Pioneers' Marketing Mix Reactions to Entry in Different Competitive Game Structures: Theoretical Analysis and Empirical Illustration

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Abstract

Pioneers' marketing mix reactions to new entries are recognized as important determinants of the outcome of pioneer-late mover competition, particularly in price-inelastic markets such as those for pharmaceuticals, cigarettes, and luxury goods. Managers in such markets are interested in better understanding when to accommodate (i.e., decrease marketing spending) or retaliate (i.e., increase spending) in nonprice marketing variables such as advertising and salesforce. In addition, the reallocation of marketing resources toward advertising (indicated by a pull strategy) or salesforce (indicated by a push strategy) upon entry is strategically important to managers.

Previous theoretical research shows that pioneers should retaliate in both static and growing markets. Results from empirical research are mixed in that they support both accommodation and retaliation in growing markets. Empirical research also shows that a pioneer accommodates (retaliates) with its low (high) elasticity marketing mix variable.

Contrary to prior research, however, some pioneers have successfully accommodated late movers in growing markets, and in some cases, have accommodated with their stronger marketing mix variables and also retaliated with their weaker marketing mix variables. For example, Bristol Myers Squibb's Capoten accommodated the entry of Merck's Vasotec in the growing ace-inhibitors market with its more powerful variable, salesforce, but also retaliated with its less potent variable, advertising. Moreover, not much is known about how the pioneer's marketing mix allocation should change (i.e., toward pull vs. push strategies) in response to new entries. We seek to better explain the pioneer's reactions and predict its shift in marketing mix allocation upon new entry.

We note that prior research's predictions on the pioneer's reactions are based on a limited number of key factors such as product-market characteristics and the pioneer's elasticities prior to a new entry. In this paper, we extend previous research by adding two other critical factors, namely, the impact of new entry on the pioneer's elasticities and margin, and different competitive game structures to better predict and explain the pioneer's reactions.

We develop analytical results on the pioneer's reactions in price, advertising, and salesforce in different competitive games (both Nash and different leader-follower games). In these results we identify the conditions under which the pioneer should accommodate, or retaliate, or not react to a late mover's entry, and shift its marketing mix allocation toward pull versus push strategies. We empirically illustrate some of the analytical results using data from a pharmaceutical category.

We show that a pioneer who adopts a follower (leader) role with respect to a marketing mix variable in a static (growing) market, and witnesses a decrease (an increase) in own elasticity and margin upon a new entry, *generally* should accommodate (retaliate) in that variable. However, we are also able to show that there are cases where these general reactions don't hold. Thus, for example, it is possible for a pioneer to find it optimal to accommodate in a growing market or to retaliate even when its elasticity decreases upon entry, depending on the combination of competitive game, the impact of entry on elasticities and margin, and market growth. In this way, our results point to the fact that it is necessary to look not only at one factor at a time, but instead examine the combination of all the factors.

We explain the empirical support for both accommodation and retaliation in growing markets by showing that the pioneer should accommodate (retaliate) a late mover with its *competitively* low (high) elasticity marketing mix variable. Competitively high (low) elasticity variables are not (are) likely to be significantly reduced by a new entry in the anticipated competitive game. With regard to reallocation of the pioneer's marketing mix, we show that the change in the pioneer's marketing mix allocation should follow the change in the relative marketing mix effectiveness after new entry. This, in turn, depends on the structure of competition, the impact of the late mover on its elasticities and margins, and the competitor's marketing mix elasticities, in addition to own elasticities.

The results can guide managers on how factors such as competitive structure, changes in elasticities and margin, and market growth impact the pioneer's marketing mix decisions, and on when to accommodate, retaliate, or not react to a late mover's entry, and shift marketing mix allocation toward pull versus push strategies.

(Competitive Strategy; Defensive Strategy; Econometric Models; Game Theory; Marketing Mix; Resource Allocation Policy)

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1. Introduction

Pioneers' marketing mix reactions to new entries are recognized as important determinants of the outcome of pioneer-late mover competition (Weitz 1985). For example, Kalyanaram and Urban (1992, p. 248) argue that "Entry penalties (for late movers) may also be affected by the defensive reactions of pioneers rather than the basic market granted advantage (for pioneers)." Pioneers' reactions in product offering and repositioning have been well documented (e.g., Hauser and Shugan 1983, Nault and Vandenbosch 1996, Vandenbosch and Weinberg 1995). Pioneers' responses in nonprice marketing mix variables (resource allocation variables) such as advertising, distribution, and salesforce, and their allocation in different competitive contexts, however, have not received as much attention. Conceptually, pioneers can respond to a new entry in these variables in three ways: decrease (accommodate to make room for the new entrant), increase (retaliate), or not change their expenditures (Scherer 1980, p. 244). Pioneers' reactions in these variables are particularly important in markets involving nonprice competition such as pharmaceuticals, cigarettes, and luxury goods. In such markets, the reallocation of resources toward advertising (indicated by a pull strategy) or salesforce (indicated by a push strategy) upon entry is also strategically important to managers.

Previous theoretical research shows that pioneers should retaliate rather than accommodate in both static and growing markets (Gruca et al. 1992, Kumar and Sudharshan 1988). Results from empirical research are mixed in that they support both accommodation and retaliation in growing markets (Cubbin and Domberger 1988, Robinson 1988). Empirical research also shows that a pioneer accommodates (retaliates) with its low (high) elasticity marketing mix variable (Gatignon et al. 1989). Theoretical and empirical research on marketing mix allocation shows that a brand should allocate its spending between two major marketing mix variables in the ratio of their elasticities (Gatignon and Hanssens 1987, Rangaswamy and Krishnamurthi 1991), but have not examined the *shift* in the pioneer's allocation upon new entries.

Contrary to prior theoretical research, however, some pioneers have successfully accommodated late movers in growing markets. In addition, some pioneers have accommodated with their stronger marketing mix variables, and in some cases, also retaliated with their weaker marketing mix variables. For example, Kodak accommodated Fuji in the growing photographic film market in advertising, its stronger marketing mix variable, yet remained highly profitable (*LNA Report* 1979–90). Furthermore, Bristol Myers Squibb's Capoten accommodated the entry of Merck's Vasotec in the growing ace-inhibitors market with its more powerful variable, salesforce, but also retaliated with its less potent variable, advertising, and has been very successful (*Business Week* 1988). How can we explain the pioneer's reactions in these cases as well as the conflicting results of Cubbin and Domberger (1988) and Robinson (1988)? How are the reactions different in static and growing markets? What factors do they depend on? For example, do they vary with changes in the pioneer's elasticities and margins? Do they differ across competitive game structures between the pioneer and the late mover? If so, how? Moreover, should the pioneer shift its allocation strategy from a primarily pull strategy toward a push strategy or vice-versa in response to a new entry? In sum, under what conditions should pioneers accommodate, or retaliate, or not react to a late mover's entry, and when should they shift allocation toward pull versus push allocation strategies? We seek to answer these questions in this research.

In doing so, we note that an entrant may shift the elasticities of incumbents, thereby affecting their reactions and complicating the prediction of competitive response (Gatignon et al. 1989, p. 54). We also note that the pioneer's role in its competitive game with the late mover (i.e., leader or follower) may significantly influence the pioneer's response and the outcome of the competition. For instance, Coca-cola, a pioneer in the cola market, has led Pepsi in advertising and has been highly profitable (Gasmi et al. 1992). The pioneer's leader or follower roles may be related to its reactions in terms of retaliation or accommodation, respectively. In fact, Chintagunta and Jain (1995, p. 129) suggest "It would be useful for future research to empirically examine alternative equilibria, viz., Stackelberg, cooperative, etc." Furthermore, we recognize that empirical

research on pioneering has not considered the endogeneity of the incumbent's decisions or the strategic interaction of the marketing mix of the incumbent and the new entrant, which may lead to biased estimates of marketing mix parameters (e.g., Moore et al. 1991, Roy et al. 1994). We consider these factors, namely, shift in the pioneer's elasticities and margin, competitive game, and endogeneity of decisions, in this paper to better predict the pioneer's optimal reactions.

In this paper, we formulate analytical models of pioneers' marketing mix decisions before and after a new entry. Based on these models, we develop analytical results on the pioneer's optimal marketing mix reactions and changes in mix allocation that depend on the game structures and on the changes in pioneers' elasticities and margin after entry in addition to market growth. We test some of these results through an empirical analysis of an ethical drug category. In doing this, we address the earlier research questions and extend prior research approach in two ways. First, we study changes in the pioneer's marketing mix allocation in addition to changes in its marketing mix variables after new entry and are able to explain the conflicting empirical results. Second, much research on incumbents' reactions has been either theoretical or empirical, not both. In this paper, we *both* develop theoretical predictions and test some of them empirically.

We believe our paper offers several important *analytical* and *empirical* results that extend the literature. We identify the conditions under which the pioneer should accommodate or retaliate or not respond to a new entry and shift its marketing mix allocation in static and growing markets in different competitive games. These conditions involve the changes in the pioneer's elasticities and margin after a new entry and the competitive game structure, two factors not considered by prior research. We show that a pioneer who adopts a follower (leader) role with respect to a marketing mix variable in a static (growing) market and witnesses a decrease (an increase) in own elasticity and margin upon a new entry *generally* should accommodate (retaliate) in that variable. However, we also explore conditions where these general reactions don't hold. Contrary to Gruca et al. (1992) and Kumar and Sudharshan (1988) who suggest retaliation in both static and growing markets, we show that the pioneer should accommodate if the pioneer's marketing mix elasticity or margin significantly declines upon new entry or if the pioneer follows the new entrant in the marketing variable. Furthermore, we explain the empirical support for both accommodation and retaliation in growing markets (Cubbin and Domberger 1988 and Robinson 1988) and extend Gatignon et al. (1989) by showing that the pioneer should accommodate (retaliate) a late mover with its *competitively* low (high) elasticity marketing mix variable. Finally, we show that the shift in the pioneer's marketing mix allocation follows the change in the relative marketing mix effectiveness, extending Gatignon and Hanssens (1987) and Rangaswamy and Krishnamurthi (1991). These results can guide managers on optimal marketing mix reactions to new entry.

