 0 \text{ otherwise} \end{array} \right\} \tag{2}$$

$$Reopen^{*}_{cet} = \theta_{1c} + \theta_2 EAttr_{cet} + \theta_3 SitFac_{cet} + \theta_4 MktCom_{cet} + \zeta_{cet} \quad Reopen_{cet} = \left\{ \begin{array}{l} 1 \text{ if } Reopen^{*}_{cet} > 0 \\ 0 \text{ otherwise} \end{array} \right\} \tag{3}$$

Where *EAttr*, *SitFac*, and *MktCom* refer to email attributes, situational factors, and marketing communications. The errors, $\Sigma = (\varepsilon_{cet}, \xi_{cet}, \zeta_{cet})'$, are distributed multivariate normal, i.e., $\Sigma \tilde{} MVN(0, \Omega)$. We capture consumer heterogeneity in a parsimonious way using random effects in the intercept terms only. Specifically, we model the intercept terms $\Phi_h = (\alpha_{1c}, \beta_{1c}, \theta_{1c})$, as follows:

$$\Phi = D_h \Theta + \Omega \tag{4}$$

Where D_h is the matrix of consumer characteristics consisting of age and education; Θ captures the corresponding coefficients associated with D_h; and $\Omega \tilde{} MVN(0, \Lambda)$. We note that email responses *Click* and *Reopen* are conditional events that can occur only after the opening of email newsletter has taken place, i.e., consumers cannot click or reopen unless he/she has opened the email first. Therefore, to account for the conditional events for click and reopen, we use Heckman correction method. We outline the details of the method in Appendix A.

5.2. The consequence of consumers' email responses

Let $Purchase_{cet}$ be the spending (in dollars) made by consumer c on the products items shown in the email newsletter e at time t.[7] We note that our operationalization of *Purchase* variable only includes consumer spending on those products that are featured in the email newsletter. Therefore, the value of this variable may be observed as zero for some periods for some consumers. Thus, the observed data for *Purchase* might be zero-inflated. To account for such zero-inflated data, we use Tobit model (Min and Agresti 2002).[8]

Therefore, let $Purchase^{*}_{cet}$ bet the latent purchase variable which is related to observed $Purhcase_{cet}$ as follows: $Purchase_{cet} = \begin{cases} Purchase^{*}_{cet}, & if\ Purchase^{*}_{cet} > 0 \\ 0, & if\ Purchase^{*}_{cet} \leq 0 \end{cases}$. Then, we model $Purchase^{*}_{cet}$ as a function of consumer c's email responses and design characteristics of the email newsletters as follows[9]:

$$Purchase^{*}_{cet} = \delta_{1c} + \delta_2 Open_{cet} + \delta_3 Click_{cet} + \delta_4 Reopen_{cet} + \delta_5 EAttr_{cet} + \delta_6 SitFac_{cet} + \delta_7 MktComm_{cet} + \omega_{cet} \quad (5)$$

The definition of explanatory variables are same as earlier. Our main parameters of interest are $\delta_2\delta_3$, and $\delta_4$that capture the effects of email open, click, and reopen on consumers' purchases of the product items shown in the email, respectively. The error term is distributed normal, i.e., $\omega_{cet} \sim N(0, \sigma^2)$. Heterogeneity is specified in a parsimonious way using random effect for the intercept term only. More specifically, $\delta_{1c} \sim N(D_h\pi, \tau^2)$ where D_h is consumer characteristics consisting of age and education; captures the corresponding coefficients associated with D_h.

We note that due to consumers' self-selection into the opt-in list, the effects of their responses, *Open*, *Click*, and *Reopen*, are endogenous. Therefore, we use an instrument variable approach to account for this. Following prior literature (Algesheimer et al., 2010; Papies et al. 2017), we use a linear probability model to predict the probability of a consumer opening (*OpenProb*), clicking (*ClickProb*), and reopening (*ReopenProb*) from the first stage, and use these predicted probabilities to substitute *Open*, *Click*, and *Reopen* in Equation (5) for the estimation. Thus, email attributes, situational factors, and marketing communications serve as instruments.

