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Pre-emptive Product Positioning in Regulated Markets: Objectives and Strategies

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Abstract

Restriction of market shares of firms in an industry is an instrument of public policy. It is used as part of a strategy in creating a regulated environment which is expected to lead to a competitive market. At the firm level, marketing managers use product proliferation strategy to achieve maximum market success (measured using market share and/or profit). This strategy is implemented through the choice of appropriate product positions. The focus of this paper is the analysis of the interplay between the implementation of public policy and management strategies.

In particular, we suggest feasible market share restrictions from a public policy perspective; given these feasible restrictions, we analyze optimal positioning strategies (both cornering and flanking) from a managerial perspective. An offshoot of the analysis is that market share maximization does not always lead to profit maximization, within the context of our model.

Errata Sheet
for

"Pre-emptive Product Positioning in Regulated Markets . . ."
by
D. Sudharshan
and
K. Ravi Kumar

1) pp. 8, line 1 : Kumar and Sudharshan (1984)
instead of Sudharshan (1984)

2) add to References:

Corley, R. N., O. L. Reed and R. L. Black (1984), The Legal Environment of Business. New York: McGraw-Hill Book Company.

Kumar, K. R. and D. Sudharshan, "Attack-Defense Marketing Strategies--A Full Equilibrium Analysis Based on Response Function Models." Working Paper, University of Illinois, Champaign.

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1. INTRODUCTION

The basic thrust of anti-trust laws is to keep markets free and competitive. To quote Hughes (1978, p. 40), "The Federal Trade commission (FTC), Department of Justice, and private plaintiffs are using new criteria of competition, and the converts are adopting these tests. Profit, market share, product-line extensions, advertising expenditures, channel strategies, and rate of return--the very heart of the marketing plan--are part of the tests for competition. . . ." Marketing strategies to achieve the objectives of maximizing profits and/or market share have to be formulated within the social constraints of anti-trust regulation.

Product proliferation (or multiple brand deployment) is a strategy which can be used for maximizing market share. Notable examples of companies using product proliferation are Procter and Gamble in the detergent and shampoo markets, Nestle in the instant coffee market and Coca-Cola in the soft drink market. If the constraint of anti-trust regulation on market share is not considered, such multiple product positioning could lead to litigation. For example, an anti-trust suit was brought against Kellog, General Foods, General Mills and Quaker Oats in the RTE cereal market for exerting shared monopoly control. In this paper, we analyze optimal positioning of products considering market share restriction as given.

From a public policy viewpoint, these market share restrictions are intended to promote multi-firm competition in the market. The selection of the market share limit cannot be done arbitrarily. For

example, even though DuPont (in 1947) restricted its capacity expansion strategy in the cellophane market under advice from the Justice Department (in an effort to promote competition), no further entry occurred initially into this growing market. This suggest that the market share allowed to a competitior may not be sufficient to support profitable entry considering cost of entry (approximately, $20,000,000 in this example), thereby thwarting the very purposes of anti-trust legislation. It is interesting to note that consumers were deprived of cellophane supply and a "grey market," where some DuPont customers resold their cellophane at higher prices, arose. In this paper, we characterize those "feasible" market share restrictions that do not lead to such anomalies.

The organization of the paper is as follows. A brief review of the literature on both market pre-emption and anti-trust is provided in Section 2. The analytical model of the market and competition is presented in Section 3, where we also show the pre-emptive product positions when unconstrained by market share restrictions. Section 4 contains the technical analysis, wherein feasible regulatory market share criteria are derived. Also analyzed therein are the optimal product positions under feasible anti-trust regulation. Within the context of our model, we show that the congruence of the profit maximization strategy with the market share maximization strategy depends critically on the size of the market and market share restriction imposed. Section 5 contains a summary of our conclusions.

2. LITERATURE REVIEW

Based on the theoretical arguments of Porter (1975), and BCG (1976), and on the empirical support from the PIMS program (Schoeffer, Buzzell, and Heany (1976)), Hofer and Schendel (1978, p. 128) state: ". . . it clearly pays to be the dominant firm in an industry. . . ." A strategy to achieve such market dominance, in a market characterized by heterogeneous consumer preferences, is brand proliferation. This strategy (i.e., multiple products aimed at the same market) is one that has long been practiced by some very successful firms, as mentioned in the introduction.

The literature on dominant firms focuses on multi-product strategies as non-price competitive options. The state of the art here (White, 1983) provides very general guidelines to managers, which are very helpful, but does not contain any analytical basis for choosing optimal product positions.