We organize the rest of the paper as follows. We address literature review and conceptual development in § 2. We develop the game theoretic models of competition and the analytical results § 3 and § 4, respectively. We follow this with a section on data description and model estimation. We present the empirical results in § 6. Finally, we outline the conclusions, contributions, managerial implications, and directions for future research.

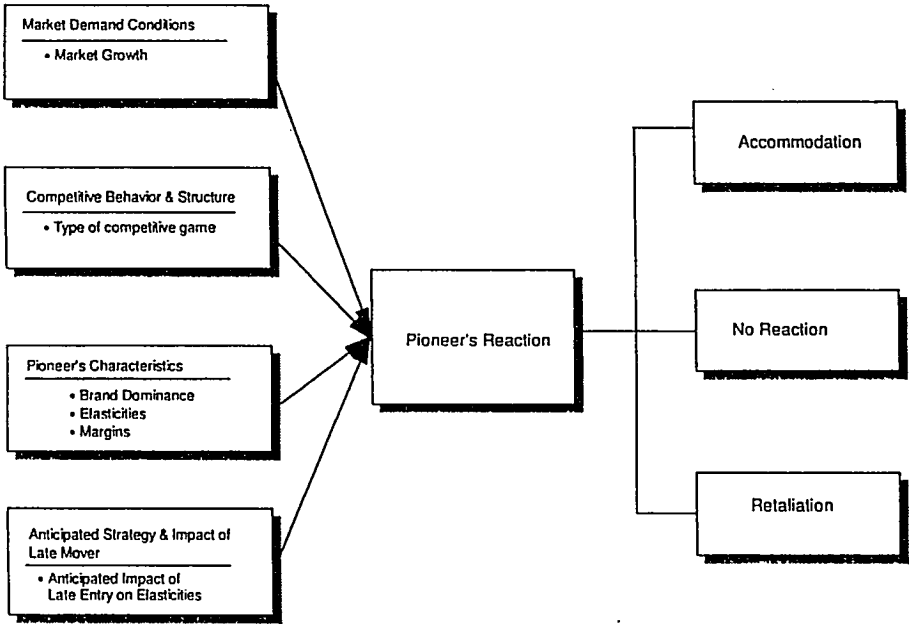
2. Literature Review and Conceptual Development

We first review theoretical and empirical research on the pioneer's response to new entries and then examine the shift in its marketing mix allocation.

2.1. Marketing Mix Reaction to New Entry

The pioneer's response to a new entry depends on four broad classes of factors—the market demand conditions, the pioneer's characteristics, the competitive structure and behavior, and the anticipated strategy and impact of the late mover (Gatignon and Bansal 1990, see Figure 1). Within these broad classes of factors, market growth (under "Market demand conditions") and firm/brand's market dominance (under "Pioneer's characteristics") have been found to be the key factors determining the pioneer's reaction by theoretical studies. For example, in a static market, a dominant incumbent (defined as a brand with more than

Figure 1 Factors Influencing the Pioneer's Response to Late Entry



half the share of the market) such as the pioneer should retaliate (Gruca et al. 1992) while a nondominant incumbent should accommodate (Gruca et al. 1992; Hauser and Shugan 1983, Kumar and Sudharshan 1988). In a growing market, an incumbent should retaliate, regardless of its dominance (Kumar and Sudharshan 1988). The intuition for the pioneer's retaliation in both growing and static markets is that market growth and brand dominance tend to increase an incumbent's revenues at the expense of its competitors, leading to increased optimal marketing spending. The intuition for accommodation by a nondominant incumbent in static markets is that new entrants bring about a decline in the nondominant incumbent's revenues, leading to a decrease in its equilibrium spending.

Empirical research on incumbent reactions is limited (Gatignon and Bansal 1990) and provides mixed results. Some studies show support for pioneers' accommodation to new entry, others provide evidence for retaliation, and a few studies even suggest no reaction. Kadiyali's (1996) analysis of the photographic film market reveals that Kodak accommodated Fuji's entry in advertising. On the other hand, Erickson (1985) and Rao (1990), in dynamic models of advertising competition in growing markets, conclude that incumbents increased advertising expenditures. A few studies suggest that incumbents may not respond to new entries (Cubbin and Domberger 1988, Robinson 1988). In an extensive analysis of 199 entrants in the PIMS new start-up businesses, Robinson (1988) found only limited competitive reactions from the pioneers, and in most cases where the pioneer reacted, retaliation was more likely than accommodation in growing markets. Cubbin and Domberger (1988) also found no reactions in 61% of a sample of 42 consumer product companies, but accommodation rather than retaliation was more likely in growing markets, contrary to Robinson (1988). Gatignon et al. (1989) suggest that both accommodation and retaliation are possible by providing an explanation based on the elasticities of marketing mix variables, a key component of "Pioneer's characteristics" identified in Figure 1. In a noteworthy empirical study of the airline industry and an OTC gynecological

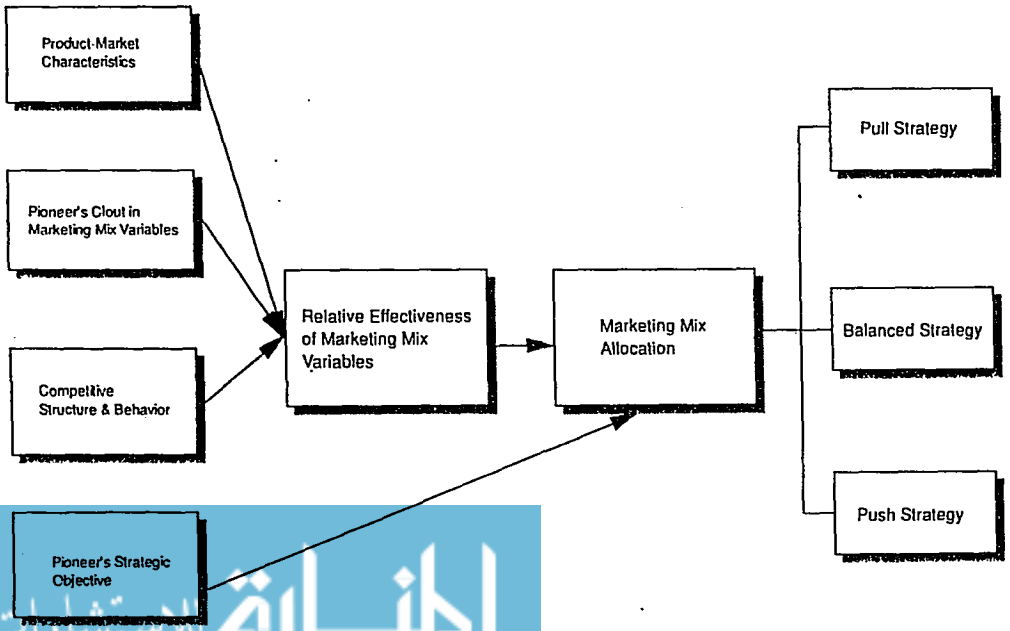
product category, they found that an incumbent retaliated to a new entry with its most effective marketing weapon (i.e., high elasticity variable relative to the incumbent's other marketing mix variables) and accommodated with its least effective marketing instrument (i.e., low elasticity variable relative to the incumbent's other marketing mix variables).

Contrary to prior research, however, in growing markets, some pioneers have successfully accommodated new entries with their stronger marketing weapons, and in some cases, retaliated with their weaker weapons as seen earlier (*LNA Report* 1979–90, *Business Week* 1988). Much research has neither explored cases in which a new entry affects the pioneer's elasticities nor considered competitive game structures other than Nash games. From Figure 1, however, these two factors are important determinants of the pioneer's reactions. Consideration of changes in elasticities and alternative game structures may enable us to better explain the pioneer's reactions in these important cases and resolve the conflicting results of Cubbin and Domberger (1988) and Robinson (1988).

2.2. Shift in Marketing Mix Allocation

In addition to the pioneer's reactions in terms of changes in each marketing mix variable, the reallocation of these variables toward pull versus push strategies is managerially important. Conceptually, the shift in the pioneer's marketing mix allocation after a new entry depends on four factors, viz., the product-market, the pioneer's clout in that variable, the competitive structure and behavior, and the pioneer's strategic objective with regard to new entries as shown in Figure 2. The first three factors affect allocation through the pioneer's relative marketing mix effectiveness. Different product-markets may differ in their responsiveness to one marketing mix variable than the other. For example, perfume markets are more responsive to advertising, whereas pharmaceutical markets are more influenced by salesforce. Brand/firm clout in a marketing mix variable can influence its elasticity in that variable. Some brands/firms are stronger in advertising (e.g., Marlboro/Philip Morris), while some others are more powerful in salesforce (e.g., IBM, Merck). These two factors imply that brands should

Figure 2 Factors Influencing the Pioneer's Marketing Mix Allocation



allocate between two marketing mix variables in the ratio of their elasticities (Gatignon and Hanssens 1987, Rangaswamy and Krishnamurthi 1991). The competitive structure and behavior, as reflected by the type of competitive game and the cross-elasticities of the competitors, also affect relative marketing mix effectiveness. For instance, the pioneer's relative marketing mix effectiveness in a Stackelberg game could be quite different from that in a Nash game.

The fourth factor, the pioneer's strategic objective, may directly impact allocation. For example, if the pioneer's strategic objective is to deter a new entrant, it may spend more on a marketing mix variable, sending a discouraging signal (Eliashberg and Robertson 1988). It can practice limit advertising, i.e., signal that its costs are low by advertising in excess of the required levels for the desired market response (Bagwell and Ramey 1988). The arguments are similar for limit salesforce spending. Previous research has not examined the shift in the pioneer's marketing mix allocation. Our purpose is to develop analytical results to predict the shift in allocation.

