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Journal of Retailing 87 (1, 2011) 1–17

Journal of Retailing

Does Online Information Drive Offline Revenues? Only for Specific Products and Consumer Segments!

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Abstract

While many offline retailers have developed informational websites that offer information on products and prices, the key question for such informational websites is whether they can increase revenues via web-to-store shopping. The current paper draws on the information search literature to specify and test hypotheses regarding the offline revenue impact of adding an informational website. Explicitly considering marketing efforts, a latent class model distinguishes consumer segments with different short-term revenue effects, while a Vector Autoregressive model on these segments reveals different long-term marketing response.

We find that the offline revenue impact of the informational website critically depends on the product category and customer segment. The lower online search costs are especially beneficial for sensory products and for customers distant from the store. Moreover, offline revenues increase most for customers with high web visit frequency. We find that customers in some segments buy more and more expensive products, suggesting that online search and offline purchases are complements. In contrast, customers in a particular segment reduce their shopping trips, suggesting their online activities partially substitute for experiential shopping in the physical store. Hence, offline retailers should use specific online activities to target specific product categories and customer segments.

Keywords: Offline revenue effects of an informational website; Web-to-store shopping; Sensory products; Latent class model; Vector Autoregressive models

Introduction

Since the commercialization of the World Wide Web, most established offline companies have set up websites to increase revenues. Many of these websites do not allow customers to make purchases online (Carroll 2002; Okazaki 2005; Van den Berg 2008)[1]; that is, they are *informational* instead of transactional (Teo and Pian 2004). Retailers may have many reasons to forego a transaction function on their website, including high expected costs and low expected benefits. As to the former, informational websites are easier to implement, because they do not require integration with the follow-up processes demanded by online orders. As to the latter, a majority of consumers still prefer to purchase in physical stores (67 percent according to Accenture, 2007), while using the Internet for information search regarding product features and prices (Mendelsohn, Johnson, and Meyer, 2006). This strategy of researching online and buying offline has been coined 'web-to-store' shopping or 'research' shopping (Verhoef, Neslin, and Vroomen 2007). Interestingly, especially heavy Internet users use the Internet for such pre-purchase information search (Jepsen 2007).

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[1] Carroll (2002) and Van den Berg (2008) report that respectively 70 percent and 63 percent of company websites do not allow customers to make purchases online. Okazaki (2005) considers European websites for the US brands in Business Week's 'Top 100 Global Brands'. Even for this select sample, only a minority of websites (49.6 percent, as computed from his table III, line 8) allow for online purchase. Unfortunately we found no references for how many *retailer*'s sites are transactional, a task which is complicated by the current fusion between retailers and manufacturers. Famous examples of 'pure' retailers with an informational website include Ikea, Zara, We and Bailey, Banks and Biddle in the US, and Hema and Kruidvat in the Netherlands.

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doi:10.1016/j.jretai.2010.10.001

Despite the rush of offline retailers to set up informational websites, the revenue implications of such actions are not well understood. Indeed, marketing literature has focused on transactional websites (e.g., Ansari, Mela, and Neslin 2008; Biyalogorsky and Naik 2003; Danaher, Wilson, and Davis 2003; Pentina, Pelton, and Hasty 2009; Zhang and Wedel 2009) and websites supported by third party advertisers (Deleersnyder et al. 2002; Geyskens, Gielens, and Dekimpe 2002; Pauwels and Weiss 2008). As a result, "systematic study of the Internet as an information source has been limited" (Ratchford, Lee, and Talukdar 2003), although informational websites can be an important part of shaping the customer experience (Grewal, Levy, and Kumar 2009).