5.3. Model estimation

We use a hierarchical Bayesian method to estimate our model (Rossi et al. 2012). Furthermore, we use data augmentation techniques for the latent variables. Markov chain Monte Carlo (MCMC) methods are used to simulate the parameters draws for which we use a total of 50,000 iterations with a "burn-in" of 40,000 iterations. Then, we use the last 10,000 iterations for calculating posterior means and standard errors of the model parameters after ensuring that the convergence criteria are met.

6. Empirical results

In Table 3, we present our empirical results from the proposed model estimation.

6.1. Effects of the antecedents of consumers' email responses

We include only those email attributes in email opening that are more likely visible to the recipients. In this regard, we find that longer subject line length (-0.05, $p \leq .01$) and larger email size (-0.22, $p \leq .01$) reduce the likelihood of email opening. Concerning situational factors, our results suggest that whereas emails launched before noon (0.19, $p \leq .05$) increases the likelihood of email opening, weekend (-0.31, $p \leq .01$) launch of emails tends to reduce the opening likelihood. The negative effect of the weekend on email opening can be attributed to the legislation that requires liquor stores to limit the sales of alcohol during the weekend.[10] Compared to non-handheld devices, we find that the likelihood of email openings is higher on handheld devices (0.85, $p \leq .01$). Interestingly, as the time gap (0.79, $p \leq .01$) between two subsequent email newsletters increases, so does the consumers' likelihood of email opening.

While subject line length and size of email do not affect click, several other email attributes such as purchase links (0.70, $p \leq .01$), non-purchase links (0.19, $p \leq .01$), and banner (0.02, $p \leq .01$) increase the likelihood of consumers' email click. Concerning situational factors, on the one hand, weekend (0.78, $p \leq .05$) launch increases the likelihood of consumers' email click, on the other hand, holiday (-0.96, $p \leq .05$) and longer time gap (-0.93, $p \leq .01$) between emails have a negative impact on the click likelihood. Interestingly, on handheld devices (-0.56, $p \leq .05$), consumers are less prone to click the email newsletter. Integrating other forms of marketing communications into email newsletters such as showing weekly specials (0.18, $p \leq .01$) and informing about educational class (0.98, $p \leq .01$) have a positive effect on click likelihood.

Finally, concerning the consumers' email reopening, we find that few email attributes such as the number of purchase (0.12, $p \leq .01$) and non-purchase (0.86, $p \leq .01$) links increase the reopen likelihood, whereas others such as larger email sizes (-0.29, $p \leq .05$) tend to decrease the reopening likelihood. Regarding situational factors, we find that holidays (0.52, $p \leq .05$) and emails launched before noon (0.06, $p \leq .01$) tend to increase the reopening likelihood, whereas a longer time gap (-0.34, $p \leq .01$) between subsequent email newsletters decreases the reopening likelihood. The likelihood of email reopening is higher on handheld devices (0.65, $p \leq .01$) compared to non-handheld devices. Consistent with the results from email clicks, we find that integrating other forms of marketing communications such as mentioning of a catalog (0.22, $p \leq .01$), showing weekly specials (0.17, $p \leq .05$), and informing about educational class (0.48, $p \leq .01$) have a positive effect on the likelihood of email reopening.

Concerning consumer heterogeneity, we find that older customers are less prone to email opening (-1.31, $p \leq .05$) and email clicking (-1.001, $p \leq .01$). However, they have a higher propensity to reopening (0.32, $p \leq .01$). Customers with a higher level of education are more likely to open (0.95, $p \leq .01$) and click (0.77, $p \leq .01$) the email newsletters, but less likely to reopen (-0.75, $p \leq .05$) email newsletters.

6.2. Estimates of the consequences of consumers' email responses on their purchases

Our empirical results suggest that there is a significant impact of consumers' email responses on their purchases of the product items shown in the email newsletters. In this regard, we find that click (0.06, $p \leq .01$) has the highest impact followed by email reopening (0.05, $p \leq .01$) and email opening (0.04, $p \leq .01$). Furthermore, email attributes such as the number of purchase links (0.02, $p \leq .01$), non-purchase links (0.01, $p \leq .01$), and banners (0.04, $p \leq .05$) have a positive influence on consumer purchase, whereas, longer subject line length (-0.03, $p \leq .05$) negatively influence consumer purchase. Our results suggest that holidays (0.08, $p \leq .01$) have a positive influence on consumer purchase, whereas the weekend has no effect. Furthermore, as the time gap (-0.007, $p \leq .01$) between subsequent emails increases, consumer

[7] In our setting, we include all the purchase made by consumer for the product items shown in the email newsletters within a week from the launch of the email newsletter.