3. Model Formulation

We develop models to examine the pioneer's marketing mix (price, advertising, and salesforce) reactions and the shifts in its mix allocation in different competitive games in static and growing markets. We do this by allowing for changes in the pioneer's elasticities and margin due to a new entry. We, therefore, consider the pioneer's decisions in the monopoly and duopoly periods separately.[1]

3.1. Before the Late Mover's Entry (Monopoly Period)

Since market growth is an important factor influencing the pioneer's reactions, we model sales, not market share. Let the sales response function for the monopolistic pioneer in a general case be represented by:

$$S_{it} = p(T_{it})q(P_{it})r(A_{it})s(D_{it}), \qquad (1)$$

where S_{it} is sales in units, T_{it} is the "time-in-market of the pioneering brand i at time t," P_{it} is the unit price, A_{it} is the advertising spending, and D_{it} is the salesforce spending. Function $p(.)$ is s-shaped, $q(.)$ is decreasing, and $r(.)$, and $s(.)$ are positive, increasing and concave functions in their arguments. We choose a decoupled multiplicative response function because it has been found to describe market behavior well (Hauser and Shugan 1983, Gatignon et al. 1989, Kumar and Sudharshan 1988).[2] We consider concave functions in the marketing mix variables because the preponderance of empirical evidence favors the strictly concave sales response to nonprice marketing-decision variables (Hanssens and Parsons 1993, p. 437). Furthermore, concave functions have been found to capture salesforce efforts well in the literature (Vandenbosch and Weinberg 1993, p. 659). For analytical purposes, we consider the following sales response function that is multiplicative in marketing mix variables (Cobb-Douglas form) and captures the market growth through Equation (3).

$$S_{it} = e^{a_{iBt}} A_{it}^{b_{iB}} D_{it}^{d_{iB}} P_{it}^{-g_{iB}}, \qquad (2)$$

$$a_{iBt} = \alpha_{iB} - \frac{\phi_{iB}}{T_{it}}, \qquad (3)$$

$t < \tau$, where subscript B denotes "Before the late mover's entry," b_i is the own advertising elasticity, d_i is the own salesforce elasticity, g_i is the own price elasticity, α_i is the brand-specific parameter, ϕ_i is the sales growth/diffusion parameter of the pioneer, and τ is the time of entry of the second mover. We assume $0 \leq b_i, d_i \leq 1$, consistent with the managerial belief of diminishing returns to marketing expenditures.[3] We also assume $g_i > 1$.

We choose this sales response function for several reasons.[4] First, unlike the linear form, the multiplicative form provides for a downward sloping concave-inward curve as postulated by the economic literature.

[1] We do not consider repositioning and product decisions addressed in some studies (e.g., Moorthy 1988, Nault and Vandenbosch 1996, and Vandenbosch and Weinberg 1995) here. We assume this decision is made exogenously, similar to Gruca et al. (1992).

[2] We later explore the sensitivity of our results to this assumption of decoupled response function.

[3] This implies that cross-partial derivatives of sales are positive (i.e., $d^2S_i/dA_i dD_i > 0$), which is appropriate when advertising and salesforce complement each other, as is generally the case in growing markets. In mature markets, however, advertising and salesforce may substitute each other. We thank an anonymous reviewer for this comment.

[4] We can show that other response functions such as semi-log (con-

Second, the Cobb-Douglas form has been found to describe sales response function well in markets where advertising and salesforce are the key marketing mix variables (Rangaswamy and Krishnamurthi 1991).[5] The advertising and salesforce elasticities in Equation (2) are similar to the short-term elasticities in the Rangaswamy and Krishnamurthi (1991) model. Third, marketing interactions are embedded in such a model because the marginal effect of one marketing mix variable is a function of the level of another (Gatignon 1993, p. 702). Fourth, the term $\exp(a_{it})$ in Equations (2) and (3) is consistent with the growth pattern in similar models (e.g., Kalyanaram and Urban 1992). The functional form in time represents the diminishing market growth pattern with respect to "time-in-market," capturing the S-shaped sales growth found in many product-markets. Finally, the model is analytically tractable, providing closed-form equilibrium solutions, and elasticities are directly provided by response parameters, unlike some other functional forms.

3.2. After the Late Mover's Entry (Duopoly Period)

For simplicity, we consider only the first late mover's entry, but the analysis could be extended to multiple late movers, consistent with Gruca et al. (1992). Because the sales response of the pioneer in a duopoly will be affected by the marketing mix decisions of the late mover, we modify Equation (1) to reflect the impact of competitive marketing mix as follows:

$$S_{it} = p(T_{it})q(P_{it})r(A_{it})s(D_{it})u(P_{jt})v(A_{jt})w(D_{jt}), \quad (4)$$

$t \geq \tau$, where A_{jt} is the advertising spending and D_{jt} is the salesforce spending, P_{jt} is the unit price of the late mover j at time t, $u(.)$ is increasing in price, $v(.)$ and $w(.)$ are positive, decreasing, and convex in their arguments, and the other terms are as defined earlier. Extending competitive effects to Equation (2), we get

$$S_{it} = e^{a_{iA}t} A_{it}^{b_{iA}} A_{jt}^{c_{iA}} D_{it}^{d_{iA}} D_{jt}^{f_{iA}} P_{it}^{-g_{iA}} P_{jt}^{h_{iA}}, \quad (5)$$

where subscript A denotes "After the late mover's entry," c_i is the cross-advertising elasticity, f_i is the cross-salesforce elasticity, and h_i is the cross-price elasticity of the late mover on the pioneer, and the other terms are as defined earlier. As before, we assume $0 \leq c_i f_i \leq 1$, consistent with the managerial belief of diminishing returns to competitive marketing expenditures. The sales response model for the late mover is similar.

We allow for *asymmetry* in competition through different parameters for the pioneer and the late mover. The functional form in Equation (3) also allows for the possibility that the pioneer may have a greater build-up effect (equity) by virtue of being in the market before the late mover's entry. Clearly, the pioneer's "time-in-market" (T_{it}) is higher than the late mover's (T_{jt}) for any given t. Therefore, a_{it} (and hence S_{it}) will be higher for the pioneer than for the late mover any time after the late mover's entry, all else equal, reflecting a first mover advantage.

Brand i's profit function in both monopoly and duopoly periods is given by

$$\Pi_{it} = m_{it} S_{it} - A_{it} - D_{it} - F_{it}, \quad (6)$$

where $m_{it} = (P_{it} - k_{it})$ is the price-cost contribution margin, k_{it} is the marginal cost of brand i at time t, and F_{it} is the fixed cost of producing brand i and the other terms are defined as earlier.

Following prior studies (e.g., Gasmi et al. 1992, Kadiyali 1996, Roberts and Samuelson 1988), we view the pioneer-late mover competition as repeated games of strategic interaction. Repeated games enable firms to enhance their profit positions vis-à-vis a one shot game (Roberts and Samuelson 1988) and better reflect the long-term nature of strategic interaction between the firms. The underlying principle in repeated games is that the competitors play the same type of game (e.g., Nash or Stackelberg games) period by period. The unique equilibria in repeated games of finite horizon are the same as those in a stage game played in every period (Tirole 1992, p. 245).

Because competitive structure and behavior is an important factor in predicting the pioneer's reactions, we focus on different types of noncooperative games. Since price is not an important decision variable in the markets

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cave) and log-reciprocal (S-shaped) produce similar results. Therefore, the results are robust to assumed decoupled response function. The derivation is available from the author.

[5]An undesirable feature of the model, however, is that the sales response will be zero should any predictor variable be zero. A simple way of avoiding this problem in model estimation is to substitute an arbitrary small value (say, 0.1% of the average value of the variable) whenever a predictor variable is zero (Naert and Weverbergh 1980).

we consider, we assume that competitors play a Nash game in prices, consistent with the "adaptation of theory to the empirical situation" approach suggested by Moorthy (1993, p. 186). Regarding advertising and salesforce, however, three leader-follower situations (leader-follower, follower-leader, and follower-follower) and three marketing mix actions (advertising only, salesforce only, and advertising and salesforce together) are possible, leading to nine different types of non-cooperative games.[6] These games are: (1) Nash in both advertising and salesforce, (2) Stackelberg in advertising with the pioneer as the leader, but Nash in salesforce, (3) Stackelberg in salesforce with the pioneer as the leader, but Nash in advertising, (4) Stackelberg in both advertising and salesforce with the pioneer as the leader, (5) Stackelberg in advertising with the late mover as the leader, but Nash in salesforce, (6) Stackelberg in salesforce with the late mover as the leader, but Nash in advertising, (7) Stackelberg in both advertising and salesforce with the late mover as the leader, (8) Stackelberg in salesforce and advertising with the pioneer as the leader in advertising, but follower in salesforce, and (9) Stackelberg in salesforce and advertising with the pioneer as the leader in salesforce, but follower in advertising.[7]

Although the type of competitive game is determined exogenously, managers can anticipate this together with the expected sales growth and the likely impact of a late mover based on the past behavior of the late mover in other markets. For instance, the pioneer might have encountered the prospective late mover in other markets. The pioneer may also have competitive intelligence on the likely impact of the late mover. Furthermore, new entrants make preannouncements long before their entry in many markets. In such cases, the pioneer can assess the impact of preannounced products based on the signaling of preannouncements (Eliashberg and Rao 1995, Eliashberg and Robertson 1988).[8]

[6]We thank the editor for this explanation.

[7]If we further assume competitors can lead or follow in prices, we will have 27 possible games leading to a highly complex analysis beyond the scope of this paper. Because our focus is resource allocation variables, we restrict our attention to only nine games.

[8]This is particularly true in the U.S. pharmaceutical industry where a new brand has to undergo a long period of clinical trials before getting an approval from the Food and Drug Administration (FDA), the regulatory authority.

[9]We provide short proofs for the results in the appendix. A detailed proof is available with the author.

4. Analytical Results

Recall that our objectives are to identify the conditions under which the pioneer should accommodate, or retaliate, or not react to a new entry, and shift its marketing mix allocation. Toward this end, we develop several analytical results, first on the pioneer's reactions in price, advertising, and salesforce variables, and next on its marketing allocation.[9] In the terms that follow, we drop the time subscript t for expositional ease.

4.1. Marketing Mix Reaction

Our first result concerns how pioneers respond in terms of price while the remaining results involve pioneers' response in terms of other marketing mix variables, viz., advertising and salesforce.

RESULT 1. *The pioneer's equilibrium price will decrease in response to new entry if the following condition on its price elasticity and marginal cost before and after the entry holds:*

$$\frac{g_{iA}}{(g_{iA}-1)}k_{iA} < \frac{g_{iB}}{(g_{iB}-1)}k_{iB}. \tag{7}$$

Furthermore, if the left-hand side (LHS) > the right-hand side (RHS) in Inequality (7), the pioneer's equilibrium price will increase and if LHS = RHS, the pioneer's price will be unchanged.

