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Comments on the Economics of Product Positioning

Economists' basic framework for analysis of the firm is generally one of perfect competition wherein product characteristics, and frequently price, are given and only decisions as to output levels are considered. This framework assumes away nearly all problems of interest to marketing managers. Marketers' economic concerns with product "positioning," advertising strategy, and pricing policy presume both heterogeneous products and imperfect consumer information.

Occasionally, economists have recognized the relevance of variations in the brands of an economic good. Hotelling (1929) stressed the importance of the choice of the product itself to a description of realistic markets.[1] Shortly thereafter, Chamberlin (1933) independently developed amendments to classic, competitive economic theory necessitated by the recognition that a major form of competition occurs via the selection of a product's characteristics. Recent years have witnessed a burgeoning economic literature concerned with product-characteristic choice (see, e.g., Meade 1974; Lancaster 1975; Spence 1976). Without exception, this literature addresses the comparison of the free-market equilibrium product variety and the socially "optimal" product variety.[2] Lancaster's paper (this issue) is within this tradition,

*The comments directed towards Lancaster's work derive from a reading of his published work. I have not had access to the unpublished book manuscript from which Lancaster's paper is excerpted. I apologize for any misconceptions arising from this limitation. Discussions with Tom Russell have been very helpful in understanding the economics of product variety. The editors of this issue also provided useful criticism.

1. Hotelling's interest was the general effect on the stability of competitive equilibrium from allowing product attributes to be choice variables. His analysis was illustrated via a geographical location example. The literature generated by this article unfortunately focused on the details of geographical location while generally ignoring the more basic variability of the product itself.

2. The analysis of optimal product choice implicitly assumes that information as to consumers' tastes is free and that compensation between consumers is costless. In such a world, free markets would always produce the optimal set of products (see Coase 1960). The market solution, given the attendant costliness of preference information, is (by the

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emphasizing "how the degree of variety differs between different market structures and between the market and the optimum" (p. S79, abstract).

Lancaster provides a thorough and elegant analysis of this basic question. He not only examines optimality versus monopoly and competition, but within the competitive (i.e., free-entry) framework allows for single- and multiproduct firms and for alternative forms of incomplete information. Lancaster's treatise on this subject will undoubtedly be of interest to students of microeconomics and marketing for many years.

Lancaster's analysis is taxing; the basic framework is necessarily cumbersome and the derivation of equilibrium complex. Nonetheless, the results are quite intuitive and applicable to a host of positive and normative issues. In this comment, I first attempt a simple restatement of Lancaster's analysis of optimal product variety. By so doing, the close relationship, indeed the identity, between Lancaster's development and existing models of spatial competition is made clear. In addition, the market forces leading away from the optimum are more heuristically understood, as is the relevance of Lancaster's analysis to some long-smoldering debates in the economics literature. In the second section of this comment an issue of particular relevance to the confluence of economics and marketing is addressed—namely, of what relevance to product planners and advisers, operating in dynamic, information-imperfect environments, are static economic models that describe only long-run equilibria?

I. Lancaster's Approach Simplified

Lancaster's analysis proceeds from his earlier work decomposing goods into more fundamental attributes. "Similar" products are distinguished as those goods that have positive quantities of the same characteristics and zero quantities of other characteristics.[3] Taste diversity is assumed by a variance in consumers' utility-maximizing

assumption of maximizing agents) always optimal. Lancaster recognizes this by reference to the free-entry solution as perfect monopolistic competition.

3. Lancaster claims that "there can be no equilibrium market solution of any kind unless there are outside goods" (p. S99). If this claim is true, the assumption that well-defined separable groups exist becomes crucial. In fact, the characteristics possessed by different goods compose an intertwined, inextricable set (e.g., automobiles, running, tennis, parties, and dinner form a chain of common characteristics). Lancaster hence implicitly claims that a more realistic model (with no well-defined outside goods) has no equilibrium solution. Both Stigler (1949) and Friedman (1953) reject the usefulness of the theory of product-characteristic competition because of the difficulty of defining industry boundaries (i.e., outside goods) with heterogeneous products. Lancaster's assumption of distinct group goods overcomes this theoretical problem. Indeed, the assumption of a clearly defined set of group goods seems superior to the perfectly competitive assumption of homogeneous products, both on grounds of realism and predictive richness.

combinations of characteristics chosen from the set of similar goods producible at equal resource cost. Given convex characteristic preferences, nonconvex trade-offs between similar goods, and noncombinable attributes, a unique "most-preferred" good for each consumer is ensured. By assumption, the aggregate demand of consumers with the same most-preferred good is less than the minimum efficient production scale. Hence a trade-off exists between the variety of products produced and the zero profit price of the products.