The economics literature, on the facility location problem, is a source of analytic positioning theories on which we build our positioning analysis. The famous duopoly location model of Hotelling (1929) and the plant location model of Losch (1954) form the basis of much of the subsequent work in location or positioning in econimics, including that of Prescott and Visscher (1977), and Eaton and Lipsey (1979). Prescott and Visscher (1977) construct an equilibrium model of firms in which the firms locate themselves sequentially in a market. Once positioned they are not allowed to reposition. Further, all firms are assumed able (with perfect foresight) to correctly predict the influence its decisions will have on the firms yet to enter.

Their solution shows the equilibrium position that may be used by the first entrant to establish a monopoly. They, however, do not allow for product repositioning or for market growth. Neither do they derive the minimum number of brands a firm needs to enter to pre-empt the market.

Eaton and Lipsey (1979) consider a spatial market with increasing market demand. Under such conditions, they show that existing firms should pre-empt the market by establishing new plants before the time when it would pay new firms to enter. Given that they study plant location, they also do not allow for repositioning.

Gruca, Kumar, and Sudharshan (1985), following Prescott and Visscher (1977) and Eaton and Lipsey (1979), derive the minimum number of products and their positions required to pre-empt competitive entry in market segments, whose sizes are stable, increasing or decreasing. General rules for obtaining such positions under varying consumer preference distributions, segment sizes, forecasting uncertainty, and cost of entry are provided therein.

None of the research cited above explicitly consider constraints on monopolization via anti-trust legislation and regulation. While the motivation for the Eaton and Lipsey (1979) paper was the judgement against Aluminum Company of America (ALCOA) by Judge Learned Hand, their focus was on demonstrating the presence of excess capacity, whether or not the dominant firm was allowed to monopolize a growing market.

The case against ALCOA was based on its use of building capacity in order to monopolize the market. That against the four RTE cereal manufacturers was based on their creation of entry barriers via brand proliferation (leading to high advertising costs). Both these cases were brought about as violations of the Sherman Act. Under Section 2 of this act, it is a violation for a firm to (1) monopolize, (2) attempt to monopolize, or (3) conspire to monopolize any market (Corley, Reed, and Black, 1984, p. 321).

The measurement of market dominance is usually done via market share appraisals. According to Judge Hand (in the ALCOA case), "[over 90%] is enough to constitute monopoly; it is doubtful whether 60 or 64% would be enough; and certainly 33% is not enough." If for the moment, one were to agree with this statement, and set the market share limit to, say, 90%, is it obvious that such a law would induce profitable entry? Schmalansee (1978), analyzing the RTE cereal market, suggests that 3% - 5% is sufficient for profitable entry. Implicit in these suggestions (of maximum market share restrictions or minimum entry supportive share) is the assumption that the market size is large enough so that contributions generated are greater than the fixed costs of entry. The DuPont case, referred to earlier, is an example where these assumptions may have been violated.

In the next section we introduce a market model to permit an analysis of both the product positioning strategies under a market share limit, and the market share limit that would allow profitable competitive entry.

3. MODEL

In developing our analysis, following Gruca, Kumar and Sudharshan (1985), we make some assumptions regarding competitive behavior, behavior of costs, and the nature of consumer demand distributions. We start with a strategist who is allowed to introduce a set of products for this market that is both jointly "optimal" and will dissuade competitors from entering their products (by making such competitive entries unprofitable). Constraints on market share will be introduced and taken care of in the next section.

The strategist is planning for a time horizon over which average total demand is assumed to be constant. When such demand changes the strategist is assumed to plan anew. We take the vantage point of the strategist who enters the first product(s) for this segment. Others are treated as followers, who react by positioning products (if at all) based on the actions of the leader.

Consumer demand is assumed to be a function of product characteristics. In our analysis we consider the case of a product class defined on one characteristic (or two related characteristics).[1] Each product has associated with it a fixed cost (L). We assume that this fixed cost as well as unit variable cost is the same for all firms (whether leader or follower) and for all products. Competition for share of consumer demand is based strictly on product characteristic differences. We assume that any price charged by a brand (or firm) will be met by its competitors, and this pricing strategy is common knowledge to all potential entrants.

