To Whom, When, and How Much to Discount?
A Constrained Optimization of Customized Temporal Discounts

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Abstract

The authors show how customized temporal discounts that control to whom, when, and how much to discount can improve company profitability. They use the output of the model to devise an optimal coupon strategy under a budget constraint and assess the impact of the optimal coupon strategy on its inventory policy. To do so, they model household purchase incidence and brand choice in response to coupons. They use Bayesian estimation to obtain individual household parameters on a US data set having coupons. They formulate the optimization task of customized coupons as a constrained multiple-knapsack problem under a given budget. The output of the model is used to arrive at an optimal inventory policy for the retailer. They use simulations of the empirical contexts to obtain optimal solutions and to assess improvement in profits relative to existing practice and alternate models in the literature. The proposed model yields increase in profits of 1.2% to 2.4% relative to a model in the literature which optimizes the value but not timing of discounts.

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