

Managing Customers through Marketing Mix Allocation for Long-term Profitability

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In managing its customer base and optimizing the marketing mix allocation, a firm needs to consider the evolution of its customers over time. Changes in the marketing environment as well as intrinsic changes in customers' preferences or needs may discretely shift customers into different buying-behavior states. The ability to identify the dynamics in customer behavior and its drivers presents an opportunity for the firm to influence the movement of customers to more favorable states of buying behavior. A successful marketing resource allocation at the individual level enhances customer equity and constitutes an important tool for managing the firm's customer base. However, the task of allocating resources at the individual level is complicated and requires estimating the purchase behavior and responsiveness to marketing interventions for each customer over time. This is particularly difficult in dynamic settings where customers evolve over time and marketing interventions may have enduring impact on buying behavior.

Accordingly, we address the following managerial questions in this research: (1) how can the firm dynamically segment its customer base? (2) what are the short and long-term effects of marketing activities? and (3) given the enduring effects of its marketing activities, how should the firm allocate and target its marketing resources to maximize long-term profitability?

To address these questions an integrative framework is presented. We propose a non-homogeneous hidden Markov model that accounts for dynamics in customer behavior and the long-term impact of marketing actions. We capture dynamics in customer behavior by allowing customers to transition over time among a set of latent states of buying behavior. We propose a unique and flexible approach to capture the enduring impact of marketing actions by incorporating a non-stationary transition matrix that is dynamically affected by these actions. We disentangle short-term from long-term effects by allowing marketing mix activities to affect customers' transitions among buying-behavior states

as well as customers' immediate actions given their current state. To optimally allocate marketing activities, we propose a dynamic programming approach which takes into account the evolution of customers' behavior and the uncertainty in customers' current behavioral state.

We apply our model in the context of direct-to-physicians marketing data from a major pharmaceutical company. The results suggest that physicians move among several behavioral states over time, showing a high degree of dynamics. Furthermore, there is substantial heterogeneity in their response to marketing actions and in the dynamics of their prescription behavior. We are able to disentangle the immediate and the enduring effects of detailing and sampling. Specifically, we find that only a fraction of the total effect of these marketing activities occurs the first month. The integrative framework we propose, provides important marketing implications for managing customers and maximizing long-run profitability.

Keywords: long-term effects of marketing activities, dynamic choice models, marketing mix allocation, hidden Markov model, Bayesian estimation, dynamic programming.