Without any loss of generality it is assumed that the range of characteristic values have been rescaled to be in $(\frac{-KL}{2}, \frac{KL}{2})$. Consumer tastes are associated with levels of this characteristic and each consumer is assumed to buy one unit. The distribution of consumer tastes is given by the rescaled density $f(\alpha) = 1$, where $\frac{-KL}{2} \leq \alpha \leq \frac{KL}{2}$. Each consumer is assumed to buy the product positioned closest to his taste level. The total demand for this market is, therefore, KL.[2]

Profit for a product for a given period is given by $\Pi = (CM * a * KL - L)$, (where CM, the unit contribution margin, is constant, equal to one for ease of exposition, and a is the market share for that product).

For each period, the leader's strategist is assumed to estimate the market demand KL. With L as the fixed cost per product, and a unit contribution of one, the maximum number of products that may be supported by this market (i.e., its size) is K. The estimate of K that the leader obtains from his estimation of KL is K_1, termed estimate of market size. We assume that such estimation is done for only one period at a time, and further allow for estimation errors causing K_1 to be different from K.

The leader is assumed to have perfect foresight regarding the optimal positions chosen by the follower given its own actions (positions chosen). So, given its estimation of segment size K_1 and the number of products it wishes to enter, the leader can compute both its optimal positions and those of the followers who will enter such that all these products together pre-empt any further entry. Eaton and Lipsey (1979), Prescott and Visscher (1977), Lane (1980),

Sudharshan and Kumar (1984) and Sudharshan (1984) show how such computations may be performed. The profits that accrue to such positions are also known and it is further assumed that only products that would produce positive profits are feasible for entry.[3]

For the case of the pre-emptive monopolist, the following general rules of product positioning were shown in Gruca, Kumar, and Sudharshan (1985):

General Rule 1: For $K = (2N-1)$ (where N is any positive interger)[4], the maximum number of products that can theoretically be supported by this market is $(2N-2)$. But, it is both necessary and sufficient to enter only N products to pre-empt this entire market.

The entry deterring product positions need to satisfy the following conditions: (i) the distance between a product and the corresponding end point of the segment should be $\leq L$, and (ii) the distance between any two adjacent brands should be $\leq 2L$.

General Rule 2: When $K = 2N$ (where N is any positive integer), while $(2N-1)$ products can apparently be supported by this market, only N are needed for market pre-emption. The pre-emptive positions must satisfy the conditions (i) and (ii) of General Rule 1.

The positioning rules are similar to those in Prescott and Visscher (1977, example 2). The following is an example illustrating these rules for the case where $4 < K \leq 6$.

Three products are necessary and sufficient to pre-empt entry by another product for this case. The symmetric strategy is to position (as in Figure 1) a product at the center, and the other two products,

each at a distance d on either side of the center where d lies in the interval $(L(\frac{K}{2}-1), 2L)$.

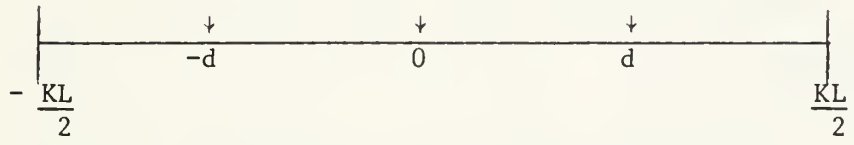

Figure 1: Symmetric Strategy Positions

The asymmetric strategy is to position the three brands as in Figure 2, such that $d_3 > d_2 > d_1$, and $\frac{KL}{2} - |d_3| \leq L$, $\frac{KL}{2} - |d_1| \leq L$, $(d_2-d_1) \leq 2L$, and $(d_3-d_2) \leq 2L$.

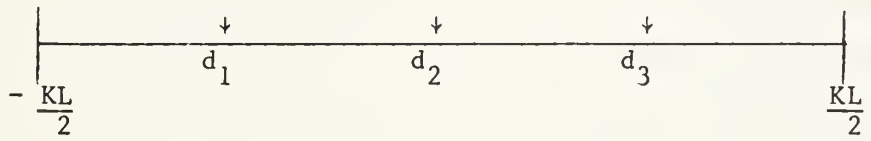

Figure 2: Asymmetric Strategy Positions

These positions pre-empt entry to the sides of the extreme brands and between any pair of adjacent brands, thus satisfying the strategist's objective of profitable pre-emption. The limiting asymmetric positions coincide with the limiting symmetric positions as $K \to 6$. This unique pre-empting strategy is: position one brand at the center and the other two, each distance 2L away from the center, on either side of it.