Studies on the Internet as an *information channel* have concentrated on the benefits to consumers (Ratchford, Lee, and Talukdar 2003), not on the revenue performance implications for the company. The main exception is Lee and Grewal (2004), who investigate the *financial* market valuation impact of adding the Internet as a communication channel. As a result, current marketing literature is still silent on whether and how adding an informational website affects offline customer buying behavior and company revenue performance. The most likely cause is the inability to combine data regarding actual search behavior in one channel with actual buying behavior in another for a specific company (Neslin et al. 2006; Thomas and Sullivan 2005). Indeed, studies relating online browsing with offline buying in general (e.g., Rasch and Lintner 2001; Verhoef, Neslin, and Vroomen 2007) cannot show whether such online search benefits the offline revenues of the company that operates the informational website.

The impact of both the introduction of a website and of its related marketing actions likely depends on product type (Huang, Lurie, and Mitra 2009). As a result, several recent papers (Neslin et al. 2006; Verhoef, Neslin, and Vroomen 2007) call for further research on actual search and purchase behavior from a *single firm* perspective, explicitly distinguishing customer segments and product categories and considering the impact of marketing actions.

This paper aims to answer these calls by studying the revenue performance impact of introducing an informational website for an offline department store with many, and very different product categories. We draw on the information search literature to specify and test hypotheses regarding the offline revenue impact of adding an informational website. We use data from a panel of individual customers that contains offline purchase behavior, customer characteristics, and website use data. We first segment customers based on their short-term response to website introduction and marketing actions using latent-class segmentation (Kamakura and Russell 1989). This analysis reveals three distinctive customer segments. Vector Autoregressive models reveal the differences in short-term and long-term responses of these customer segments to website introduction and online marketing actions (price promotions and non-price communications). Finally, we investigate whether the revenue impact derives mostly from changes in customer numbers, shopping trips per customer, products bought per trip or money spent per product.

To the best of our knowledge, this is the first study to (1) quantify the short-term and long-term effects of introducing an informational website on different offline revenue components, (2) distinguish the performance implications for different types of products and (three) customer segments, and (3) which is based on a methodology that combines latent class analysis and VARX modeling. We find support for our hypotheses that:

1) The revenue impact of web site introduction is positive in the short run, because it draws more customers to the store.
2) The long-run revenue impact of web site introduction depends on the customer segment: while consumers in two out of three segments buy higher margin products, consumers in the remaining segment reduce their shopping trips to the store.
3) The revenue impact of website introduction is higher for sensory products than for non-sensory products.
4) The revenue impact of website introduction is higher for customers living farther away from the store and for customers with high web visit frequency.
5) Online promotions increase revenues in the short run, but non-price online communications do so in the long run.

Conceptual development

By adding an informational website, managers aim to increase offline store revenue components, such as inducing customers to spend more *money* per product, increasing the number of *products* bought per trip, increasing the frequency of store *trips* per week, or increasing the number of weekly *customers* (Lam et al. 2001). All of these intended benefits require (some) customers to adapt their behavior in response to the informational website.

In this study we decompose (weekly) offline buying behavior into managerially relevant elements, as detailed in Eq. (1):

$$\text{Total Offline Revenue}_t = \frac{\tilde{M}_t}{\tilde{P}_t} \times \frac{\tilde{P}_t}{\tilde{T}r_t} \times \frac{\tilde{T}r_t}{C_t} \times C_t \qquad (1)$$

where for week t, $\tilde{M}_t$ is the monetary value spent, $\tilde{P}_t$ is the total number of products purchased, $\tilde{T}r_t$ is the total number of shopping trips and C_t is total number of customers. The first component represents the money spent per product bought (hereafter Money_t), that is, the average retail price. The second component represents the number of products bought per shopping trip (hereafter Products_t), that is, the size of the basket. The third component represents the frequency of shopping trips among that week's customers (hereafter Trips_t). Finally, the fourth component represents all panelists who shopped at least once in week t (hereafter Customers_t).

Previous literature using a decomposition of (sales or revenue) performance has most often analyzed the effects of price promotions (e.g., Gupta 1988; Pauwels, Hanssens, and Siddarth 2002). Price promotions tend to increase products bought in the category over several weeks, but do not affect any component of retailer revenue in the long run (Nijs et al. 2001; Pauwels, Hanssens, and Siddarth 2002). While we use the price promo-