



Cooperative advertising, game theory and manufacturer–retailer supply chains

Susan X. Li^a, Zhimin Huang^{a,*}, Joe Zhu^b, Patrick Y.K. Chau^c

^a*School of Business, Adelphi University, Garden City, Long Island, NY 11530, USA*

^b*Department of Management, Worcester Polytechnic Institute, Worcester, MA 01609, USA*

^c*School of Business, The University of Hong Kong, Hong Kong*

Received 15 May 2001; accepted 21 August 2002

Abstract

Cooperative (co-op) advertising plays a significant role in marketing programs in conventional supply chains and makes up the majority of promotional budgets in many product lines for both manufacturers and retailers. We develop three strategic models for determining equilibrium marketing and investment effort levels for a manufacturer and a retailer in a two-member supply chain. Especially, we address the impact of brand name investments, local advertising, and sharing policy on co-op advertising programs in these models. The first model offers a formal normative approach for analyzing the traditional co-op advertising program where the manufacturer is the leader and the retailer is a follower. The second model provides a further analysis on this manufacturer-dominated relationship. The third model incorporates the recent market trend of retailing power shifts from manufacturers to retailers to analyze efficiencies of co-op advertising programs. We examine the effect of supply chain on the differences in profits resulting from following coordinated strategies as opposed to leader–follower strategies. A cooperative bargaining approach is utilized for determine the best co-op advertising scheme for achieving full coordination in the supply chain.

© 2002 Elsevier Science Ltd. All rights reserved.

Keywords: Co-op advertising; Supply chains; Leader–follower relationship; Pareto efficiencies; Bargaining model

1. Introduction

Cooperative (co-op) advertising is an interactive relationship between two members in a manufacturer–retailer supply chain. In this relationship, the retailer initiates and implements a local advertisement and the manufacturer pays part of the costs. A manufacturer uses co-op advertising to motivate immediate sales at the retail level and uses national advertising to influence potential consumers to consider its brand and to help develop brand knowledge and preference. Retailer's local advertising, with the passage of time, brings potential consumers to the stage of desire and action and

gives an immediate reason to buy. Co-op advertising offers consumers the information needs when they move through the final stages of purchase and a congruence of information and information needs that would be impossible if the manufacturer uses only national advertising. In addition to the same objective of immediate sales at the retail level as the manufacturer, the retailer utilizes co-op advertising to reduce substantially its total promotional expense by sharing the cost of advertising with the manufacturer.

In the marketing and economics literature, co-op advertising models in manufacturer–retailer supply chains have focused on a relationship where the manufacturer is a leader and the retailer is a follower. The main subject of the research is design and management [?–?]. We are intended to discuss the relationship between classical co-op advertising models and fully coordinated co-op advertising models developed in this paper. The investigation of the

* Corresponding author. Tel.: +1-516-877-4633; fax: +1-516-877-4607.

E-mail address: huang@adelphi.edu (Z. Huang).

interactive relationship between a manufacturer and a retailer in a supply chain involves three scenarios. The first scenario utilizes a game structure that formulates the interactive relationship between the manufacturer and the retailer as a non-cooperative, and two-stage game, the second scenario deals with a newly developed higher order two-stage game structure, and the third scenario develops a fully coordinated game structure.

The retailer's sales response volume function of the product, S , is assumed to be affected mainly by the retailer's local advertising level, a , and the manufacturer's national brand name investments, q , which include national advertising and control of implementing co-op advertising agreement between the manufacturer and the retailer. As Young and Greyser [?] point out that co-op advertising is used to attract the attention of customers near the time of actual purchase and therefore it is to stimulate short-term sales. The manufacturer's brand name investments such as the national advertising is intended to take the potential customers from the awareness of the product to the purchase consideration. The function of the local advertising is to bring potential customers to the stage of desire and action, to give reasons such as low price and high quality to buy, and to state when and where to obtain the product. Therefore, the manufacturer's brand name investments and the retailer's local advertising perform different but complementary functions which have positive effects on the ultimate product sales. Saturation may be reached when both or either the local advertising efforts and the brand name investments are increased. Since co-op advertising is intended to generate short-term sales, we may consider one-period sales response volume function as $S(a, q) = 1 - a^{-\gamma}q^{-\delta}$, where γ and δ are positive constants. There is a substantial literature on the estimation of sales response volume functions (see, for example [?]), but all of them consider only the local advertising effect, not others such as national advertising on the volume of sales.

