

MISQ Archivist

Using Big Data to Model Time-Varying Effects for Market Resource (Re)Allocation

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Abstract

Marketing resource allocation has been a topic of intense scrutiny, yet the literature on the topic has not paid adequate attention to the fact that the effectiveness of marketing-mix elements varies over time. Despite the fact that firms collect volumes of data on their customers, existing estimation approaches do not readily lend themselves to modeling the temporal variations for big data and provide little guidance to managers in terms of their resource allocation decisions. We address this gap and argue that marketing-mix effectiveness varies with the evolution of the consumer-brand relationship and explicitly model these temporal variations using a time-varying effects model (TVEM) that accounts for self-selection of customers into receiving marketing communications and endogeneity of the number of such communications. The proposed TVEM framework handles the complexities associated with big data analytics and provides novel insights for data-driven decision making. We combine transaction data from a *Fortune* 500 retailer with demographic information obtained from Acxiom Corp for over a quarter million customers to test our framework. The results provide strong support for our proposed framework. Specifically, we find that the influence of marketing mailers, other transaction characteristics (coupon redemption, returns, and cross-buy), and demographic factors (age, income, household size, and interests) on sales varies significantly over the customer life cycle and ignoring such temporal variations can lead to gross misallocation of marketing investments. Specifically, our results suggest that firms can increase their revenues by over 17 percent by just reallocating their resources based on the proposed framework. To facilitate adoption of our proposed framework, we provide guidance and actionable insights for managerial relevance.

Keywords: Time-varying effect model, TVEM, big data, dynamic marketing resource allocation, time series models, dynamic models, marketing-mix effectiveness, direct marketing.