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A Decision Support System for Planning Manufacturers' Sales Promotion Calendars

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Abstract

A common event in the consumer packaged goods industry is the negotiation between a manufacturer and a retailer of the sales promotion calendar. Determining the promotion calendar involves a large number of decisions regarding levels of temporary price reductions, feature ads, and in-store displays, each executed at the level of individual retail accounts and brand SKUs over several months or a year. Though manufacturers spend much of their marketing budget on trade promotions, they lack decision support systems to address the complexity and dynamics of promotion planning. Previous research has produced insights into how to evaluate the effectiveness of promotional events, but has not addressed the planning problem in a dynamic environment. This paper develops a disaggregate-level econometric model to capture the dynamics and heterogeneity of consumer response. By modeling the purchase incidence (timing), choice and quantity decisions of consumers we decompose total sales into incremental and nonincremental (baseline plus borrowed).

The response model forms the basis of a market simulator that permits us to search for the manufacturer's optimal promotion calendar (subject to a set of constraints, some of them imposed by the retailer) via the simulated annealing algorithm. Calendar profits are the net result of the contribution from incremental sales minus the opportunity cost from giving away discounts to nonincremental sales and the fixed costs associated with implementing promotional events (e.g., retagging, features, displays). Incremental sales result from promotion-induced switching, the acceleration and quantity promotion effects on those switchers, increased consumption and the carryover effect from purchase event feedback.

We applied our approach to the promotion-planning problem of a large consumer-packaged goods company in a nonperishable, staple product category suggested by company executives (canned tomato sauce). Subject to a retailer

pass-through constant rate of 80%, provided to us by the collaborating firm, the optimal promotion calendar produced by the modeling system followed a pattern of frequent and shallow temporary price reductions with no feature or display activity. We also analyze how that result would change under different retailer pass-through scenarios.

Our findings indicated that the manufacturer could substantially improve the profitability of its sales promotion activity and that there would be a concurrent positive effect on retailer profit and volume levels. Management reported to us that the insights from the use of the system were implemented in their promotion-planning process and produced positive results. A validation analysis on follow-up data for one market showed that promotion activity could be significantly reduced, as recommended, with no adverse effect on the brand's market share, as predicted.

To generalize the model beyond the specific category where it was implemented, we conducted a sensitivity analysis on the profile of the calendar (i.e., frequency, depth, and duration of deals) with respect to changes in market response, competitive activity, and retailer pass-through. First, we found that the optimal depth, frequency, and timing of discounts is stable for price elasticities ranging from near zero to around four (in absolute magnitude). We also found no systematic impact of competitive promotions on the profile of the optimal calendar. For example, variation in competitive activity did not affect the optimal depth or frequency of discounts. Lastly, we found changes in retailer pass-through to have a significant effect on the optimal depth and number of weeks of trade promotion that a manufacturer should offer. This emphasizes the importance to manufacturers of having accurate estimates of pass-through for purposes of promotion budgeting and planning.

(Trade Promotion; Brand Management; Decision Support Systems; Scanner Data)