Note that the pioneer's equilibrium prices in both the monopoly and the duopoly periods are independent of advertising and salesforce, consistent with Hauser and Shugan (1983) and Kumar and Sudharshan (1988) who also use a decoupled response function. The optimal price decreases with price elasticity (g_i) and increases with marginal cost (k_i). In a typical situation, if the new entry brings about an increase in price elasticity and the marginal cost remains the same, the pioneer's equilibrium price will decrease, regardless of whether the market is static or growing. Such a result

is consistent with prior theoretical research (e.g., Hauser and Shugan 1983).

Our interest is primarily in markets where price is not a major decision variable, so we develop analytical results on the reactions in advertising and salesforce. To do this, we first derive the equilibrium levels of advertising and salesforce before and after the late mover's entry for all the games (see Table 1 for a summary).[10] We express the equilibria in structural form to capture the endogeneity of marketing decisions, consistent with several studies (e.g., Moore et al. 1991, Roy et al. 1994). In this form, the equilibrium spending depends on the combination of marketing effectiveness (own and competitive), margin, and sales, which are assumed to increase with market growth.

The results of Table 1 can be used to derive a number of implications. First, the change in the pioneer's equilibrium advertising and salesforce expenditures after the late mover's entry depend on the form of competitive game. To see this, note that there are four sets of solutions for optimal marketing expenditures in Table 1: one for games in which the pioneer does not lead in any marketing mix variable, viz., Games 1, 5, 6, and 7; one for games in which the pioneer leads in only advertising, viz., Games 2 and 8; one for games in which the pioneer leads only in salesforce, viz., Games 3 and 9; and one for the game in which the pioneer leads in both the variables, viz., Game 4.

Second, the degree to which the market is growing can affect the optimal response of the pioneer after entry. Thus, if the market is static, the pioneer's post-entry sales will be less than its pre-entry sales, i.e., $S_{iA} < S_{iB}$ (the new entrant will bring about a decline in the pioneer's sales in a market of fixed size). If the market is growing, the pioneer's post-entry sales will be greater than its pre-entry sales, i.e., $S_{iA} > S_{iB}$ (by assumption).

Third, we note that increases or decreases in the pioneer's margin (m_i) and elasticities (b_i and d_i) directly influence the actions of accommodation or retaliation (i.e., increasing or decreasing spending) and affect the optimal allocation. The pioneer's marketing mix elasticities may increase, remain the same, or decrease due to the late mover's entry. The pioneer's elasticities may increase after a me-too late mover's entry (Carpenter and Nakamoto 1989). They can decrease if the late mover is innovative or differentiated (Shankar et al. 1997).

Combining these four factors yields 72 possible scenarios (four sets of games, two levels of market growth, three levels of changes in margin, and three levels of changes in elasticities for each marketing mix variable. We next develop analytical results for these 72 scenarios by comparing when it is best to increase (decrease) expenditures after the late mover's entry. We do this by establishing parametric conditions for each of the four sets of games that indicate whether it is best to accommodate or retaliate. Specifically, these conditions are defined in terms of ratios of specific parameters and variables, one for each set of games. The conditions are summarized in terms of Results 2–5 in Table 2.

Next, we look at a few of the 72 scenarios where it is possible to define the optimal response independent of the parametric settings. These scenarios and the corresponding optimal reactions are summarized in Results 6–9 in Table 2.

As noted above, Results 2–5 predict the pioneer's reaction in each class of game. Result 2 predicts the pioneer's reaction if it does not lead in any marketing variable. The pioneer will accommodate if the ratio of the product of the post-entry levels of advertising elasticity and margin to that of the pre-entry levels (LHS in Inequality (2.1)) is less than the ratio of pre-entry sales to post-entry sales (RHS in Inequality (2.1)). The intuition follows. The pioneer is more likely to accommodate, the lower the LHS and the higher the RHS. When the LHS is lower, the pioneer's advertising elasticity and margin after entry are weak relative to before entry, so it is better to reduce spending. Similarly, when the RHS is higher, i.e., when post-entry sales are lower relative to pre-entry sales, the pioneer will have lower revenues to spend on its marketing activities and hence it is better to accommodate. The logic for retaliation is the converse of that for accommodation. Results 3 and 4 predict the pioneer's reaction if it leads in advertising only and salesforce only, respectively. The pioneer will accommodate if the relative combined effect of the pioneer's advertising effectiveness and

[10]The derivation of the equilibrium levels can be obtained from the author.

Table 1 Summary of Equilibria in the Games

Game	Equilibria		Equilibrium *A/D* Ratio	
Before late mover's entry	$A_i^{8*} = b_{iB}m_{iB}S_{iB}$ $D_i^{8*} = d_{iB}m_{iB}S_{iB}$	(1.1) (1.2)	$\frac{A_i^{8*}}{D_i^{8*}} = \frac{b_{iB}}{d_{iB}}$	(1.3)
1. Nash in both advertising and salesforce	$A_i^{1*} = b_i m_i S_i$ $D_i^{1*} = d_i m_i S_i$	(1.4) (1.5)	$\frac{A_i^{1*}}{D_i^{1*}} = \frac{b_i}{d_i}$	(1.6)
2. Pioneer led Stackelberg in advertising, Nash in salesforce	$A_i^{2*} = \left\{b_i + \frac{c_i c_j}{(1 - b_j)}\right\} m_i S_i$ $D_i^{2*} = \left\{d_i + \frac{c_i f_j}{(1 - b_j)}\right\} m_i S_i$	(1.7) (1.8)	$\frac{A_i^{2*}}{D_i^{2*}} = \frac{\{b_i(1 - b_j) + c_i c_j\}}{\{d_i(1 - b_j) + c_i f_j\}}$	(1.9)
3. Pioneer led Stackelberg in salesforce, Nash in advertising	$A_i^{3*} = \left\{b_i + \frac{f_i c_j}{(1 - d_j)}\right\} m_i S_i$ $D_i^{3*} = \left\{d_i + \frac{f_i f_j}{(1 - d_j)}\right\} m_i S_i$	(1.10) (1.11)	$\frac{A_i^{3*}}{D_i^{3*}} = \frac{\{b_i(1 - d_j) + f_i c_j\}}{\{d_i(1 - d_j) + f_i f_j\}}$	(1.12)
4. Pioneer led Stackelberg in both advertising and salesforce	$A_i^{4*} = \left\{b_i + \frac{c_i(c_i + f_j)}{(1 - b_i - d_j)}\right\} m_i S_i$ $D_i^{4*} = \left\{d_i + \frac{f_i(c_i + f_j)}{(1 - b_i - d_j)}\right\} m_i S_i$	(1.13) (1.14)	$\frac{A_i^{4*}}{D_i^{4*}} = \frac{b_i(1 - b_i - d_j) + c_i(c_i + f_j)}{d_i(1 - b_i - d_j) + f_i(c_i + f_j)}$	(1.15)
5. Late mover led Stackelberg in advertising, Nash in salesforce	$A_i^{5*} = b_i m_i S_i$ $D_i^{5*} = d_i m_i S_i$	(1.16) (1.17)	$\frac{A_i^{5*}}{B_i^{5*}} = \frac{b_i}{d_i}$	(1.18)
6. Late mover led Stackelberg in salesforce, Nash in advertising	$A_i^{6*} = b_i m_i S_i$ $D_i^{6*} = d_i m_i S_i$	(1.19) (1.20)	$\frac{A_i^{6*}}{B_i^{6*}} = \frac{b_i}{d_i}$	(1.21)
7. Late mover led Stackelberg in both advertising and salesforce	$A_i^{7*} = b_i m_i S_i$ $D_i^{7*} = d_i m_i S_i$	(1.22) (1.23)	$\frac{A_i^{7*}}{B_i^{7*}} = \frac{b_i}{d_i}$	(1.24)
8. Pioneer led Stackelberg in advertising, late mover led stackelberg in salesforce	$A_i^{8*} = \left\{b_i + \frac{c_i c_j}{(1 - b_j)}\right\} m_i S_i$ $D_i^{8*} = \left\{d_i + \frac{c_i f_j}{(1 - b_j)}\right\} m_i S_i$	(1.25) (1.26)	$\frac{A_i^{8*}}{D_i^{8*}} = \frac{\{b_i(1 - b_j) + c_i c_j\}}{\{d_i(1 - b_j) + c_i f_j\}}$	(1.27)
9. Late mover led Stackelberg in advertising, pioneer led Stackelberg in salesforce	$A_i^{9*} = \left\{b_i + \frac{f_i c_j}{(1 - d_j)}\right\} m_i S_i$ $D_i^{9*} = \left\{d_i + \frac{f_i f_j}{(1 - d_j)}\right\} m_i S_i$	(1.28) (1.29)	$\frac{A_i^{9*}}{D_i^{9*}} = \frac{\{b_i(1 - d_j) + f_i c_j\}}{\{d_i(1 - d_j) + f_i f_j\}}$	(1.30)

The superscript numbers for the equilibrium levels of marketing mix variables in Table 1 denote the numbers of the games they correspond to.

Table 2 Summary of the Pioneer's Predicted Marketing Mix Reactions Under Plausible Scenarios

Result	Pioneer's Role in competition	Market Size	Elasticity	Margin	Parameter and Variable Conditions[a]	Reaction
2	Not a leader in any variable (Games 1, 5, 6, & 7)	NR	NR	NR	$\frac{b_{iA}m_{iA}}{b_{iB}m_{iB}} < \frac{S_{iB}}{S_{iA}}$ (2.1)	Accommodate
3	Leader in only advertising (Games 2 & 8)	NR	NR	NR	$\left[\frac{b_{iA}}{b_{iB}} + \frac{c_i c_j}{b_{iB}(1 - b_j)}\right]\frac{m_{iA}}{m_{iB}} < \frac{S_{iB}}{S_{iA}}$ (2.2)	Accommodate
4	Leader in only salesforce (Games 3 & 9)	NR	NR	NR	$\left[\frac{b_{iA}}{b_{iB}} + \frac{f_i c_j}{b_{iB}(1 - d_j)}\right]\frac{m_{iA}}{m_{iB}} < \frac{S_{iB}}{S_{iA}}$ (2.3)	Accommodate
5	Leader in both advertising & salesforce (Game 4)	NR	NR	NR	$\left[\frac{b_{iA}}{b_{iB}} + \frac{(c_i + f_i)c_j}{b_{iB}(1 - b_j - d_j)}\right]\frac{m_{iA}}{m_{iB}} < \frac{S_{iB}}{S_{iA}}$ (2.4)	Accommodate
6	Not a leader in any variable (Games 1, 5, 6, & 7)	Static	No increase	No increase	None	Accommodate
7	Not a leader in any variable (Games 1, 5, 6, & 7)	Growing	No decrease	No decrease	None	Retaliate
8	Leader in any one variable (Games 2, 8, 3, & 9)	Growing	No decrease	No decrease	None	Retaliate
9	Leader in both advertising & salesforce (Game 4)	Growing	No decrease; $(b_j + d_j) < 1$	No decrease	None	Retaliate

NR-Not relevant.