The manufacturer's dollar marginal profit for each unit to be sold is ρ_m , and the retailer's dollar marginal profit is ρ_r .

The fraction of total local advertising expenditures which manufacturer agrees to share with retailer is t , which is the manufacturer's co-op advertising reimbursement policy.

The manufacturer's, retailer's and system's profit functions are as the following:

$$\pi_m = \rho_m(1 - a^{-\gamma}q^{-\delta}) - ta - q, \quad (1)$$

$$\pi_r = \rho_r(1 - a^{-\gamma}q^{-\delta}) - (1 - t)a, \quad (2)$$

$$\pi = \pi_m + \pi_r = (\rho_m + \rho_r)(1 - a^{-\gamma}q^{-\delta}) - a - q. \quad (3)$$

This paper is organized in the following manner. In Section ?? the relationship between the manufacturer and the retailer as an interactive two-stage game is developed and formulated. In this interactive two-stage co-op advertising structure, the manufacturer, as the leader, first specifies the brand name investments and the co-op reimbursement policy. The retailer, as the follower, then decides on the local advertising level. The Stackelberg equilibrium is achieved.

In Section ??, we discuss higher order Stackelberg equilibrium of the two-stage game model. An analysis indicates that if the manufacturer (leader) moves its strategy away from Stackelberg equilibrium, its profit will be higher than before. Since the retailer is rational, the change of the manufacturer's strategy forces him/her to reconsider its own strategy. Therefore, a new equilibrium, i.e., higher order Stackelberg equilibrium can be achieved. We show that, both members are better off at higher order Stackelberg equilibrium than at Stackelberg equilibrium.

In Section ??, we relax the leader–follower structure by assuming a symmetric relationship between the manufacturer and the retailer. We focus on the discussion of fully coordinated models for co-op advertising. We show that, (i) all Pareto efficient co-op advertising schemes are associated with a single local advertising level and a single brand name investment quantity; (ii) among all possible co-op advertising schemes, the system profit (the sum of the manufacturer's and the retailer's profits) is maximized for every Pareto efficient scheme, but not for any other schemes; (iii) the system profit at any Pareto efficient scheme is higher than at both Stackelberg and higher order Stackelberg equilibriums; (iv) the manufacturer's brand name investments at full coordination is higher than at Stackelberg equilibrium but lower than at higher order Stackelberg equilibrium; (v) the local advertising level at full coordination is higher than at both Stackelberg and higher order Stackelberg equilibriums, and (vi) there is a subset of Pareto efficient co-op advertising schemes on which both the manufacturer and the retailer achieve higher profits than at both Stackelberg and higher order Stackelberg equilibriums and which are determined by the sharing policy of the local advertising expenditures between the manufacturer and the retailer.

Among those feasible Pareto efficient co-op advertising schemes, the question is which one is the best (sharing policy) for both system members. We address this issue and consider one cooperative bargaining model for determining the best sharing policy. Preferences of the manufacturer and the retailer for the amount of shares of the system profit gain are represented by their cardinal (especially additive cardinal) utilities. Managerial implications of bargaining results are discussed. Concluding remarks are in Section ?. All proofs of results are in Appendix A.

2. Interactive two-stage co-op advertising model

We model the relationship between the manufacturer and the retailer as an interactive two-stage game with the manufacturer as the leader and the retailer as the follower. The solution of the game is called Stackelberg equilibrium. The original idea of co-op advertising came from the demands of the retailer's promotional help from the manufacturer in order to increase the retailer's advertising budgets without spending more of retailer's own funds. In the absence of the manufacturer's co-op advertising funds, the retailer

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات