



Basket Composition and Choice Among Direct Channels: A Latent State Model of Shopping Costs ☆

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Abstract

Shoppers of multi-channel retailers often place orders using different channels on different shopping occasions. The differential use of channels is related to both basket composition and channel characteristics, such as the ability of the channel to provide additional information that resolves uncertainty about the purchase. In this paper, we examine the impact of basket composition on the choice among direct channels. We develop a two-stage, shopping cost model with two, latent states. Given a shopping basket, the shopper first decides if she needs additional information about items in the basket. If she is uncertain about the items in the basket meeting her needs, she uses an information rich channel, such as the retailer's website or call center, and risk reduction costs become salient in addition to the other shopping costs. If she does not require additional information, she places her order by choosing among all available channels, and she may incur a welfare loss from making a purchase that does not optimally meet her needs. We operationalize welfare loss with Shannon information and various metrics based on purchase history.

Our empirical setting is a data set from a catalog retailer that offers multiple direct channels. Our estimates show that basket composition impacts channel choice. Large baskets shift to the Internet channel, suggesting that the Internet channel has lower ordering costs. High-risk baskets shift to call centers and this suggests that the call center has lower risk reduction costs. Collectively these estimates provide evidence for the notion of channel specialization—some channels are better at addressing certain shopping costs compared to others. Our estimates also show that electronic self-service channels have high initial access costs and a significant learning curve compared to the call center suggesting that these channels might be better suited to heavy users. We use the estimated model to quantify the value of channels, to identify categories that need risk reduction, and to segment and target shoppers for Internet ordering based on basket size and the potential to accumulate experience.

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Keywords: Multi-channel shopping; Internet retailing; Channel specialization; Direct marketing; Shopping costs; Internet; Call centers; Price shocks; Hierarchical Bayes; Dynamic linear model; Shannon information; Welfare loss

Introduction

“Technology when you want it, people when you don't.”
The Tag Line from an insurance T.V. Commercial

Shoppers of multi-channel retailers often place orders using different channels on different shopping occasions. For example

during one purchase occasion, a shopper might place an order using a call center, and on another occasion, the same shopper might use a self-service technology like the Internet (Rangaswamy and Van Bruggen 2005). In this paper, we examine the impact of changes in basket composition on the choice among direct channels. The setting for our investigation is transactional data from a catalog/direct retailer where shoppers first receive a catalog/mailler and then make choices between different direct channels such as the Internet, call center, mail and automated telephone ordering systems to complete the transaction. Shoppers might need additional information over and above the catalog. Building on the existing literature on shopping costs in retailing (Bell, Ho and Tang 1998) we develop a structural

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model of channel choice where consumers choose channels to minimize shopping costs. A unique aspect of this research is the modeling of information acquisition costs using transactional data in the context of direct channels.

We do not directly observe the shopper's need to supplement the information from the catalog in transactional data, and we model it by introducing latent states that are the result of an explicit cost/benefit analysis (Ratchford 1982; Shugan 1980; Weitzman 1979). If the expected cost of obtaining additional, risk-reducing information is less than the welfare loss of completing the purchase without that information, the shopper is in an information acquisition (IA) state; otherwise she is in a no information acquisition (NIA) state. The shopper's state then determines what channels she will consider. In our context, if she is in the IA state, risk reduction costs become salient in addition to other shopping costs, and she will choose from either the Internet or the call center. If she is in the NIA state, she will choose among all available channels based on access and order placement costs only. We use a Shannon information theoretic approach to model information need and welfare loss. We develop a dynamic linear model of price shocks to identify baskets that are associated with high-information needs. The development of a latent state-modeling framework that incorporates shopper's cost–benefit analysis for information acquisition in the context of choice among direct channels is one of the key contributions of this research.

We estimate the model using a hierarchical Bayesian approach, which provides a good fit to the observed channel choices. We find that shoppers with large baskets shift to the Internet. This is consistent with the Internet having lower ordering costs. Our analysis shows that the Internet is not simply better for the average shopper; the entire distribution of order placement cost parameters for the Internet stochastically dominates the distribution for the call center with appreciable separation between the two distributions. This finding is consistent with Chintagunta et al. (2012) who also find that large baskets shift to the Internet but in the context of grocery shopping.

We find that higher-risk baskets shift to the call center. This suggests that call centers are better at providing information than the website of this retailer. This analysis of call centers relative to the Internet is a new empirical finding. Our model also provides estimates of shopping costs such as risk reduction costs and order placement costs. Quantifying such costs from observational data is difficult and our findings add to the existing literature. From a practical perspective, our estimates of order placement costs and risk reduction costs can also serve as usability benchmarks for channels. We also find that electronic channels have high initial access costs. This suggests that they might be better suited to heavy users who have more opportunities to amortize these upfront costs. Collectively these estimates provide evidence for the notion of channel specialization—some channels are better at addressing certain shopping costs for certain shoppers compared to others. While the retailing industry has made Omni-Channel retailing a priority, channel specialization seems to be underappreciated.

In addition to these substantive findings, our model has several practical applications. Our shopping cost estimates can be used to quantify the value add of channels as opposed to the

more common practice of measuring the importance of channels based on transaction volume. Companies report that it is cheaper for them to process orders over the Internet. For example, cosmetics manufacturer Avon estimated that in its United States operations, it can save \$1 to \$3 for every order processed over the Internet instead of its traditional paper and pencil approach (White 1999). With such savings as a motivation, retailers might be interested in incentivizing customers to order over the Internet. Although our model cannot quantify the monetary incentives required to shift behaviors, our model estimates show which shoppers might require more incentives than others. An additional insight from our model is that there might be gains to focusing such incentives on the accumulation of experience. An example would be an offer that provides incentive upon the completion of multiple Internet orders as opposed to a single order.

Our results suggest that even though the Internet has lower order placement costs than call centers, the latter fill an important role in facilitating the purchase process for shoppers who have greater uncertainty about their purchase. These findings are consistent with current developments in multi-channel marketing and retailing. For example, many direct retailers have moved to hybrid channels where Internet shoppers can speak with or instant message with a sales representative if they need more information than that provided by the website. We also find that high-risk baskets occur in certain subset of categories. Providing information and risk reduction to shoppers in these categories might provide a thesis for competitive differentiation against retailers that offer a more automated self-service approach.

Our research contributes to the emerging literature on multi-channel shopping behavior. In a landmark study, Cox and Rich (1964) conducted a survey to identify determinants of shopping by phone versus visiting the store. They found that despite it being more convenient, the majority of respondents did not shop by phone due to large perceived risks for telephone shopping. Alba, et. al. (1997) posit that different channels are more or less attractive to shoppers in different categories and recommend incentives to align customers' channel choice with retailers' goals. In a conceptual model of multi-channel shopping, Balasubramanian, Raghunathan, and Mahajan (2005) distinguish between product utility and process utility. This paper focuses on shopping costs, which are primarily what they call the 'instrumental elements' of process utility. Kumar and Venkatesan (2005) develop a cross sectional model to identify the performance of multi-channel shoppers. We build a cross sectional time series model at the level of each transaction. Ansari, Mela, and Neslin (2005) model customer migration across channels and the impact on spending patterns. Smith and Brynjolfsson (2001) study access costs in online retailing, Liang and Huang (1998) compare transaction costs between conventional retailers and traditional retailers, Chintagunta, Chu, and Cebollada (2012) quantify transaction costs between online and physical grocery stores. Our study contributes to this literature by developing a channel choice model with latent states, quantifying the impact of basket composition, and obtaining estimates of shopping costs in the context of direct channels in a general merchandise setting.

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