[a]In Results 2–5, we identify the conditions under which the pioneer will accommodate in advertising, regardless of the level of the other factors (i.e., if LHS < RHS). The conditions for retaliation and no reaction are similar, i.e., the pioneer will retaliate if LHS > RHS, and, the pioneer will not change its spending if LHS = RHS. The conditions for salesforce reaction are similar with the own and cross-elasticity parameters, b, d, c, and f, replaced by d, b, f, and c, respectively. Note that the cross-elasticities (c_i and f_i) are relevant only after the late mover's entry and hence we drop the subscript A for these.

margin after and before entry is less than the ratio of the pre-entry to post-entry sales levels as reflected by Inequalities (2.2) and (2.3). The pioneer's advertising effectiveness in Condition 2.2 (2.3) includes the pioneer's cross-advertising (salesforce) elasticity and the late mover's advertising (salesforce) elasticity because of the leadership in advertising (salesforce). These conditions are similar to those in Result 2. Result 5 predicts the pioneer's reaction if it leads in both advertising and salesforce. The condition, i.e., Inequality (2.4), is similar to Conditions (2.2) and (2.3) except that advertising effectiveness is net of all the elasticities of the pioneer

and the late mover, excluding the late mover's salesforce elasticity (f_j). The intuition for Result 5 is similar to those for Results 2–4.

Results 6–9 concern reactions in any marketing mix variable in those scenarios that do not have any parameter and variable conditions. The levels of the factors in these results are sufficient conditions for predicting the pioneer's reactions. Result 6 predicts the pioneer's reaction when it does not lead in any variable and its elasticity and margin don't increase in static markets. An accommodation strategy is optimal in this case. The intuition is that new entrants bring about a decline in the pioneer's sales revenues in static markets. This together with the absence of leadership and increases in elasticities and margins weaken the pioneer's retaliating ability, leading to reduced optimal marketing spending. Result 7 predicts the pioneer's reaction when the pioneer does not lead in any marketing variable and the elasticity and margin don't decline in a growing market. Retaliation is the optimal strategy in this case. Growing markets offer increased revenues for the pioneer. These additional revenues combined with no adverse changes in elasticity and margin allow the pioneer to spend more in equilibrium. Result 8 predicts the pioneer's reaction when it leads in only one marketing variable and the elasticity and margin don't decline in a growing market. A retaliation strategy is optimal in this situation. The logic is the same as that for Result 7 with the added strength of leadership in one marketing mix variable improving the ability of the pioneer to use it in the form of retaliation. Result 9 predicts the pioneer's response when the pioneer leads in both advertising and salesforce and the elasticity and margin don't decline in a growing market. As in Results 7 and 8, retaliation is the optimal strategy. The intuition is the similar to that in Result 8. Leadership in both the marketing mix variables provides further strength to retaliate.

We can also use the above results to derive "comparative static type" results, i.e., what tends to be the pioneer's best response if one of the four factors (e.g., the type of game, market growth, etc.) changes, holding fixed the other factors. To examine the impact of the competitive game on the pioneer's reaction, we compare the LHS in the conditions for Results 2–5 since the RHS, i.e., the ratio of pre-entry sales to post-entry sales levels, is the same in all conditions. The LHS in Inequality (2.4) > the LHS in Inequality (2.3) or (2.2) > the LHS in Inequality (2.1) for the same values of parameters. This suggests that, for the same values of parameters and sales of the pioneer across all the games, the pioneer is more likely to accommodate when it is less likely to be a leader in any marketing variable, i.e., a follower (leader) role typically leads to accommodation (retaliation). The intuition is as follows. Because the sales response function is multiplicative, the reaction functions in the leader-follower games are downward sloping in the competitor's marketing mix decisions. This implies that leadership in a marketing variable increases the pioneer's ability to use the variable for greater returns, leading to higher profits for Stackelberg leader, all else equal (Gal-Or 1985, Lee and Staelin 1997).[11]

To study the effect of changes in elasticities and margin, we examine the LHS in the conditions of Results 2–5. The LHS in each of the Inequalities (2.1) to (2.4) decreases with post-entry elasticities and margin. The pioneer is more likely to accommodate if the LHS is lower, all else equal. The intuition is that lower post-entry elasticity leads to decreased revenues and hence decreased optimal spending. Similarly, lower post-entry margin leads to reduced optimal spending.

To understand the role of market growth, we can look at the RHS of Results 2–5, i.e., the ratio of the pre-entry to the post-entry sales levels. This ratio is greater than one in a static market and less than one in a growing market. Thus, the likelihood of the LHS being less than the RHS, i.e., an accommodating reaction, is higher in a static market than a growing market. We can also infer this by comparing Result 6 with Results 7–9. This comparison suggests that static (growing) market typically lead to accommodation (retaliation). Greater market growth provides greater sales revenues, leading to increased optimal spending.

In summary, the analytical results show that a pioneer who adopts a follower (leader) role with respect to a marketing mix variable, in static (growing) market, and witnesses a decline (an increase) in own elasticity

[11]We thank the editor for pointing this out.

and margin upon new entry, should *generally* accommodate (retaliate) in that variable. Specifically, the reaction depends on the combination of competitive game, the pioneer's margin and post-entry elasticities, and market growth. Clearly, the different competitive game structures and the change in the pioneer's elasticities and margin upon the late mover's entry play an important role in the pioneer's equilibrium reactions to the new entry.

These analytical results better explain the pioneer's reactions compared to prior research. Results 2–5 show that accommodation may be an equilibrium strategy for the pioneer in a static market, contrary to the prediction of Gruca et al. (1992). This can be explained as follows. Gruca et al. (1992) consider a coupled response function (attraction model of market share), whereas we consider a decoupled response function in sales. In their attraction model, an incumbent's optimal marketing spending increases with decline in its market share if it has more than half the market (dominant brand), the elasticities and margin don't change, and the game structure is Nash. Since, in a static market, the pioneer's market share declines upon a new entry, this leads to an increase in the pioneer's equilibrium marketing spending. Essentially, their results show that the pioneer can increase its marketing spending from the level before the new entry and improve its attraction relative to other brands and hence its profits. In contrast, in our decoupled response function, since equilibrium marketing spending is proportional to sales and because sales decrease with new entry in a static market, the equilibrium reaction is to decrease spending. In addition, the pioneer's elasticities and margin may decrease after a new entry. It must be noted that Gruca et al.'s (1992) model is not appropriate for the case of pioneer's reaction to a second mover's entry because it presumes the presence of more than one brand in the market before any new entry. Thus, by considering competitive game structures and the changes in the pioneers' elasticities and margin, our results can better explain the pioneer's reaction to a second mover in a static market.

Results 7–9 support Kumar and Sudharshan's (1988) finding that the pioneer should increase spending in a growing market, independent of what happens with parameters other than own elasticities and margin. However, even though the pioneer's sales will increase in a growing market, its marketing mix spending can increase, or decrease, or remain the same, depending on how the pioneer's elasticities and margins are modified by entry. If these parameters don't decline after the late mover's entry, the equilibrium reaction is to increase spending, regardless of the game (Results 7–9). However, if for example, the pioneer is not a leader in any marketing variable, the pioneer's elasticity decreases, and its margin does not increase, the equilibrium reaction is to decrease spending. Kumar and Sudharshan's (1988) model does not allow for changes in the incumbent's elasticities and margin upon new entry. Thus, Kumar and Sudharshan's (1988) conclusion is not valid in growing markets under the conditions identified in Inequalities (2.1)–(2.4). If these conditions hold, the equilibrium reaction is to decrease marketing spending even in growing markets.

The results also suggest that the pioneer may accommodate with its high elasticity variable and retaliate with its low elasticity variable under certain conditions, contrary to Gatignon et al. (1989). In fact, from inequalities (2.1)–(2.4), the pioneer's reaction in a marketing variable depends on the pre- and post-entry elasticities of that variable, and not on those of its other variable. Therefore, even if the pre-entry elasticity of one variable (say, advertising) is higher than the other (salesforce), it is possible that the pioneer may accommodate in advertising if any of the appropriate conditions on the pre and post-entry advertising elasticities in Results 2–5 hold. Thus, Results 1–9 provide a more general prediction of the pioneer's responses to new entry than prior research.