[8] In Appendix B, we provide the details of zero-inflated data modeling.

[9] Even though, in our data same newsletters are sent to all the consumers, it is possible that the firms can send personalized newsletters to individual consumer.

[10] https://sla.ny.gov/system/files/documents/2018/06/special-event-permit-terms-and-conditions.pdf.

Table 3
Empirical results.

Variables	Consumers' Email Responses						Consumer Purchase	
	Open		Click		Reopen		Purchase	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Email Attributes								
Subject Line Length	-0.0463***	0.0017	-0.0478	0.0387	-0.5577	0.3234	-0.0303**	0.0124
Email Size	-0.2213***	0.0317	-0.6987	0.4218	-0.2942**	0.1201	-0.0804	0.0643
Purchase Links	–	–	0.7001***	0.1856	0.1241***	0.0148	0.0213***	0.0116
Non-Purchase Links	–	–	0.1876***	0.0332	0.8648***	0.2312	0.0092***	0.0013
Banner	–	–	0.0218***	0.0056	0.0964	0.0986	0.0441**	0.0288
Situational Factors								
Weekend	-0.3076***	0.1411	0.7765**	0.3317	0.0012	0.0418	-0.0054	0.0065
Holiday	0.9854	0.9834	-0.9571**	0.3986	0.5217**	0.2213	0.0767***	0.0107
Launch Time	0.1961**	0.0807	0.3387	0.1904	0.0601***	0.0068	0.0541	0.0935
Time Gap	0.7908***	0.2481	-0.9288***	0.2267	-0.3389***	0.1012	-0.0072***	0.0018
Handheld Device	0.8455***	0.2106	-0.5614**	0.2367	0.6476***	0.1236	-0.0006***	0.0001
Marketing Communications								
Catalog	–	–	0.7566	0.4226	0.2231***	0.0323	0.0378***	0.0126
Weekly Specials	–	–	0.1765***	0.0211	0.1734**	0.0736	0.1481***	0.0218
Educational Class	–	–	0.9781***	0.0754	0.4788***	0.1123	0.1762**	0.0423
Email Responses								
Open	–	–	–	–	–	–	0.0373***	0.0209
Click	–	–	–	–	–	–	0.0558***	0.0312
Reopen	–	–	–	–	–	–	0.0464***	0.0103
Age	-1.3133**	0.4876	-1.0015***	0.2254	0.3214***	0.1078	0.0011	0.0062
Education	0.9541***	0.2013	0.7742***	0.1589	-0.7543***	0.2165	0.0024**	0.0012
Intercept	-0.3287**	0.0219	-0.3334***	0.0376	-0.2534***	0.0126	0.0154	0.0711

***p $\leq$ .01.
**$p \leq .05$ (99% and 95% confidence intervals do not contain 0).
Consumers' email responses are modeled using multivariate probit model with Heckman correction.
Consumer purchase is modeled using tobit model that accounts for zero-inflated data modeling.

purchases of the product items advertised in the email newsletters tend to decrease. Also, emails opened on handheld devices (-0.001, $p \leq .01$) have a negative impact on consumer purchases. Our results suggest a positive influence of catalog (0.04, $p \leq .01$), weekly specials (0.15, $p \leq .01$), and educational class (0.17, $p \leq .05$) on the customer purchase of the product items featured in the email newsletter.

Concerning customer heterogeneity, we find that more educated (0.22, $p \leq .05$) customers are more likely to spend. There is no effect of customers' age on their purchases.

6.3. Summary of results

While we do find support for several of our hypotheses, there is considerable variability. Concerning our hypothesis 1, while we find support for email open and purchases, the evidence does not exist for email click and reopen. Thus, emails' subject line is less of a concern for click and reopen that occur conditionally on consumers' email opening. We find support with regards to email open and reopen for our hypothesis 2, but there is no significant evidence for click and purchase. We find full support for hypothesis 3 where the number of links, both purchase and non-purchase, in an email newsletter positively influence email click, email reopen, and purchases. For our hypothesis 4, we find support for email click and purchase, but not for reopen. Thus, in conclusion, email design elements have effects that vary across consumers' email responses and purchases.