Having discussed a model of pre-emptive product positioning, without incorporating regulartory constraints, we take up the task of explicitly incorporating anti-trust regulations of the forms that restrict maximum market share in the next section.

4. ANALYSIS OF FEASIBLE RESTRICTION POLICIES AND POSITIONING STRATEGIES

In this section we first present a characterization of feasible market share restrictions. Given the existence of such a feasible market share restriction in a market, we then develop and discuss the various pre-emptive product positioning alternatives available for that market. Such pre-emptive positioning is a market share maximizing solution. Profit maximization may, however, be the objective pursued. Therefore, to complete this section, we then discuss the issue of whether constrained market share maximizing product positions are also profit maximizing ones.

4.1 Feasible Market Share Restriction

Market share has been widely used as a criteria to detect dominance in industries. Judge Hand (in the ALCOA case) opined that 90% share was definitely sufficient to constitute a monopoly, while 33% was definitely not sufficient. Let us consider the institution (for the purpose of ensuring multiple firm presence in a market) of a restriction on the market share permissible to a company to be 90%. Further, consider a marketing manager who is choosing positions of the products to introduce into the market with the aim of acquiring the maximum allowable market share. Let the fixed cost of entry be $20,000,000 (as in the DuPont example mentioned in Section 2).

Suppose the market size was $260,000,000. In terms of the model in Section 3, L, the fixed cost is $20,000,000 and K the market size parameter is 13. From general rule 1 of the previous section, the

marketing manager could choose to position his brands as in Figure 3.

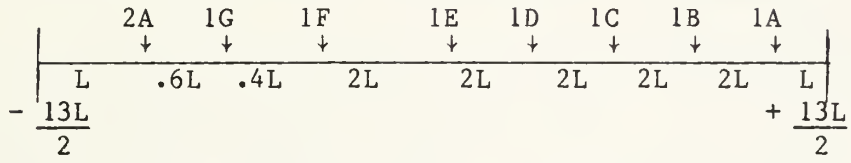

Figure 3: Feasible Market Share Restriction

The first firm has seven products labeled 1A through 1G, allowing a second firm to enter product 2A with a market share of 10%. If 2A were positioned closer to 1G, it would allow an entrant (3A) at the old 2A position, thus making 2A unprofitable. Firm 1 has therefore achieved its objective of attaining the maximum possible market share of 90% and anti-trust regulation has succeeded in ensuring multiple firm entry.

Suppose, on the other hand, that the market size was $160,000,000, with the same fixed cost of $20,000,000, i.e., K is now 8. The marketing manager for firm 1 could choose product positions as in Figure 4 (following general rule 2 of Section 3) to achieve 90% market share, if firm 2 entered product 2A as shown in Figure 4.

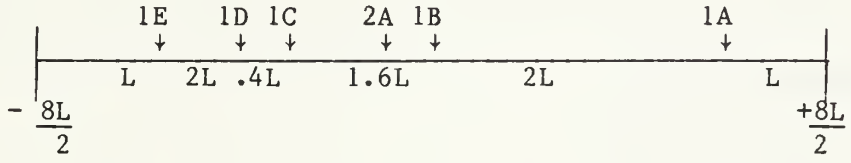

Figure 4: Infeasible Market Share Restriction

While the product positions of Figure 4 would allow firm 1 to have a market share of 90% if firm 2 entered product 2A, this solution is not feasible. Intuitively, this is true because obtaining 10% of the market will not cover the fixed cost of entry for product 2A. This is

clearly a case where the regulation does not achieve the desired results of multiple firm entry. For multiple firm entry to occur in this case, firm 1 has to lower its market share objective/target to less than 87.5% (allowing a new entrant to obtain a share greater than 12.5%, i.e., a contribution greater than $20,000,000. Therefore, in this example, any market share restriction between 87.5% and 100% will not result in multiple firm entry, and therefore will be a self-defeating regulation.

Alternatively, under a 90% market share restriction, multiple firm entry can occur if the fixed cost of entry for firm 2 is lowered by more than $4,000,000 to less than $16,000,000. This will make product 2A profitable and firm 1 can achieve its objective.

Notice that in the example depicted in Figure 4, firm 1 obtained 100% of the market even though it tries to obtain only 90% of it. Yet another way of enforcing this 90% market share restriction is to force firm 1 to have a capacity sufficient to serve not more than 90% of the market (similar to the restriction placed on DuPont in the cellophane market in 1947). In such a case, 10% of the market is not served by firm 1 and since no other firm can profitably enter this market, this 10% of the market remains unserved.

