

Retailer and manufacturer advertising scheduling in a marketing channel<sup>☆</sup>Guiomar Martín-Herrán<sup>a,1</sup>, Simon P. Sigué<sup>b,\*</sup>,<sup>2</sup><sup>a</sup> Departamento de Economía Aplicada (Matemáticas), Universidad de Valladolid, Avda, Valle de Esgueva 6, Valladolid 47011, Spain<sup>b</sup> Faculty of Business, Athabasca University, 201-13220 St. Albert Trail, Edmonton, AB T5L 4W1, Canada

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## ABSTRACT

This paper investigates, in a bilateral monopoly, the optimal scheduling of retailer and manufacturer advertising in a three-period planning horizon. Consistent with previous literature, the integrated channel adopts continuous advertising schedules when advertising effects are not very large and decay exponentially over time. Conversely, when pricing and advertising decisions are uncoordinated, vertical externalities also influence advertising scheduling. Consequently, channel members can optimally implement each of the following three advertising schedules depending on the effects of retailer and manufacturer advertising: The full continuous schedule, in which channel members advertise in the three periods; the full pulsing schedule, in which the two channel members advertise only in the first and third periods, and the mixed schedule where the retailer continuously advertises and the manufacturer advertises exclusively in the first and third periods. Surprisingly, the uncoordinated channel adopts lower retail prices than the integrated channel when the mixed schedule is adopted.

## 1. Introduction

The growing fragmentation of the media and the continuous increase in marketing communication costs are constantly challenging marketing managers to improve the effectiveness of their marketing communication programs. One of the major challenges that manufacturers and retailers encounter in marketing channels is how to optimally schedule their respective investments in advertising programs over time.

Retailer advertising, also known as local advertising, refers to advertising or promotional activities undertaken by retailers to locally promote manufacturers' products. It contributes to the effectiveness of advertising in marketing channels in three major ways. First, retailers have a better knowledge of their local markets and can therefore undertake more effective advertising programs for manufacturers' products. Second, retailers use local media, which generally apply lower advertising rates than national media. Finally, retailer advertising is believed to stimulate immediate sales at the retail level, although its long-term effects on sales remain controversial (Herrington & Dempsey, 2005; Jørgensen, Sigué, & Zaccour, 2000; Jørgensen, Tabouji, & Zaccour, 2003).

Manufacturer advertising or national advertising are advertising activities initiated and controlled by a manufacturer to promote their own products that have a nationwide scope. Expenditures on this type of advertising represent a significant portion of marketing budgets in many companies. For instance, according to Kantar Media's index, Procter & Gamble, AT & T, General Motors (GM), Verizon, and L'Oréal spent \$2.95, \$1.9, \$1.78, \$1.64, and \$1.34 billion, respectively, on advertising in 2011. These same companies also spent \$773.8, \$535.5, \$593.4, \$342.4, and \$342.4 million on national advertising programs in the first quarter of 2014. Manufacturer advertising tends to have a variety of objectives, including promoting product awareness, brand image, brand preference, and product purchase. Depending on the objective of a specific manufacturer advertising campaign, its effects on both short- and long-term sales can vary considerably (Herrington & Dempsey, 2005).

Casual observations of advertising practices in some industries indicate that there are periods when both manufacturer and retailer advertising expenditures reach their maxima; while in others, advertising expenditures are substantially reduced, often reaching zero. This is the case of the automobile industry, where the emphasis of marketing communication activities significantly changes over months and both

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dealers and manufacturers spend substantial amounts on advertising. In summer and early fall, manufacturers and dealers focus on stimulating the sales of the current year's models. Around the end of fall and beginning of winter, while dealers still run some promotional activities, manufacturers generally shift their focus to advertising programs that communicate the distinctive features of the next year's models. Kantar (Media, 2014) attributes the drop of 5.8% of local newspaper advertising in the first quarter of 2014 to auto dealers' cutbacks in local advertising. Conversely, at the same period, manufacturers such as General Motors, Fiat Spa, and Toyota Motor significantly saw dramatic increases of 55.8%, 38.8%, and 17.7%, respectively in their advertising expenditures. The launches of these manufacturers' 2014 redesigned car models where the main drivers of the increases observed in manufacturers' advertising expenditures.

Very little has been done in the marketing channel literature to formally investigate the simultaneous optimal scheduling of retailer and manufacturer advertising programs. Channel research that incorporates advertising has mainly focused on cooperative advertising, as a mechanism that can help to either coordinate channels or improve channel efficiency (see Aust & Buscher, 2014; Jørgensen & Zaccour, 2014 for reviews). A significant portion of the published works uses static games and, therefore, overlooks the impact of channel members' advertising decisions over time (e.g., Karray, 2013; Karray & Zaccour, 2006; Szmerekovsky & Zhang, 2009; Xie & Ai, 2006; Yan, 2010). Those that use differential games capture the impact of channel members' advertising decisions over time, but many prescribe constant advertising strategies over time or advertising strategies that depend on the evolution of the goodwill of manufacturers' brands (e.g., Jørgensen, Sigué, & Zaccour, 2001; Jørgensen et al., 2003; Sigué & Chintagunta, 2009; Zhang, Gou, Liang, & Huang, 2013). Retailers and manufacturers are given the opportunity to adjust their advertising expenditures as the goodwill stocks of manufacturers' products evolve, generally, to converge toward a steady state. In either case, while the study of the optimal advertising scheduling is not their main goal, current advertising works in the marketing channel literature prescribe continuous advertising program schedules and cannot explain the use of discontinuous advertising schedules observed in the market place. The first formal attempt to investigate retailer advertising and cooperative advertising scheduling in a bilateral monopoly uses a two-period game (Martín-Herrán & Sigué, 2017). This paper shows that the retailer may delay advertising to the second period when advertising either has minimal impact on short-term sales or harms long-term sales. Otherwise, the retailer should continuously advertise with or without a cooperative advertising support from the manufacturer.