We find empirical results have mixed support for hypotheses on situational factors. The support for the effects of weekend and holidays on consumer responses, i.e., hypothesis 5, is mixed. This could be attributed to the nature of the alcohol product category that has a restriction on selling during such special occasions. For email launch time, i.e., hypothesis 6, we find support for email open and email reopen, but there is no support for email open and customer purchase. For hypothesis 7, we find full support. Thus, the frequency of email has a significant influence on consumer response behavior. Also, while handheld devices increase the likelihood of email opening, their effect on email click, reopen, and the purchase is negative, confirming the support for hypothesis 8. Thus, we conclude that while situational factors prominent factors that influence consumers' responses towards digital advertising, we note that such effects can be moderated by several other factors such as business type (e.g., B2B vs. B2C firms), product category (e.g., durable vs. non-durable products), and consumption context (e.g., utilitarian vs. hedonic consumption).

Concerning hypothesis 9, we find full support for the positive influence of the firm's integrated marketing communication on consumer purchases; however, there is considerable variability when it comes to consumers' email responses. There is full support for the positive influence of weekly specials and educational class on email open and reopen; however, the catalog only has a positive impact on email reopen and does not influence email click. Thus, retailers should be mindful of how to approach their integrated marketing program into email marketing to influence consumers' email responses towards email newsletters.

Finally, we find complete support for hypotheses 10–12. Such a positive impact of consumers' email responses on consumer purchases should motivate firms to manage their email marketing program actively. Support for these hypotheses also provides firms with a credible metric to measure the return on investment of their investment in the email marketing program. Next, we explore the relative strengths of these email responses on purchases.

6.4. Relative strength of consumers' email responses on their purchases

Our results suggest that consumers' email responses to the newsletter have a positive impact on their spending. Due to the sequential nature of email responses (De Bruyn and Lilien 2008), their combined effect on spending may be more meaningful for email marketing strategies.

Therefore, for each newsletter in our sample, we compare the four sets of consumers' email responses, 1) open only, 2) open and reopen only, 3) open and click only, and 4) open, click, and reopen, on their spending to the base case of consumers' spending who do not respond to that particular email newsletter at all. In Fig. 2, we report the percentage change in the customer spending for these four cases compared to the base case. While email opening (1.38%) certainly have a positive impact on lifting customers' purchases, we find that customers who open and click (5.53%) on emails purchase more than those customers who open and reopen (3.45) email but do not click. However, consumers who indulge in all three responses, open, click, and reopen, spend most (7.61%) than those customers who do not respond to email newsletters at all.

7. Managerial implications

We offer the following managerial insights into email marketing based on our empirical findings and simulation results.

7.1. Choose metrics carefully for attribution

A better understanding of consumers' email responses is critical as these responses directly affect sales that are attributed to the email newsletter. However, focusing on meaningful metrics is equally important to optimize the outcome. Our results suggest that email click has the highest impact on sales generated from the purchase of product items shown in the email newsletters. Also, managers obsessed with open rates should focus on email reopen as another metric. To this end, we carry out a simulation study where keeping other variables constant, we sequentially increase the probabilities of click, open, and reopen, and then calculate the percentage change in purchases to the base case. The results of this simulation are shown in Fig. 3. The simulation confirms the importance of email clicks on purchases as an increase in click probability has the highest positive impact on the rise in customer spending. However, we find contrasting effects with regards to email opening and reopening. There is an inflection point around the probability of 0.41 below which email reopening has a higher impact on customer spending than email opening, and above this point, the effect reverses. Thus, marketers should strategically choose meaningful metrics to optimize the effects of email newsletters on consumer purchases.