4.2. Shift in Marketing Mix Allocation

We now use the results from Table 1 to examine the shift in the pioneer's marketing mix allocation toward pull or push strategies in Results 10–13, each corresponding to one class of competitive game. These results are summarized in Table 3. Result 10 predicts the shift in the pioneer's allocation when it does not lead in any marketing variable. The pioneer will shift toward a pull strategy if the post-entry advertising to salesforce elasticity ratio is higher than the corresponding pre-entry ratio. The allocation in both the monopoly and duopoly periods depends on a combination

Table 3 Summary of the Pioneer's Predicted Shift in Marketing Mix Allocation Strategies

Result	Pioneer's Role in Competition	Marketing Mix Elasticity Condition[a]		Shift in Allocation
10	Not a leader in any marketing mix variable (Games 1, 5, 6 & 7)	$\frac{b_{iA}}{d_{iA}} > \frac{b_{iB}}{d_{iB}}$	(3.1)	Shift toward pull
11	Leader in only advertising (Games 2 & 8)	$\frac{b_{iA}(1 - b_i) + c_i c_j}{d_{iA}(1 - b_i) + c_i f_j} > \frac{b_{iB}}{d_{iB}}$	(3.2)	Shift toward pull
12	Leader in only salesforce (Games 3 & 9)	$\frac{b_{iA}(1 - d_i) + f_i c_j}{d_{iA}(1 - d_i) + f_i f_j} > \frac{b_{iB}}{d_{iB}}$	(3.3)	Shift toward pull
13	Leader in both advertising & salesforce (Game 4)	$\frac{b_{iA}(1 - b_i - d_i) + c_i(c_i + f_i)}{d_{iA}(1 - b_i - d_i) + f_i(c_i + f_i)} > \frac{b_{iB}}{d_{iB}}$	(3.4)	Shift toward pull

[a]We identify the Conditions (3.1) to (3.4) for a shift toward pull strategy (i.e., if LHS > RHS). The condition for a shift toward push strategy is the converse of this condition (i.e., if LHS < RHS).

of product-market characteristics and the pioneer's clout (see Figure 2) represented by the ratio of marketing mix elasticities, consistent with Gatignon and Hanssens (1987) and Rangaswamy and Krishnamurthi (1991).

Results 11–13 predict the shift in allocation when the pioneer leads in one or more variables. Result 11 is relevant when the pioneer leads in advertising only, Result 12 when the pioneers leads in salesforce only, and Result 13 when the pioneer leads in both advertising and salesforce. In Results 11–13, the shift in the pioneer's marketing mix allocation depends on the competitive game structure and the change in the pioneer's elasticities in addition to the combination of product-market characteristics and the pioneer's clout identified in Figure 2. The change in allocation does not depend on the brand-specific or growth parameters (α_i or ϕ_i) in all types of games. The RHS in Conditions (3.1)–(3.4), the ratio of pre-entry advertising and salesforce elasticities are the same, so the differences in allocation shift across Results 10–13 depend on the differences in the LHS. The LHS in each result represents the post-entry relative marketing mix effectiveness of the pioneer in that game. While the reallocation depends only on the pioneer's own elasticities in a Nash game, it also depends on the late mover's own elasticities and the brands' cross-elasticities in the leader-follower games. Clearly, post-entry elasticities play a critical role in determining the shift in allocation strategy. The LHS and the RHS in Inequalities (3.2)–(3.4) can be viewed as the pioneer's relative marketing mix effectiveness after and before entry, respectively. Thus, the shift in the pioneer's marketing mix allocation depends on the change in its relative marketing mix effectiveness after a new entry.

In summary, Results 10–13 show the conditions under which the pioneer will reallocate its marketing mix resources toward a pull or push strategy. This reallocation depends on the combination of the structure of competition, the impact of the late mover on its elasticities and margins, and the competitor's marketing mix elasticities, in addition to own elasticities. Previous research, however, has not examined the pioneer's shift in marketing mix allocation after new entry.

Finally, it should be remembered that all the results except Result 6 are sensitive two key assumptions, viz.,

the response function is decoupled and the pioneer's sales increase with market growth. The sensitivity of the results to these assumptions is shown in Table 4. The result on the pioneer's optimal price (Result 1) depends on the decoupled response function that contributes to its independence from other marketing variables in equilibrium. Results 2–5, which predict accommodation in the four classes of games, also depend on the multiplicative functional form that determines the equilibrium marketing mix before and after entry. Results 7–9, which predict retaliation, are sensitive to both the form of response function and the assumption that the pioneer's sales increase upon new entry in a growing market because the pioneer's equilibrium spending is proportional to its sales. Results 10–13 are also dependent on the decoupled nature of response function as it affects the pioneer's relative marketing effectiveness. In contrast, Result 6, which predicts accommodation in a static market, is not sensitive to these assumptions because a second entry in a static market reduces the pioneer's sales revenues, regardless of the functional form, and if the pioneer's elasticities and margins do not increase, this leads to a decline in equilibrium spending.

5. Data and Model Estimation

We recognize that all the analytical results cannot be empirically tested in a single market because all the levels of factors may not be represented in that market. We, however, test some of the results on a data set that covers a category of chronic-care ethical drug in the U.S. market during the 1970s and the 1980s.

5.1. Data Description

The category consists of monthly data on sales and salesforce and journal advertising expenditures of the pioneer and the late mover for 10 years and 4 months starting from the introduction of the pioneering brand until market maturity.[12] We use total number of prescriptions as a measure of sales. The pioneer established the market and remained dominant in a growing market until the late mover brand entered the market 3 years and 1 month after the pioneering brand. The late mover was considered to be innovative or favorably differentiated from the pioneer in product dosage.[13] Both the pioneer and the late mover are leading multinational pharmaceutical firms with adequate marketing resources. We provide a summary of the data in Table 5. The pioneer accommodated the late mover in salesforce, but retaliated in advertising. Furthermore, the pioneer could not match the late mover's innovation, precluding any strong reactions in product offering, which may be important in some cases (see Nault and Vandenbosch 1996 for a detailed analysis of protection by the incumbent through product innovation). In addition, in the U.S. ethical drug industry, any new product or product improvement needs approval from the Food and Drug Administration (FDA), the regulatory authority, making reaction in product offering a time-consuming process. Therefore, the pioneer's reaction in the resource allocation variables is critically important in such a market. The key question is why did the pioneer react the way it did in advertising and salesforce? Are the pioneer's reactions in accordance with prior research predictions, or do they follow the more general analytical results in the previous section?

We found the demand for the category to be price-inelastic for the period of data, consistent with the findings of Gatignon et al. (1990) in other prescription drug markets. During the period of the data, physicians, the decision makers in this market, were insensitive to prices. No generic products entered during the period of data, so there was no price competition. Further, we found little or no monthly variation in price data. The advertising and salesforce expenditures of each firm were substantially greater than zero each month. Consequently, we do not have to worry about estimating a model where one of the independent variable is zero (see Footnote 4). Since the market was price-inelastic and these two pharmaceutical firms dominated the market, they typically priced so as to maintain a predetermined contribution margin during each period.[14]

[12]The names and specific details of the brands and the market can not be disclosed as per a written agreement signed with International Management Systems (IMS).

[13]This conclusion is based on interviews with physicians and executives in the pharmaceutical industry.

[14]Based on interviews with executives from the pharmaceutical firms.

Table 4 Sensitivity of Analytical Results to Assumptions

Result	Decoupled Response Function	Pioneer's Sales Increases in a Growing Market	Rationale/Explanation
1: Price Reaction	X		The multiplicative functional form for brand sales contributes to the optimal price being independent of other marketing variables.
2–5: Advertising & Salesforce Reactions	X		Inequalities (2.1)–(2.4) are driven by relative marketing mix elasticity, which is dependent on the decoupled response function.
7–9: Retaliations		X	Since equilibrium marketing spending is proportional to sales, an increase in pioneer's sales in a growing market leads to increase in marketing spending, all else equal.
10–13: Shift in Marketing Mix Allocation	X		The pioneer's relative marketing mix effectiveness before and after new entry is determined by the response function.

Table 5 Summary Statistics of the Data[a]

Brand	Time-in-Market	Average Monthly Sales ('000 Total Prescriptions)	Average Monthly Advertising Spending ($ '000s)		Average Monthly Salesforce Spending ($ '000s)	
			Before Entry[b]	After Entry[b]	Before Entry[b]	After Entry[b]
Pioneer	10 years, 4 months	733	775	972	1070	831
Late Mover	7 years, 3 months	1041	553		911	

[a]Used with the expressed written permission of IMS America, Ltd.

[b]Based on a period of five months before and after the late mover's entry

5.2. Model Estimation

Because the market was price-inelastic, we use a sales response function without the price terms for the empirical analysis. We estimate the models during the monopoly and duopoly periods separately. We allow for learning or adaptive behavior of the competitors over the product life cycle (PLC) by splitting the duopoly period into two critical phases, a *fast growth phase* and a *slow growth phase*. Toward this end, we allow for changes in the competitors' optimal marketing mix decisions with changes in the pattern of the game and/or elasticities between these two phases. We identify the transition point that separates the PLC into two phases by modeling total sales of the pioneer and the late mover as an S-shaped function of time, consistent with the general pattern of category sales over time. The inflection point on this curve represents the transition from the fast growth to the slow growth phase. We

selected a log-reciprocal model of category sales as the best fitting S-shaped function.[15] We found the inflection point to be month 68.[16]

In the duopoly period, we estimate a simultaneous system of equations for each structural game that includes the sales response equations as well as the equilibrium marketing mix response equations for both brands to take into account the endogeneity of marketing mix decisions. We assume a multiplicative error term for each equation consistent with multiplicative models (e.g., Gatignon et al. 1989). We identify the models by imposing constraints on the parameters as provided by the equilibrium equations. Because the margins of the brands were typically predetermined, we treat them as constants during the period of estimation and recover them as parameters from the estimation. We estimate the models by 3-stage least squares (3SLS). Of the games tested, we found that Game 6, a late mover–led game in salesforce but Nash in advertising, best fit the data using the minimized sum of squared error (SSE) as the criterion.

6. Empirical Results and Discussion

A late mover–led Stackelberg game in salesforce is plausible for three major reasons. First, several studies have found evidence for the existence of Stackelberg games (e.g., Gasmi et al. 1992, Roy et al. 1994). Second, it is consistent with evidence for the success of late movers (e.g., Golder and Tellis 1993, Lilien and Yoon 1990, Shankar et al. 1997). Third, since the late mover is a reputed industry leader in salesforce and both firms in our data set are leading multinational pharmaceutical companies that compete in several international markets, the pioneer may have acknowledged the late mover's leadership by acting as a follower, consistent with the theory of multimarket competition (Bernheim and Whinston 1990).[17]

The results of the estimated models before and after the late mover's entry (Game 6) are provided in Tables 6 and 7, respectively. The parameters are intuitive and the margins of the brands are reasonable. The differences in the pioneer's and the late mover's parameters

[15]We tried other functional forms such as the logistic and ADBUDG form, which provided similar results. We selected the log-reciprocal model because it has the same functional form as the sales growth in Equation (3).