Firm 1 has, therefore, 100% share of the served market. To ensure that it is not in violation of anti-trust, firm 1 could subsidize another firm to an extent that makes entry by this second firm profitable. This is a possible explanation for DuPont designing and building a production plant for Olin Industries (Fleming, 1972).

This leads to the following general considerations governing the choice of maximum market share allowable, β, by public policy makers:

i) the first entrant must be profitable, i.e., if it enters m products to achieve share β, then $\beta KL > mL$.

ii) another entry is also profitable, i.e., $(1-\beta)KL > L$.

For any firm to enter m products, it requires a minimum entry supportive share, given by $\beta_{min} = \frac{m}{K} + \varepsilon$. If β is set to comply with the above considerations as in the example depicted in Figure 3, then it is termed feasible.

4.2 Constrained Product Positioning Strategies

Given a feasible market share restriction β, the market share maximizing marketing manager of the first firm can position his products according to either a "cornering" or a "flanking" strategy. The former allows competitive entry in a corner of the market. The latter calls for allowing competition between two self products. The positions associated with these strategies are discussed next.

A. Cornering

In this strategy the manager forces the new entrant to serve a corner of the linear market by making him position his product at a distance L from an end of the market. The first firm would enter as many products (N) as are necessary to pre-empt the entire market (see the general rules of Section 3). The positions of these products would be as follows:

i) One product should be positioned at a distance less than or equal to L from an end point.

ii) The other products should be positioned at a distance less than or equal to 2L from one another.

iii) The product closest to the other end should be located at a distance of $L + 2(1-\beta-\frac{1}{K})KL$ from that end.

This strategy is demonstrated in Figure 5 for $N = 3$ and $4 \leq K \leq 6$.

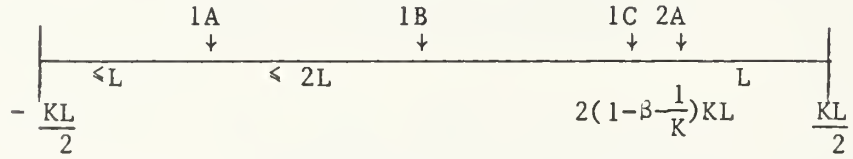

Figure 5: Cornering Strategy Example

Such a strategy allows firm 1 to capture β share of the market, both firms 1 and 2 to be profitable, and pre-empts entry by other firms.

B. Flanking Strategy

Such a strategy allows the second firm's product to be entered between two of the first firm's products. In other words, the first firm's products flank the second firm's product. Here again, the first firm would enter as many products (N) as are necessary to pre-empt the entire market.

The positions of these products would be as follows:

i) One product should be positioned at a distance $\leq$ L from each other.

ii) The distance between any two of firms 1's products should be $\leq$ 2L, except between the products that are to flank firms 2's product.

iii) The distance between the flanker products should be $2(1-\beta)KL$. Figure 6 shows an example of the strategy for $N=3$ and $4 \leq K \leq 6$.

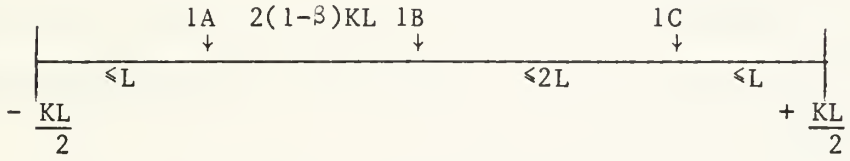

Figure 6: Flanking Strategy Example

In general, the first firm's marketing manager can choose either the cornering or the flanking strategy as long as β is feasible. However, it makes no sense to talk about a choice between these strategies for $K \leq 3$ (as the market can support no more than two products). In choosing between cornering and flanking a manager may favor the former, when there are significant benefits from interproduct synergy due to product closeness. Flanking strategy would be preferred, on the other hand, if the manager believes that the regulation maybe relaxed or abolished. This is because the flanker products can be repositioned to squeeze the second firm's product. In the cornering strategy the second firm's product is always assured of revenues greater than L.

4.3 Market Share vs. Profit Maximization

We have thus far assumed that the manager is a market share maximizer. In such a case the number of products (N) that he should enter is the number necessary to pre-empt the entire market. In the case of no market share restriction, this N product solution is also the profit maximizing solution. If however anti-trust regulations stipulate a market share ceiling, then this market share maximizing N product

solution need not necessarily maximize profit also. The following example illustrates this observation.

