Intern. J. of Research in Marketing 19 (2002) 253–266

International Journal of Research in Marketing

www.elsevier.com/locate/ijresmar

Disaggregate market share response models

Wayne S. DeSarbo [a,*], Alexandru M. Degeratu [b], Michael J. Ahearne [c], M. Kim Saxton [d]

[a]Department of Marketing, The Smeal College of Business, The Pennsylvania State University, 701 Business Administration Building, University Park, PA 16802, USA

[b]McKinsey & Co., 55 East 52nd Street, New York, NY 10022, USA

[c]School of Business, University of Connecticut, Storrs, CT 06269, USA

[d]Endocrine Marketing Research, Eli Lilly & Co., Lilly Corporate Headquarters, Indianapolis, IN 46285, USA

Abstract

Traditional market share response (multiplicative competitive interaction or MCI) models have been gainfully employed in marketing research practice as an effective methodology for estimating competitive effects. Legions of books and articles on MCI models and their use have been published documenting the successful formulation and implementation of this class of models. In this spirit, this paper proposes a generalization of this class of models to a latent structure framework incorporating within-segment random brand effects. We apply and contrast this new formulation against the traditional aggregate MCI model formulations in an application involving physician prescription shares for three major brands of central nervous system (CNS) ethical pharmaceuticals (known as CNS drugs). We conclude the manuscript with managerial implications and suggestions for future research.

Keywords: Market share models; Finite mixtures; Random effects; Prescription drugs; Maximum likelihood

1. Introduction

This new millennium will usher in an era of intense competition on both domestic and global fronts. Business firms of all sizes and varieties will become more concerned with the market share and profitability figures they achieve in the marketplace. Investors and respective stock market performance demand such attention. For product and brand managers in particular, a sense of urgency associated with the gains and losses of market shares for the products/services in their charge will continue to characterize business scenarios. It is clear that market indices such as market shares will command the attention of marketing managers as generic performance measures of a particular brand/service in the marketplace. It is therefore clearly desirable for those individuals concerned to have knowledge of the processes which generate such market-share figures, and to be able to calculate the impact of their own actions (and competitors' actions) on market shares, as well as respective profit implications.

In this light, Cooper and Nakanishi (1988) and Cooper (1993) have produced comprehensive reviews of the major research performed in the area of market share models. Building on the research in Bell, Keeney, and Little (1975), Kotler (1984), Naert and Bultez (1973), Nakanishi (1972), Nakanishi and

* Corresponding author. Tel.: +1-814-865-8150; fax: +1-814-865-3015.

E-mail address: desarbows@aol.com (W.S. DeSarbo).

0167-8116/02/$ - see front matter
PII: S0167-8116(02)00078-2

Cooper (1974), and others, Cooper and Nakanishi (1988) recommend the use of "multiplicative competitive interaction (MCI) models" for modeling market share based on the following attraction formulation. Let:

$i = 1, \ldots, m$ brands;

$k = 1, \ldots, K$ marketing mix variable (e.g., price, product attributes, expenditures for advertising, distribution, sales force, etc.);

$s_i =$ the market share of brand i;

$Q_i =$ the sales of brand i;

$Q = \sum_{i=1}^{m} Q_i =$ total sales of the market.

According to Kotler (1984), a brand's market share is proportional to the marketing effort supporting it. Thus,

$$s_i = cM_i = \frac{Q_i}{Q}, \tag{1}$$

where: M_i = the marketing effort of brand i; c = a constant of proportionality. Since $\sum_{i=1}^{m} s_i = 1$ by definition of market share, $\sum_{i=1}^{m} cM_i = 1$ or

$$c = \frac{1}{\sum_{i=1}^{m} M_i}, \tag{2}$$

and substituting for c using expression (2) in Eq. (1), one obtains:

$$s_i = \frac{M_i}{\sum_{j=1}^{m} M_j}, \tag{3}$$

implying that the market share of brand i is equal to the brand's share of total marketing effort (Kotler's fundamental theorem of market share; cf. Bultez and Naert, 1975). Note, if brands tend to differ in terms of their effectiveness of marketing effort, one can modify Eq. (3) above via:

$$s_i = \frac{\alpha_i M_i}{\sum_{j=1}^{m} \alpha_j M_j}, \tag{4}$$

where α_i is the effectiveness coefficient for brand i's marketing effort, implying that even if two brands expend the same amount of marketing effort, they may not have the same market share.

Here, the marketing effort of a brand is assumed to be some monotonic function of its marketing mix. Assuming that the elements of the marketing mix interact, Cooper (1993) suggests the multiplication function:

$$M_i = P_i^p A_i^a D_i^d, \tag{5}$$

where: P_i = the price of brand i's product; A_i = the advertising expenditures of brand i; D_i = the distribution effort of brand i; p, a, d, are estimated parameters reflecting the importance of each respective component of the marketing mix. Bell et al. (1975) derive the same representation/model using an attraction-based formulation. These authors posit that the primary determinant of market share is the attraction that consumers feel toward each alternative brand.

Thus, the *simple* MCI model for the aggregate case can now be formulated (by substitution) as:

$$s_i = \frac{M_i}{\sum_{j=1}^{m} M_j}, \tag{6}$$

$$M_i = \exp(\alpha_i + \varepsilon_i) \prod_{k=1}^{K} X_{ik}^{\beta_k}, \tag{7}$$

where the X_{ik}'s reflect the marketing mix variables and ε_i is an error term. M_i can be either interpreted as marketing effort or attraction. β_k reflects the parameters to be estimated which are common across brands in the *simple version* of the model. The point market share elasticities of this simple MCI model are:

$$e_{s_i}^k = \frac{\partial s_i}{\partial X_{ki}} \frac{X_{ki}}{s_i} = \beta_k (1 - s_i). \tag{8}$$

Plotting this elasticity against X_{ki}, one sees that share elasticity for this simple MCI model monotonically declines as X_{ki} increases. Note, such elasticity formulations for the *simple* MCI model does