Advertising scheduling has, however, been extensively studied both theoretically and empirically in the marketing literature (e.g., Dubé, Hitsch, & Manchanda, 2005; Freimer & Horsky, 2012; Mahajan & Muller, 1986; Mesak & Ellis, 2009; Sasiemi, 1989; Villas-Boas, 1993). Among other issues, researchers have investigated factors that favor the use of either advertising pulsing schedules or other alternatives such as continuous or even advertising schedules. In an advertising pulsing schedule, the advertiser alternates between high and zero levels of advertising, while in a continuous or even advertising schedule, the firm advertises without interruption or at a constant level throughout the planning period (as in all current dynamic channel models using the Nerlove Arrow's goodwill accumulation model). Sales response to advertising and the existence of advertising carryover effects on future demands are generally identified as the main explanations of the superiority of pulsing advertising. In particular, it is believed that pulsing is optimal under the S-shaped advertising response curve, which captures both the phenomena of increasing and decreasing marginal returns to various levels of advertising efforts (Mahajan & Muller, 1986; Sasiemi, 1989; Villas-Boas, 1993). Pulsing is also considered a better cost-saving advertising practice, compared to other scheduling alternatives, when advertising effects decay slowly over time (Dubé et al., 2005; Ephron & McDonald, 2002). Advertisers can take advantage of the carryover effect and temporally stop their advertising

activities as a way of reducing advertising costs (Aravindakshan & Naik, 2011). This well-established theory in the monopoly has not been formally assessed in a marketing channel context. The recent work by Martín-Herrán and Sigué (2017), in addition to focusing on cooperative advertising, is limited to two periods, and cannot therefore qualify as studying pulsing as defined in this literature. On the other hand, some marketing textbooks tend to exclusively link advertising scheduling to product uses. For instance, continuous advertising schedules are believed to be suitable for products that are used on a sustained basis regardless of the season (e.g., Belch, Belch, & Guolla, 2014).

This paper extends for the first time previous research on advertising scheduling to a two-member marketing channel, in which a manufacturer and a retailer have the possibility to undertake their own advertising programs in a three-period planning horizon. Allowing the manufacturer and retailer to advertise simultaneously, as we do in this research, creates two major issues in marketing channels that can change our current knowledge base of advertising scheduling. The first is the opportunism between channel partners due to the fact that they both make separate advertising decisions that affect the demand of the product. As a consequence, a channel member may not invest in advertising or the two channel members may underinvest in advertising compared to the optimal levels of an integrated channel. In such a context, pulsing can easily be motivated by the desire to reduce advertising costs at the expense of a channel partner. Also, lower advertising expenditures due to free-riding may favor continuous advertising schedules, as prescribed in the current channel literature. The second is the controversy about the role of advertising in market development. While it is commonly argued that the retailer invests in advertising to boost sales in the short run, the now well-established existence of long-term effects of retailer advertising activities change channel interactions. For instance, some retailer advertising activities are believed to decrease brand preference and quality perception and to increase price sensitivity at the retail level in the long run (DelVecchio, Henard, & Freling, 2006). This belief has led manufacturers like Toyota and Honda to proscribe advertising that features prices below invoice to their dealers (Barkholz, 2015). In many cases, manufacturers are not able to prevent retailers from undertaking the type of advertising that best satisfies their various goals, including clearing unwanted stocks and maximizing sales in some specific periods. They can however schedule their own advertising to either counterbalance or support the effects of any advertising activities that retailers may want to undertake. The question in a bilateral monopoly then is: How should the manufacturer and retailer, who are given the possibility to advertise throughout a planning horizon of three periods, optimally schedule their respective advertising activities? Particularly, should channel members adopt a full pulsing schedule, a full continuous schedule, or a mixed schedule?

The full pulsing schedule in this configuration consists of simultaneously undertaking both retailer and manufacturer advertising in the first and third periods, while a complete advertising break is taken in the second period by the two channel members. The full continuous schedule refers to spreading both retailer and manufacturer advertising efforts over the three periods. A mix schedule refers to a situation where either the manufacturer or the retailer takes an advertising break in the second period (but not both at the same time) and the two channel members advertise in the first and third periods.

To address the above issues, we confine our interest to a case where a manufacturer sells a single brand to a retailer. We develop a stylized three-period model to capture the carryover and decay effects of the two types of advertising. Examples of the automobile industry are used throughout, but any other industry (e.g., household appliances, telecommunications, office supplies, and technical equipment) that maintains a sustained level of demand during the planning period would serve. In each period, the manufacturer sets a wholesale price and its own advertising level, while the retailer determines a retail price and its own advertising level. We study both the case of a coordinated and

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