Consider a market with K = 4.5. We need 3 products (N=3) to preempt the market. With feasible β restrictions, the market share maximizing positioning is shown in Figure 7.

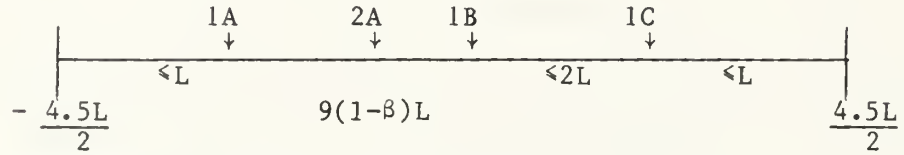

Figure 7: Market Share Maximizing Positions

Although in this example we have chosen a flanking strategy, the cornering strategy gives similar profits for firm 1 of (4.5βL-3L). For the same market, the profit maximizing solution for firm 1 when it enters only two products is shown in Figure 8.

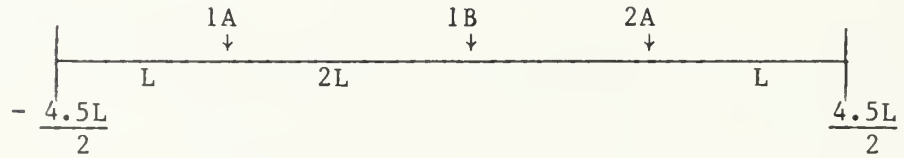

Figure 8: Profit Maximizing Positions

The profit for firm 1 in this case is (3.25L - 2L = 1.25L). If β is set to be the maximum feasible β for this K (i.e., set at $1 - \frac{1}{4.5} = \frac{7}{9}$), then the profit from the market share maximizing positions is 0.5L which is less than 1.25L, the profit obtained by entering just two products.

In general, the profit obtained from positioning to maximize market share is given by

$P1 = (\beta K - N)L$, where β is feasible and N is the minimum number of products required to pre-empt as given by the general rules in Section 3. The maximum profits from positioning only (N - 1) products is given by

$P2 = (N-2)L$, where N has the same meaning as before [5].

As in the example depicted in Figures 7 and 8, P1 need not be greater than P2. The market share maximizing strategy is also the profit maximizing strategy under certain combinations of K and β only.

INSERT FIGURE 9 HERE

Figure 9 shows the relationship between (P1 - P2) and K, when β is chosen to be the maximum feasible for each K. For $2 < K \leq 3$, P1 - P2 is negative, implying that the market share maximizing strategy is less profitable than the one using one less product. The market share maximizing strategy is also profit maximizing for $3 \leq K \leq 4$. Similar regions alternate for $K > 4$. If however, a different β is chosen by policy makers (where β is less than the maximum feasible β), it is possible that even for $3 \leq K \leq 4$ (and similar regions), the market share maximizing strategy will not be profit maximizing. An example of this is shown in Figure 10, where β is chosen to be 2/3 of the maximum feasible β.

INSERT FIGURE 10 HERE

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5. CONCLUSION

Restriction of market shares of firms in an industry is an instrument of public policy. It is used as part of a strategy in creating a regulated environment which is expected to lead to a competitive market. At the firm level, marketing managers use product proliferation strategy to achieve maximum market success (measured using market share and/or profit). This strategy is implemented through the choice of appropriate product positions. The focus of this paper has been the analysis of the interplay between the implementation of public policy and management strategies.

The feasibility of institutionalizing market share restrictions without regard to market size and entry cost is questioned. We have provided simple criteria for the choice of maximum feasible market share restraints to permit multiple firm entry. Our analysis also provided a possible explanation for the need of a subsidy (providing technology and construction aid) to Olin Industries to enter a product to compete with DuPont in the cellophane market.

We have discussed the flanking and cornering alternative strategies available to a marketing manager in developing positioning strategy in a regulated market with feasible share restrictions. We have also shown that the dilemma of choosing between a flanking and a cornering strategy may be resolved using synergy or regulatory uncertainty considerations.

Finally, we show that market share maximizing product positioning, within the context of our model, does not always lead to profit maximizing also. Whether the same strategy results in the maximization of both profit and market share is shown to depend critically on the market size K, and the market share restriction imposed.

Footnotes

[1]By two related characteristics, we mean the existence of a technological constraint of the form $f(w,z) = 1$, where w and z are the levels of the two characteristics of any product and f is a homeomorphism.

