ELSEVIER

Intern. J. of Research in Marketing 22 (2005) 441–457

International Journal of Research in Marketing

www.elsevier.com/locate/ijresmar

# Consumer heterogeneity in the longer-term effects of price promotions

Jooseop Lim [a,1], Imran S. Currim [b,*], Rick L. Andrews [c,2]

[a] John Molson School of Business, Concordia University, Montreal, Quebec, Canada H3G 1M8
[b] Paul Merage School of Business, University of California, Irvine, CA 92697-3125, USA
[c] Department of Marketing, Louisiana State University, Baton Rouge, LA 70803, USA

**Abstract**

While a significant literature has emerged recently on the longer-term effects of price promotions, as inferred from persistence models, there is very little if any attention paid to whether such longer-term effects vary across different types of consumers. This paper takes a first step in that direction by exploring whether the adjustment, permanent, and total effects of price promotions, and the duration of the adjustment period, differ between consumers segmented based on their usage rates in a product category and their loyalty to a brand. We also investigate whether such consumer segmentation will improve the forecasting performance of persistence models at both product category and brand levels. Expectations are developed based on consumer behavior theory on various effects of price promotions, such as the post-deal trough, the mere purchase effect, the promotion usage effect, and responsiveness to competitor's reactions. Evidence from household-level supermarket scanner data on four product categories is provided. We find substantial differences between consumer segments and provide insights on how managers can increase the longer-term effectiveness of price promotions by targeting each consumer segment with a different promotion program. In addition, consumer segmentation is found to significantly improve the forecasting performance of the persistence model for two of the four product categories. For the other two product categories, consumer segmentation provides forecasting performance similar to that obtained from aggregate-level persistence models.


*Keywords:* Segmentation; Time-series models; Price promotions

Since the early 1970s, price promotions have accounted for the main share of the marketing budget in most consumer packaged good categories (e.g., Srinivasan, Pauwels, Hanssens, & Dekimpe, 2004). During the past two decades, a substantial academic literature has established the nature of *short-term* (immediate)[3] sales response to temporary price reductions, including an assessment of consumer heterogeneity in the effects of a temporary price reduction on sales. A key finding of this literature is that the immediate effect of temporary price reductions, as reflected in short-term (contemporaneous) changes in sales, is consistently found to be high (Neslin, 2002) and to vary substantially across consumer segments. For example, heavy users are found to be more price elastic than light

* Corresponding author. Tel.: +1 949 824 8368; fax: +1 949 725 2826.
*E-mail addresses:* jlim@jmsb.concordia.ca (J. Lim), iscurrim@uci.edu (I.S. Currim), randrews@lsu.edu (R.L. Andrews).
[1] Tel.: +1 514 848 2424x2772.
[2] Tel.: +1 225 578 2434.

[3] In this paper, the immediate effect of a price promotion is defined as the change in sales due to the promotion during the period in which the promotion is run.

0167-8116/$ - see front matter © 2005 Elsevier B.V. All rights reserved.
doi:10.1016/j.ijresmar.2005.09.006

users (e.g., Neslin, Henderson, & Quelch, 1985), and non-loyal consumers are found to have higher (total[4]) price elasticity than loyal consumers (e.g., Krishnamurthi & Raj, 1991). Such information on how the short-term sales response to temporary price reductions varies across segments of customers is useful in designing and targeting temporary price reductions. For example, larger sizes can be promoted and targeted to attract heavy users, which can result in substantial increases in market share (Neslin et al., 1985, p. 160), and price cuts can be targeted to influence either switching or increased purchase (Krishnamurthi & Raj, 1991, p. 173).

Because the profitability of a promotion depends on *longer-term* as well as short-term effects, another important literature has emerged more recently on examining the longer-term effects[5] of price promotions, in particular, examining enduring effects through persistence modeling that does not assume mean reversion of the dependent variable (e.g., Dekimpe & Hanssens, 1995a,1995b, 1999; Dekimpe, Steenkamp, Hanssens, & Silva-Risso, 1999; Nijs, Dekimpe, & Hanssens, 2001; Srinivasan, Leszczyc, & Bass, 2000). Pauwels, Hanssens, and Siddarth (2002) define these different temporal effects, describe various streams of research in this area, including the advantages of persistence modeling relative to other approaches,[6] and describe the main findings of the research. In this literature, sales are first classified as stationary or evolving. When sales are stationary, promotions may have an immediate effect on sales that persists over the next several weeks (an adjustment period), but there is no permanent effect. In contrast, when sales are evolving they do not have a fixed mean and therefore could (but need not) be permanently affected by promotions. A key finding of this research is that while permanent effects of promotions are largely absent, there are adjustment period effects which vary by product category and brand, and which affect both total[7] promotion response and profitability.

While the effects of consumer heterogeneity on short-term promotion responses as inferred from multinomial logit models have been widely studied and have generated useful recommendations for marketing managers, to the best of our knowledge, there is no study that investigates the effect of consumer heterogeneity on longer-term promotion effects as inferred from persistence models. Consequently, as a first step, we explore differences in the longer-term responses to promotion among segmentation bases which are both basic and widely used by marketing managers: heavy vs. light users and loyal consumers vs. switchers. Usage- and loyalty-based segmentation has a long-standing tradition in the marketing literature beginning with early works by Boyd and Massy (1972) and Twedt (1967), respectively. Wedel and Kamakura (2000, p. 18) indicate that such segmentation "greatly enhances the usefulness of outcomes for management."

Specifically, we are interested in several research questions. Are the longer-term effects of temporary price promotions, as inferred from persistence models, different across segments of consumers? What aspects of longer-term effects are different (e.g., adjustment periods or effects, permanent effects, or total effects) across which types of customer segments (e.g., heavy vs. light users, loyal consumers vs. switchers), and how large are the differences? Alternatively, will segments of consumers who have been found to substantially differ in their immediate response to temporary price promotions also differ in their longer-term response to such promotions? To what extent? Can we improve the forecasting performance of persistence models by conducting a segment-level analysis?

Such an exploratory investigation can be an important first step towards generating valuable payoffs for marketing modelers and managers. First, if consumers are found to be heterogeneous in their longer-term responses to price promotions, marketing modelers ultimately will be able to attain richer and more accurate portraits of consumer longer-term response that are less subject to aggregation and specification errors, just as

[4] Total price elasticity includes elasticities of both brand choice and quantity purchased.

[5] In this paper, the longer-term effects are defined to include the adjustment and permanent effects, which occur subsequent to the immediate effect. The adjustment effect occurs during an adjustment period which is defined as the time period between when the immediate effect is observed, and the time at which sales (incremental sales in the case of evolving sales series) reach an equilibrium level.

[6] Pauwels et al. (2002, pp. 422–423) discuss the advantages of persistence modeling over approaches based on the Koyck model (e.g., Mela, Gupta, & Lehmann, 1997; Papatla & Krishnamurthi, 1996), flexible consumption functions (e.g., Ailawadi & Neslin, 1998), and multiplicative response models (e.g., Ailawadi, Lehmann, & Neslin, 2001). Basically, while both research streams model dynamic effects of price promotions, other approaches capture transient, not enduring effects, because they assume mean reversion of the dependent variable (e.g., Dekimpe & Hanssens, 1995a, 1999; Pauwels et al., 2002).

[7] The total promotion effect is defined as the sum of the immediate, adjustment, and permanent effects. If there is a permanent effect, the total effect of the promotion will be infinite.