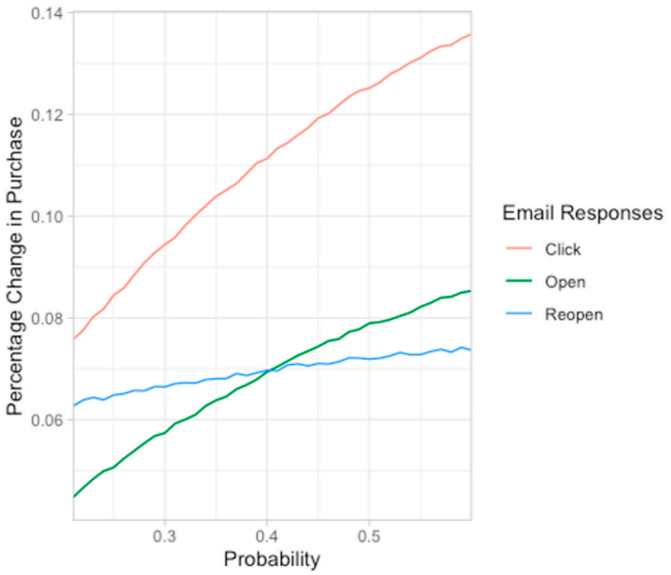
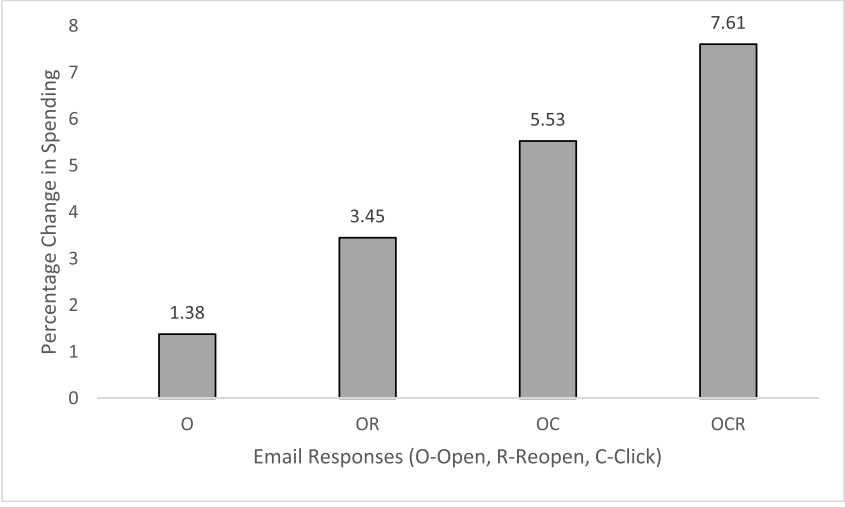


Fig. 3. Simulation study: Relative strengths of consumers' email responses.

7.2. Focus on email design elements

Consumers use email newsletters as a source of entertainment, engagement, interaction, shopping, and information search, among others. Firms should keep in mind that these tools should simplify their purchase decisions. Therefore, the design and execution of email newsletters are crucial to the success of email marketing (Sahni et al. 2018). In this regard, our results highlight the significance of various email attributes, situational factors, and marketing communications. Specifically, the subject line length, email size, purchase links, non-purchase links, and banner should be taken into consideration while designing the email newsletter. Shorter and succinct subject line improves email open, click, and reopen. The presence of both purchase and non-purchase links positively influence consumers' email responses as well as their purchases. Also, marketers can creatively design the banners in the email newsletters as they happen to positively influence consumers' email click and purchase. Furthermore, the frequency of sending the email newsletters should be optimized as it has a mixed



Note: The base case is the consumers who do not respond at all to an email newsletter.

Fig. 2. Relative Strengths of Consumers' Sequential Email Responses
Note: The base case is the consumers who do not respond at all to an email newsletter.

effect on email responses as well as purchase. To that end, we recommend marketers to experiment and accordingly setting the benchmark for one of the email marketing metrics that would like to optimize. For example, if the main goal of the marketers is to increase the email open rate, then, they could experiment with sending newsletters daily, weekly, or monthly, and compare the email open rate across these different conditions to find the sweet spot for sending frequency accordingly. Thus, in conclusion, situational factors are essential design considerations that are under the control of marketers to improve the performance of email marketing.