[16]To ensure that the accuracy of the transition in the PLC does not drive the results, we performed a sensitivity analysis around the transition point. We took three periods on either direction of the transition point and repeated our analysis. The conclusions remained the same.

[17]The late mover is regarded as a leader in terms of the efficacy of its salesforce and its trend-setting salesforce campaigns that other firms typically follow, as learned from our discussions with industry experts and from industry publications.

Table 6 Results of the Model Before the Late Mover's Entry (Monopoly Period)

Parameter	Estimate (Standard Error)
Pioneer's brand specific parameter (α_{iB})	−0.29 (0.30)
Pioneer's own advertising parameter (b_{iB})	0.33 (0.03)**
Pioneer's own salesforce parameter (d_{iB})	0.65 (0.04)**
Pioneer's margin (m_{iB})	3.06 (0.25)**
Pioneer's growth parameter (ϕ_{iB})	0.24 (0.20)

**Significant at 0.01 level.

Table 7 Results of the Model After the Late Mover's Entry (Duopoly Period)

Parameter	Estimate (Standard Error)
Pioneer's brand specific parameter (α_i)	4.40 (1.75)*
Pioneer's own advertising parameter (b_i)	0.18 (0.02)**
Pioneer's cross-advertising parameter (c_i)	0.02 (0.27)
Pioneer's own salesforce parameter (d_i)	0.23 (0.03)**
Pioneer's cross-salesforce parameter (f_i)	0.03 (0.16)
Pioneer's margin (m_i)	5.30 (1.73)**
Pioneer's growth parameter (ϕ_i)	1.03 (0.43)*
Late mover's brand-specific parameter (α_j)	4.70 (2.28)*
Late mover's own advertising parameter (b_j)	0.28 (0.09)**
Late mover's cross-advertising parameter (c_j)	0.06 (0.11)
Late mover's own salesforce parameter (d_j)	0.26 (0.05)**
Late mover's cross-salesforce parameter (f_j)	0.08 (0.22)
Late mover's margin (m_j)	5.11 (2.27)*
Late mover's growth parameter (ϕ_j)	11.51 (0.54)**

*Significant at 0.05 level.

**Significant at 0.01 level.

clearly demonstrate the *asymmetry* in competition. Based on these parameters, we compute the estimated reactions in advertising and salesforce and test the analytical results on marketing mix reaction and shift in allocation that pertain to Game 6, i.e., Results 2 and 10, respectively.

6.1. Marketing Mix Reaction

The actual and estimated advertising and salesforce levels before and after the late mover's entry appear in Table 8. Average monthly advertising expenditures increased from $775,000 to $972,000 after the late mover's entry. This finding is also reflected by the average estimated levels of advertising in Table 8. Average actual monthly salesforce expenditures of the pioneer, on the other hand, decreased from $1,070,000 to $831,000 after the late mover's entry.[18] The average estimated levels of salesforce before ($1,060,000) and after ($781,000) the late mover's entry also support this conclusion. Thus, the pioneer retaliated in advertising, but accommodated in salesforce.[19]

To explain the pioneer's reactions, we use Result 2 on advertising and salesforce reactions that pertains to this game. Since the LHS of the condition for advertising reaction in Inequality (2.1) computed from the estimated parameters is 0.94, while the RHS of Inequality (2.1) computed using the actual sales levels of the pioneer before and after entry is 0.84, our prediction is retaliation. This is in concert with the actual action of the pioneer. For salesforce, the corresponding parameter ratio (LHS) is only 0.61; much less than the average actual sales ratio of 0.84 (RHS), predicting the normative action of accommodation. Again, the prediction is in concert with the actual action of the pioneer. Although the market growth and the increase in margins were common for both advertising and salesforce, the pioneer retaliated in advertising but accommodated in salesforce. This is because the pioneer's salesforce parameter was *significantly* reduced after the late mover's entry, whereas the advertising parameter was not adequately reduced. In the case of salesforce, the effect of the reduction in salesforce elasticity (from 0.65 to 0.23) was greater than that of market growth and of the increase in the pioneer's margin after the late mover's entry. In the case of advertising, although the pioneer's advertising elasticity was also reduced after the late mover's entry (from 0.33 to 0.18), the effect of this decrease on the spending was less than the effect of the increase in the pioneer's sales due to market growth and the increase in the pioneer's margin. Thus, the decline in advertising elasticity was less steep than the decline in salesforce elasticity, leading to a retaliation in advertising but an accommodation in salesforce. The late mover's differentiation from the pioneer in product dosage might have contributed to the decline in the pioneer's elasticities after the late mover's entry.

These findings draw interesting comparisons from previous research. Prior theoretical research suggests pioneers should retaliate a new entry in growing markets (Kumar and Sudharshan 1988). Our findings show that although the pioneer retaliated in advertising, it accommodated in salesforce in a growing market. Although both our model and the Kumar and Sudharshan (1988) model use a decoupled response function, our model allows for changes in the pioneer's parameters, in particular, its elasticities after new entry. The pioneer accommodated in salesforce because its salesforce elasticity declined significantly after the late mover's entry. Thus, our model enables us to better predict the pioneer's reaction in this case. Prior empirical research results are mixed in that they support pioneers' accommodation and retaliation in growing markets (Cubbin

[18]Based on a period of five months before and after the late mover's entry.

[19]Note that the pioneer's salesforce spending decreased only during the first few months after the late mover's entry. Subsequently, as the market expanded, the own sales growth effect and the effect of increase in the pioneer's margins offset the effect of decline in salesforce elasticity. Thus, the pioneer scaled back its salesforce spending growth upon the late mover's entry.

Table 8 The Pioneer's Average Advertising and Salesforce Spending Before and After the Late Mover's Entry ($ '000s)

	Before the Late Mover's Entry		After the Late Mover's Entry	
Marketing Mix Variable	Normative Estimate	Actual	Normative Estimate	Actual
Advertising	534	775	611	972
Salesforce	1060	1070	781	831

and Domberger 1988, Robinson 1988). Our findings show that both accommodation and retaliation are possible in a growing market, but in different marketing mix variables, consistent with Gatignon et al. (1989). Contrary to Gatignon et al. (1989), however, our findings show that the pioneer accommodated with its stronger variable (salesforce), but retaliated with its weaker variable (advertising). This is primarily because, unlike the cases studied by Gatignon et al. (1989), the pioneer's elasticities changed upon the late mover's entry. In cases where the pioneer's elasticities may be significantly reduced upon new entry, the pioneer may indeed accommodate with its stronger variable and retaliate with its weaker variable.

6.2. Shift in Marketing Mix Allocation

We use Result 10 to explain the shift in marketing mix allocation from the ratios of the estimated advertising and salesforce elasticities of the pioneer before and after the late mover's entry in Table 9. This ratio in the duopoly period, the LHS of Inequality (3.1), in Result 9 is 0.74. The ratio in the monopoly period, the RHS of Inequality (3.1), is 0.50. Clearly, LHS > RHS, leading to a shift toward pull strategy as predicted by Result 10. Thus, the pioneer shifted its allocation toward advertising upon the late mover's entry mainly because the relative effectiveness of the pioneer's advertising over its salesforce was higher during the duopoly period compared with the monopoly period. By shifting its allocation toward advertising after the entry, the pioneer appears to have avoided "playing into the strength (salesforce) of the late mover" even though its own salesforce efforts were more effective than its advertising. The pioneer's shift in resource allocation to advertising after the late mover's entry is consistent with its retaliation in advertising and accommodation in salesforce. Therefore, the pioneer's shift in allocation follows the change in the ratio of marketing mix elasticities, consistent with Gatignon and Hanssens (1987) and Rangaswamy and Krishnamurthi (1991).

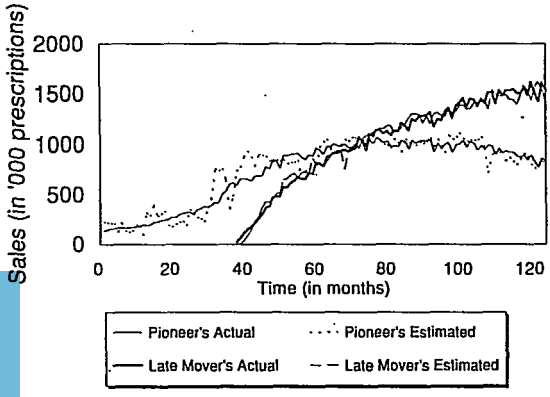
We check the validity of the results by comparing the actual and estimated marketing mix allocation ratios, the actual and estimated sales of the brands, and the parameters with those from prior research. The average actual ratio of advertising and salesforce spending for the pioneer before and after the late mover's entry are 0.64 and 0.73, respectively, close to the parameter ratios of 0.50 and 0.74, respectively, emphasizing the goodness-of-fit of our models. In comparing these ratios, we check for limit advertising or salesforce spending. Limit advertising or salesforce spending would be reflected by unusually low elasticities and high margin before a late mover's entry (Kadiyali 1996). The high values of the elasticities and the low margin before entry suggest that the pioneer is not likely to have signaled an unattractive market to the late mover through either limit advertising or limit salesforce spending. Figure 3 shows the plots of the actual and estimated sales for the pioneer and the late mover. The estimated sales are close to the actual sales for both the brands reflecting the goodness-of-fit of the models. The advertising to salesforce resource allocation ratios for the brands are consistent with the ratios in the pharmaceutical industry found by Rangaswamy and Krishnamurthi (1991).

We assess the importance of the pioneer's marketing

Table 9 The Pioneer's Average Advertising to Salesforce Allocation Ratios

Before the Late Mover's Entry		After the Late Mover's Entry	
Normative Estimate	Actual	Normative Estimate	Actual
0.50	0.64	0.74	0.73

Figure 3 The Pioneer's and the Late Mover's Sales

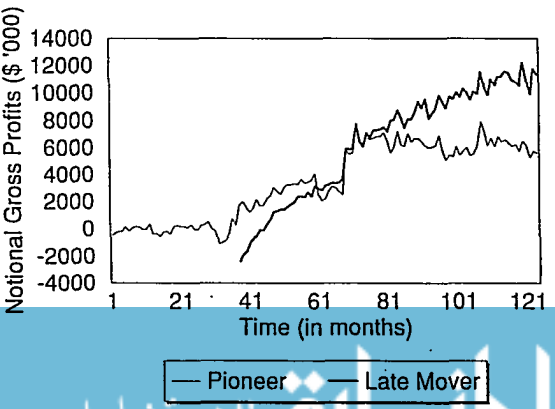


mix reaction toward the outcome of the pioneer-late mover competition by comparing the gross profits of the pioneer and the late mover. Figure 4 represents the "notional" gross profits of the pioneer and the late mover (π_{it} in Equation (4) without considering fixed costs of production, F_{it}). Although the pioneer accommodated the late mover's entry in salesforce and followed the late mover in salesforce, the pioneer's margins did not decrease and its profits rose over time. These results are consistent with Bresnahan and Reiss (1990) who concluded that monopoly auto dealers did not block the entry of a second dealer and that entry did not lead to a fall in their margins.