[2]Runyon (1982, pp. 355) states: "Many markets can be segmented on the basis of price; the automobile market is a prime example. Used in this way, pricing strategy is an effective device for appealing to a particular economic segment of the total market."

[3]In general the characteristic space (relevant for this segment) may be the interval [a,b] with a total segment demand KL, i.e., the consumer density function $f(\hat{\alpha}) = \frac{KL}{b-a}$. This is readily transformed by $\alpha = (\frac{KL}{b-a})\hat{\alpha} - \frac{KL(a+b)}{2(b-a)}$ to a rescaled space $[-\frac{KL}{2}, \frac{KL}{2}]$ with a consumer density function $f(\alpha)=1$ and segment demand KL. This transformation is linear and uniquely invertible. Therefore, given a position α in rescaled space the corresponding characteristic value can be uniquely and easily obtained.

[4]We use the terms product and brands interchangeably throughout our discussion.

[5]Given N the minimum number of pre-emptive products, the maximum profits obtainable from positioning only M products, where $M \leq N - 1$, is given by (M-1)L, which increases with M. Therefore, maximum profitability entails positioning at least N-1 products.

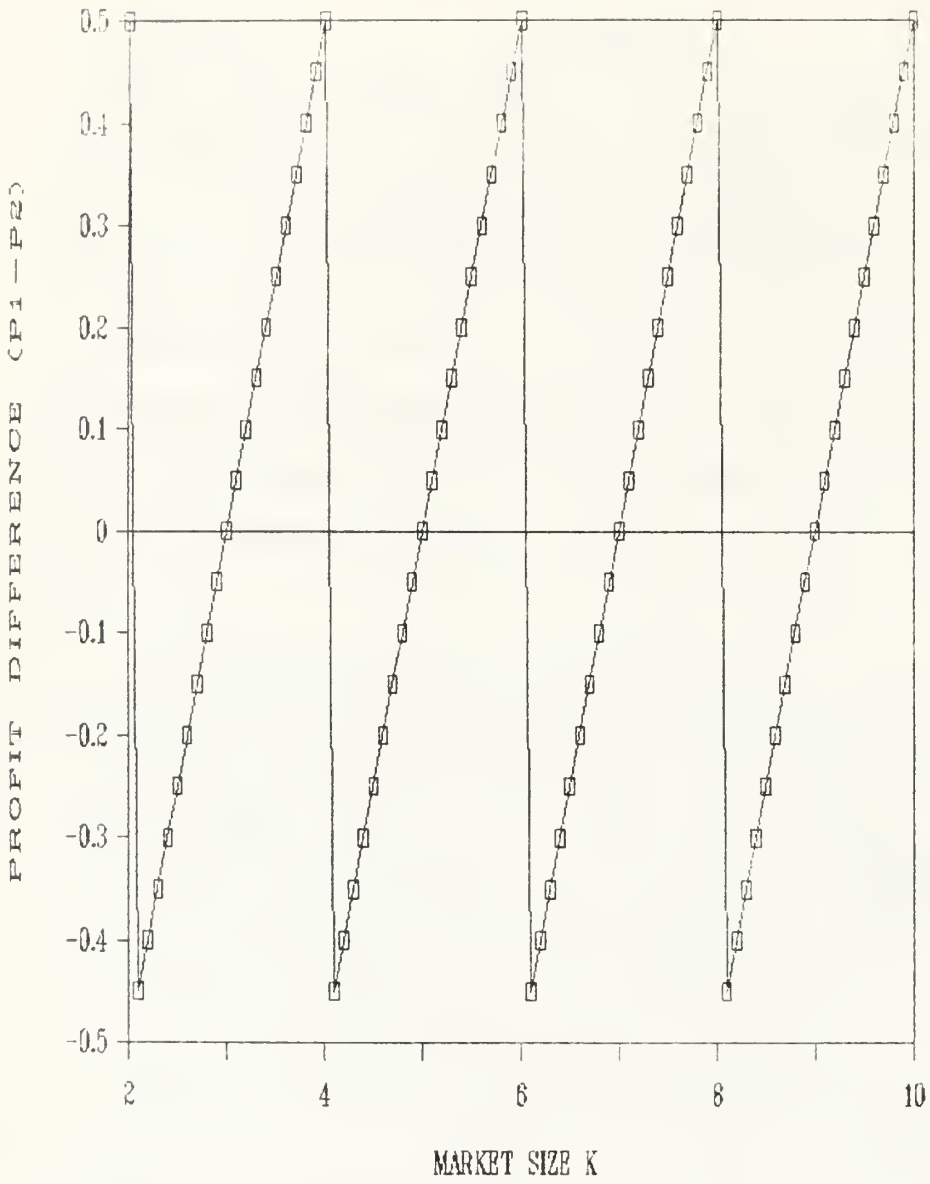

Figure 9: Relationship between (P1 - P2) and K under $\beta = \beta_{max}$

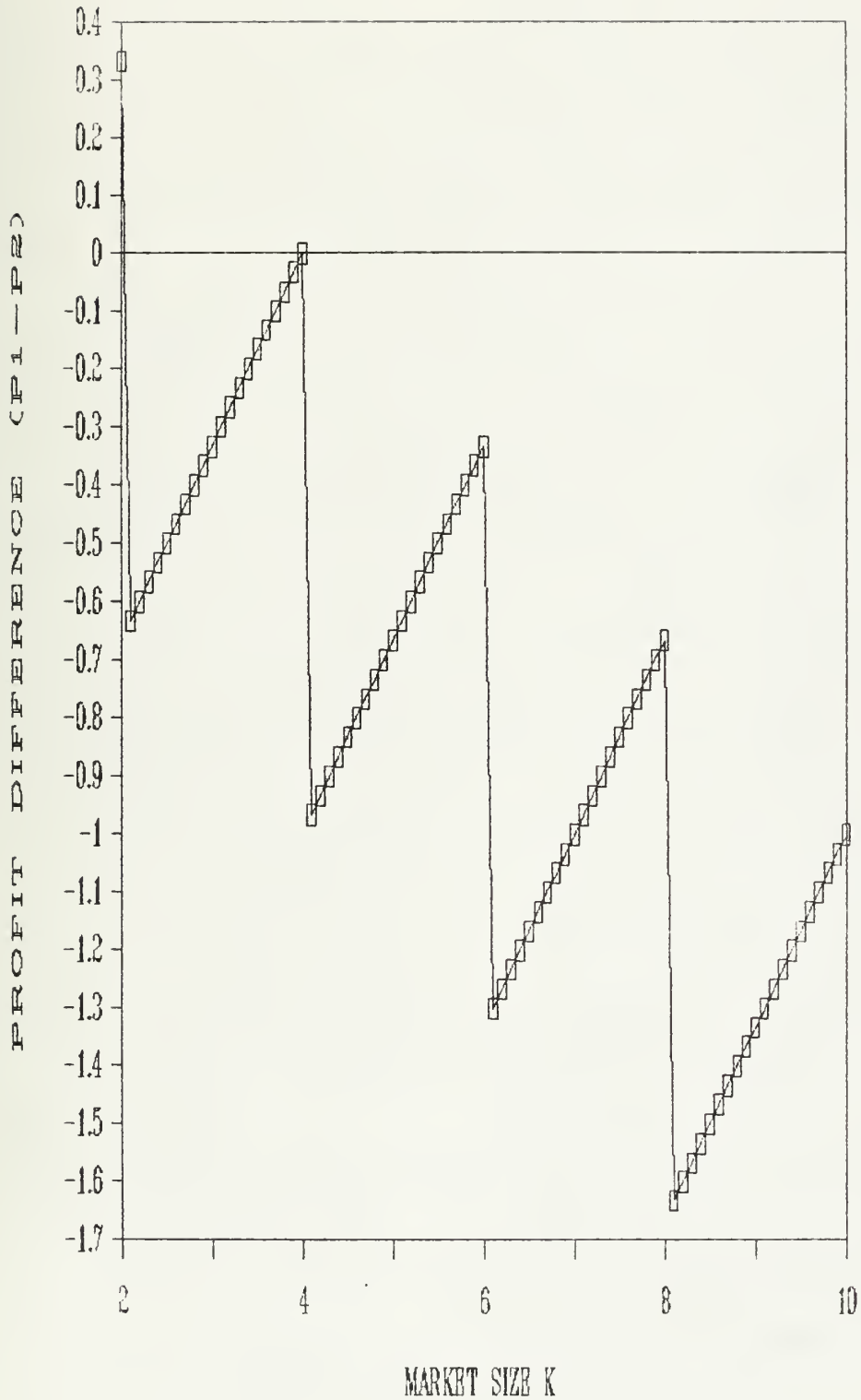

Figure 10: Relationship of (P1 - P2) and K under $\beta = 2/3\ \beta_{max}$

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