7.3. Integrate other marketing communication with email newsletter

Firms are using a mix of marketing communications as a part of their marketing communication strategy (Kumar et al. 2017). Consumers are also consuming different media within a short period simultaneously, a phenomenon termed as media multiplexing (Lin et al. 2013). Therefore, integrating other forms of marketing communication with email newsletters has the potential of increasing the efficacy of email marketing. Our results suggest that reinforcing firms' types of marketing communications (such as catalog and weekly specials) with email newsletters has positive effects on consumers' email responses as well as their purchases.

7.4. Use emails to simulate consumer spending but first focus on customer engagement

While emails are proper marketing tools to foster customer engagement (Sahni et al. 2018), there has been a constant debate on the effectiveness of email on stimulating consumer spending (Zhang et al. 2017). Our research findings provide evidence that consumers engaged in email newsletters (as evidenced by their responses towards email newsletters in the form of open, reopen, and click) tend to spend more. A higher level of email engagements such as click and reopen is more effective than a lower level of commitment, such as email open. Therefore, we recommend email marketing managers to deepen the customers' engagement with the email newsletter to stimulate customer spending. In this regard, managers can take a cue from various design elements of email newsletters that are highly effective in engaging consumers via emails.

8. Conclusion and limitations

In this study, we disentangle the relationship between consumers' email responses and their purchase of the product items shown in the email newsletter. We capture consumers' email responses along three dimensions: open, click, and reopen. Using a novel dataset that combines scanner panel data with an email marketing database, we empirically examine the relationship at an individual consumer level. Our results suggest that consumers' email clicks have the highest effect on their purchases, followed by email reopening and opening. However, our simulation study shows that for emails with the low open probability, it is a better strategy to focus on email reopening. However, as the open probability increases and crosses a threshold, the role of email opening is larger than email reopening on consumer purchases. Our results show significant effects of email design characteristics (such as email attributes, situational factors, and marketing communication) on consumers' email response as well as their purchases. Therefore, such insights can be used in designing the email for optimal return on investment from email marketing.

There are some limitations to our study. First, there could be a significant effect of consumer characteristics, such as consumer psychographics, on their email responses as well as purchases. Therefore, customer heterogeneity can be captured using a rich set of psychographic variables that are important in influencing online customer behavior. Second, there could be dynamic effects of consumers' email responses to email newsletters on their purchase behavior over the period. Such dynamics could be due to the repeated exposure to email newsletters to consumers. In our empirical setting, we account for only the contemporaneous effects of consumers' email responses on their purchase. Finally, for an optimal combination of email design characteristics that increases the return on investment of email marketing, one could experiment with several design factors. We leave these limitations for future research avenue.

Appendix-A. Heckman Correction Model

In our model setup, Equations (1)–(3), we note that consumers' email responses click and reopen take place only after consumers have opened the email. Thus, we have the following scenario:

$$Click = 1 \Leftrightarrow Open = 1$$

$$Reopen = 1 \Leftrightarrow Open = 1$$

Therefore, in Equations (2) and (3), the errors are correlated with error of Equation (1). In general,

$$E(\xi|\varepsilon) = \gamma_1.\varepsilon$$

and

$$E(\zeta|\varepsilon) = \gamma_1.\varepsilon$$

Therefore, if $\gamma_1 \neq 0$ and $gamma_2 \neq 0$ then it will introduce selectivity bias in the estimates for click and reopen equations respectively.

We note that:

$$E[Click|X,\varepsilon] = X\beta_{Click} + E(\xi|X,\varepsilon) = X\beta_{Click} + \gamma_1.\varepsilon$$

$$E\left[Reopen|X,\varepsilon\right] = X\beta_{Reopen} + E(\xi|X,\varepsilon) = X\beta_{Reopen} + \gamma_2.\varepsilon$$

We need the expected value of *Click* and *Reopen* conditional on *X* and *Open*:

$$\begin{aligned} E[Click|X,Open] &= E[(X\beta_{Click} + \gamma_1.\varepsilon)|X,\varepsilon,Open] \\ &= X\beta_{Click} + \gamma_1.E[\varepsilon|X,Open] \\ &= X\beta_{Click} + \gamma_1.g_1(X,Open) \end{aligned}$$