7. Conclusions, Contributions, Managerial Implications, and Future Research

In conclusion, we developed several analytical results that better predict the pioneer's marketing mix reactions to a late mover's entry than previous research by basing them on a more comprehensive set of factors. We empirically illustrate some of these. We analytically identify the conditions under which the pioneer will accommodate, retaliate, or not react, and shift its marketing mix allocation. We show that the type of competitive game and the anticipated impact of the late mover on the pioneer's margin and elasticities are two critical factors that significantly affect the pioneer's decisions, in addition to the pioneer's characteristics and the market conditions considered by prior research. We show that a follower (leader) role in a marketing mix variable, a static (growing) market, a decrease (an increase) in own elasticity and margin *generally* lead to accommodation (retaliation) in that variable. However, we are also able to show that there are cases where these general reactions don't hold. Thus, for example, it is possible for a pioneer to find it optimal to accommodate in a growing market or to retaliate even when its elasticity decreases upon entry, depending on the combination of competitive game, the impact of entry on elasticities and margin, and market growth. In this way, our results point to the fact that it is necessary to look not only at one factor at a time, but instead examine the combination of all the factors. Our results show that the shift in the pioneer's equilibrium marketing mix allocation follows changes in its relative marketing mix effectiveness. This, in turn, depends on the structure of competition, the impact of the late mover on its elasticities and margins, and the competitor's marketing mix elasticities, in addition to own elasticities.

Figure 4 Notional Gross Profits



Our results offer new insights relative to the literature. Prior analytic research suggests that a pioneer should retaliate the second mover in static and growing markets (Gruca et al. 1992, Kumar and Sudharshan 1988). We show that this does not hold when the pioneer's marketing mix elasticity and margin significantly decrease and the pioneer follows the new entrant in the marketing variable. In such cases, the pioneer's equilibrium response is to accommodate. Furthermore, the likelihood of the pioneer's accommodation increases with its follower role in the competitive game with the late mover.

Empirical research supports both accommodation and retaliation in growing markets (Cubbin and Domberger 1988, Robinson 1988). We show that both accommodation and retaliation are possible in the same market. While empirical research suggests that a pioneer will accommodate (retaliate) with its low (high) elasticity marketing mix variable (Gatignon et al. 1989), we show that a pioneer should accommodate (retaliate) with its *competitively* low (high) elasticity variable. More specifically, the pioneer's reaction in a

marketing mix variable to the late mover's entry is based on the combined impact of the competitive game, market growth, and the late mover's entry on its elasticity, the result of which we call "competitive effectiveness." Competitively most (least) effective variables are variables whose elasticities are not (are) likely to be *significantly* reduced by the late mover's entry in the anticipated competitive game. A *significant* effect is one in which the effect of reduction on the marketing mix elasticity more than offsets the expansion effects of the pioneer's sales growth and any increase in the pioneer's margin in the anticipated game, leading to reduced spending. Thus, it is possible that the pioneer accommodates with its stronger marketing weapon (relative to its other weapon) and retaliates with its weaker weapon so long as the accommodation is in a competitively weak weapon and the retaliation is in a competitively strong weapon.

Finally, prior research shows that a brand will allocate its marketing mix in the ratio of its elasticities (Gatignon and Hanssens 1987, Rangaswamy and Krishnamurthi 1991). We extend this to show that the pioneer should shift its marketing mix allocation upon a new entry according to the change in its relative marketing mix effectiveness, which is reflected by the combined effect of changes in own elasticities, cross-elasticities, and the competitive game structure.

Our research has important managerial implications. Managers of pioneering brands can use the results in Tables 2 and 3 for their decisions on marketing mix reactions to new entry. These results suggest that managers should not always retaliate a late mover in static or growing markets, or retaliate with their high elasticity variables and accommodate with their low elasticity variables as suggested by prior research. Instead, managers should also base their decision on the anticipated competitive structure and the impact of new entry on the pioneer's elasticities and margin. They should accommodate a late mover in growing markets with their high elasticity variables if they anticipate the new entry to *significantly* impact the effectiveness of its marketing mix variable in the anticipated game. Managers of pioneering brands should allocate expenditures between two marketing mix variables in the ratio of their elasticities during the monopoly period. In the duopoly period, however, they should base their allocation on the anticipated impact of the new entry, the structure of the competitive game (Nash or leader-follower games), and the cross-elasticities of the brands. As elasticities change upon new entries, managers of pioneering brands should anticipate the impact of new entries, monitor the elasticities of their marketing mix variables, and revise their marketing mix allocations.

Our research, however, has certain limitations that could be addressed by future research. First, we assume that repositioning decisions are made exogenously. If repositioning decisions are considered together with the other marketing mix decisions, our results will not change if we assume that sales response is decoupled in positioning like it is in other variables. The likelihood of accommodation, however, may be reduced in Results 2–5 in Table 2 if the pioneer can increase its sales after new entry through repositioning. The intuition is that repositioning provides the pioneer with an additional weapon to combat the new entrant and, because sales response is multiplicative in the marketing mix variables, the pioneer is less likely to accommodate compared to a situation in which repositioning is not an attractive option.

Second, we have assumed a decoupled response function that may be limiting in some situations. Examining the results in coupled response functions will be of value. Third, we have studied the pioneer's reaction in a duopoly. This can be extended to an oligopoly for any incumbent in general with added modeling complexity. This will likely involve analysis of collusive games as well. Fourth, our data on one product category allowed us to empirically test some of the analytical results. We could test other results using data from other product markets that may exhibit different levels of the key factors. Finally, we have not considered objectives other than profit-maximization and underspending behavior by managers (Chakravarthi et al. 1981). The inclusion of these may enrich the competitive framework despite adding to the modeling complexity.[20]

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Appendix

RESULT 1. Substituting Equation (7) into the expression for P_{iA} and P_{iB}, we get

$$P^*_{iA} = \frac{g_{iA}}{(g_{iA} - 1)} k_{iA} < \frac{g_{iB}}{(g_{iB} - 1)} k_{iB} = P^*_{iB}. \quad \text{(A1)}$$

RESULT 2. Here, Condition (2.1) holds. Substituting these into the expressions for A_{iA} and A_{iB} in Table 1, we get

$$A^*_{iA} = b_{iA} m_{iA} S_{iA} < b_{iB} m_{iB} S_{iB} = A^*_{iB}. \quad \text{(A2)}$$

RESULT 3. Here, Condition (2.2) holds. Substituting these into the expressions for A_{iA} and A_{iB}, we get

$$A^*_{iA} = \left\{ \frac{b_{iA}}{b_{iB}} + \frac{c_i c_j}{b_{iB}(1 - b_j)} \right\} b_{iB} m_{iA} S_{iA} < b_{iB} m_{iB} S_{iB} = A^*_{iB}. \quad \text{(A3)}$$

RESULT 4. Here, Condition (2.3) holds. Substituting these into the expressions for A_{iA} and A_{iB}, we get

$$A^*_{iA} = \left\{ \frac{b_{iA}}{b_{iB}} + \frac{f_i c_j}{b_{iB}(1 - d_j)} \right\} b_{iB} m_{iA} S_{iA} < b_{iB} m_{iB} S_{iB} = A^*_{iB}. \quad \text{(A4)}$$

RESULT 5. Here, Condition (2.4) holds. Substituting these into the expressions for A_{iA} and A_{iB}, we get

$$A^*_{iA} = \left\{ \frac{b_{iA}}{b_{iB}} + \frac{(c_i + f_i) c_j}{b_{iB}(1 - b_j - d_j)} \right\} m_{iA} S_{iA} < b_{iB} m_{iB} S_{iB} = A^*_{iB}. \quad \text{(A5)}$$

RESULT 6. If the market is static, $S_{iA} < S_{iB}$ (the new brand will obtain some share of the existing market). Here, $m_{iA} \leq m_{iB}$ and $b_{iA} \leq b_{iB}$. Substituting these into the expressions for A_{iA} and A_{iB}, we get

$$A^*_{iA} = b_{iA} m_{iA} S_{iA} < b_{iB} m_{iB} S_{iB} = A^*_{iB}. \quad \text{(A6)}$$

RESULT 7. If the market is growing, $S_{iA} > S_{iB}$. Further, if $m_{iA} \geq m_{iB}$ and $b_{iA} \geq b_{iB}$,

$$A^*_{iA} = b_{iA} m_{iA} S_{iA} > b_{iB} m_{iB} S_{iB} = A^*_{iB}. \quad \text{(A7)}$$

RESULT 8. If the market is growing, $S_{iA} > S_{iB}$. Further, if $m_{iA} \geq m_{iB}$ and $b_{iA} \geq b_{iB}$,

$$A^*_{iA} = b_{iA} \left\{ 1 + \frac{c_i c_j}{b_{iA}(1 - b_j)} \right\} m_{iA} S_{iA} > b_{iB} m_{iB} S_{iB} = A^*_{iB}. \quad \text{(A8)}$$

RESULT 9. Here, if the market is growing, $S_{iA} > S_{iB}$. Further, if $m_{iA} \geq m_{iB}$, $b_{iA} \geq b_{iB}$ and $(b_j + d_j) < 1$,

$$A^*_{iA} = b_{iA} \left\{ 1 + \frac{(c_i + f_i) c_j}{b_{iA}(1 - b_j - d_j)} \right\} m_{iA} S_{iA} > b_{iB} m_{iB} S_{iB} = A^*_{iB}. \quad \text{(A9)}$$

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