

A Multi-Category Model of Physician Prescription and Detailing

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Abstract

A major target of marketing activity in the pharmaceutical industry is the primary care physician (PCP). This is because, as a group, PCPs are the largest segment of physicians, they prescribe across a wide range of product categories and account for a significant proportion of all prescriptions in large therapeutic categories. An important question for firms is how to manage resource allocation across categories in marketing to the same physician in the presence of different competitors across categories.

In order to address this question, the firm needs to answer two questions. First, how does the physician respond to own as well as competitors' marketing activities? In other words, firms need to measure the effectiveness of their marketing activities in each category for each physician. Second, do these marketing activities show any spill-over effects across the categories marketed by the same firm to the same physician? If the answer to the latter question is yes, firms can allocate their marketing efforts more effectively by leveraging the information on physicians' response to marketing activities across those categories.

Recent research in marketing has witnessed a surge of interest in understanding physicians' responses to firms' marketing activities, such as (e.g., Gonul et al 2001, Manchanda et al 2004, Narayanan et al 2005, Dong et al 2007). All these studies have focused on analyzing physicians' responses within one therapeutic category. Our study is the first attempt to capture cross category effects when studying how marketing efforts impact physicians differently both across physicians and across categories.

Given that the detailing decisions are not random across physicians, we adopt the limited information approach (Villas-Boas and Winer 1999) to account for the endogeneity of detailing decisions in our analysis. In this approach, the overall model contains two components. In the first part, we model how physicians' prescription decisions are affected by sales visits from competing firms. As the number of prescriptions written by a physician in a given time period is a nonnegative integer, we use a correlated (across drugs) count model to model multicategory prescription behavior. The model allows for physician response to be correlated across therapeutic categories via unobserved factors. In the second part, using the correlated count model, we allow observed detailing to be a function of lagged detailing, lagged competitive detailing and lagged prescriptions. Further, we allow the unobserved factors from both prescription and detailing models to be correlated as well.

We estimate our model on a physician-level panel dataset using three different assumptions for the random terms across both prescription and detailing models. First, we assume that these random terms are distributed following a multivariate normal distribution. Second, we use the error components method to decompose the random terms into two components: (a) specific to each category (b) specific to each brand. In the third model, we allow for a completely flexible distribution of the random terms by assuming that they come from a mixture of multivariate normal distributions.

Cast in a Hierarchical Bayesian framework, our model allows us to obtain individual physician-level estimates for the response parameters for both own and competitive detailing in each category. More importantly, we can estimate the full covariance matrices for these response parameters, while controlling for the correlations across brands resulting from other unobserved factors. Our results provide evidence of spill-over effects of the marketing activities via positive correlation estimates that are statistically significant.

Using the model estimates at the individual physician level with cross-category effects incorporated, we conduct experiments to demonstrate managerial implications of our model. Specifically, we examine how one firm in our data with brands – one in each of the two categories studied – can reallocate detailing within and across categories in order to increase its revenues.