Similarly,

$$E[Reopen|X, Open] = E\left[\left(X\beta_{Reopen} + \gamma_1.\varepsilon\right)|X, \varepsilon, Open\right] = X\beta_{Reopen} + \gamma_1.E[\varepsilon|X, Open] = X\beta_{Reopen} + \gamma_1.g_2(X, Open)$$

Based on the above conditions, i.e., $Click = 1 \Leftrightarrow Open = 1$ and $Reopen = 1 \Leftrightarrow Open = 1$, we need to find $g_1(X, 1)$ and $g_2(X, 1)$ such that:

$$E\left[\varepsilon|X, Open = 1\right] = E[\varepsilon|\varepsilon \geq -X\beta_{Open}]$$

This implies that ε follows a truncated normal distribution for which we can use the following known result:

$$E[z|z > a] = \frac{\phi(a)}{1 - \varphi(a)}$$

where a is a constant, ϕ is the standard normal probability density function (pdf), and φ is the standard normal cumulative distribution function (cdf). Thus,

$$E[\varepsilon|X, Open = 1] = \frac{\phi\left(-X\beta_{Open}\right)}{1 - \varphi\left(-X\beta_{Open}\right)} = \frac{\phi\left(X\beta_{Open}\right)}{\varphi\left(X\beta_{Open}\right)} = \lambda\left(X\beta_{Open}\right)$$

lambda is called the inverse Mills ratio and associated parameter is called selectivity correction parameter (*gamma*). Thus, we include this terms in *Click* and *Reopen* equations to get the unbiased estimates as follows:

$$E[Click|X, Open = 1] = X\beta_{Click} + \gamma_{Click}\lambda\left(X\beta_{Open}\right)$$

$$E[Reopen|X, Open = 1] = X\beta_{Reopen} + \gamma_{Reopen}\lambda\left(X\beta_{Open}\right)$$

Appendix-B. Zero-inflated Data Modeling

Not all the consumers will purchase advertised product items via email, *e*, in a given time period, *t*. Thus, the consumer spending variable $Purchase_{cet}$ will contain zeros. Depending on the frequency of the newsletter and the type of product advertised in it, there is a possibility that this variable is zero-inflated. To model such zero-inflated data we use Tobit modeling. Specifically, the Tobit model assumes the underlying normally distributed variable $Purchase^*_{cet}$ such that:

$$Purchase_{cet} = \begin{cases} Purchase^*_{cet}, & if\ Purchase^*_{cet} > 0 \\ 0, & if\ Purchase^*_{cet} \leq 0 \end{cases}$$

Including the explanatory variables, the model assumes the following form (Equation (5)):

$$Purchase^*_{cet} = X\delta_{Purchase} + \omega_{cet}$$

where X is the set of explanatory variables as specified in Equation (5), and the error term is distributed normal, i.e., $N(0, \sigma^2)$. Let ϕ be the probability density function (pdf), and φ the cumulative distribution function (cdf) of the $N(0, 1)$ distribution. For the Tobit model, the probability of zero observation is:

$$P(Purchase_{cet} = 0) = P(X\delta_{Purchase} + \omega_{cet} \leq 0) = P(\omega_{cet} \leq -X\delta_{Purchase}) = \varphi\left(\frac{-X\delta_{Purchase}}{\sigma}\right) = 1 - \varphi\left(\frac{X\delta_{Purchase}}{\sigma}\right)$$

Conditional on $Purchase_{cet} > 0$, its pdf is:

$$f(Purchase_{cet}; \delta_{Purchase}, \sigma) = \sigma^{-1}\phi\left(\frac{Purchase_{cet} - X\delta_{Purchase}}{\sigma}\right)$$

Thus, the likelihood function for the sample of n independent observations is:

$$\ell(\delta_{Purchase}, \sigma) = \left[\prod_{Purchase_{cet=0}} \left\{1 - \varphi\left(\frac{X\delta_{Purchase}}{\sigma}\right)\right\}\right]\left[\prod_{Purchase_{cet>0}} \left\{\sigma^{-1}\phi\left(\frac{Purchase_{cit} - X\delta_{Purchase}}{\sigma}\right)\right\}\right]$$

The model assumes normality for the distribution of the error term, with constant variance.

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