In this environment, consumers' welfare is influenced by the set of goods actually produced even when the number is held fixed. Lancaster avoids problems of welfare comparison (or compensation) by investigating the surrogate problem—namely, minimization of the total resource cost of providing given utility levels. Just as the vector of endowments parameterizes the optimal production mix in standard welfare analysis, so does the vector of exogenous utility levels in this case. Lancaster simplifies the problem via a "uniform" preference assumption that enables parameterization of the optimal product variety by a single (equal for all) level of utility.

The derivation of the optimal product variety in the context of Lancaster's model is simply illustrated by making use of one additional assumption: that the production of any product in a product group requires expenditure of a fixed (or setup) cost, F, and the good is thereafter produced at constant marginal costs. Following Lancaster, all costs are measured in terms of the composite good, Y, which represents the quantity of nongroup goods sacrificed to produce group goods.

Assume initially that no goods in the group being considered are made. Curve Y in figure 1 illustrates the total resource costs (i.e., quantity of Y) of providing a given level of utility, $\overline{U}$, to each consumer as the number of consumers, N, increases. The linearity of this curve results from Lancaster's uniform-preference assumption. Now assume a single group good that is the most preferred of the first consumer considered in figure 1. Additional consumers are then added in decreasing order of their valuation of the single group good. Under these conditions a curve of the shape of curve XY in figure 1 will illustrate the minimum resource cost of achieving the specified utility levels for alternative numbers of consumers. Because the value of being able to consume the single group good falls as the number of consumers increases, the marginal costs increase at an increasing rate (as shown by the convex shape). Eventually, additional consumers will achieve the given utility level by consuming only the "outside" good Y. This is shown by XY paralleling the Y curve beyond N_2.

It will be efficient to produce the group good if and only if the actual number of consumers (and their implied preference diversities) equals or exceeds N_1; that is, only when consumers in the aggregate would pay

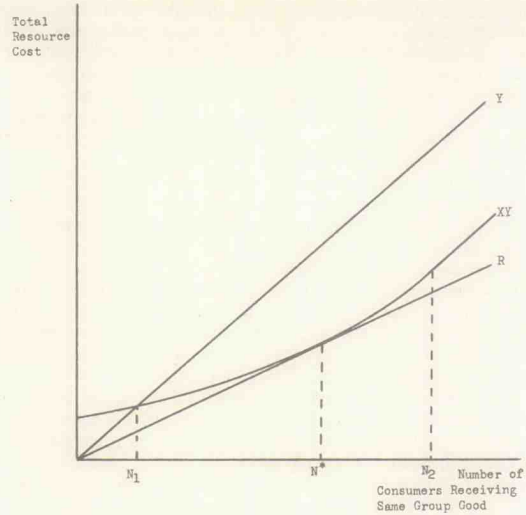

FIG. 1.—Optimal consumer segment

an amount equal to or exceeding F to purchase X at its constant marginal cost. Ignoring divisibility problems, any number of consumers whose preferences are characterized by the XY curve can achieve the given utility level at an average cost given by the minimum of the Y, XY curves. Naturally, minimization of the average cost per consumer will minimize the total costs of achieving the specified utility distribution. This is shown in figure 1 by the tangency of a ray from the origin, R, with XY at N^*. The optimal number of products is then given by the total number of consumers divided by the optimal number per product "brand," N^*.

In order to relate the product-variety model to the spatial competition model, it is natural to search for an analogue of transport cost. Lancaster suggests that a crucial distinction between his framework and the spatial location framework is the presence in his model of nonlinear "transport costs."[4] Lancaster uses his notion of the compen-

4. Spatial models, of course, need not be limited to linear transportation technologies, though this simplifying assumption is generally present in the models. Lancaster also emphasizes that his model has smooth substitutability between the group goods and the outside good. However, recent models of spatial competition (see, in particular, Stern [1972]) explicitly model smooth substitution between a transported good and a composite (outside) good.

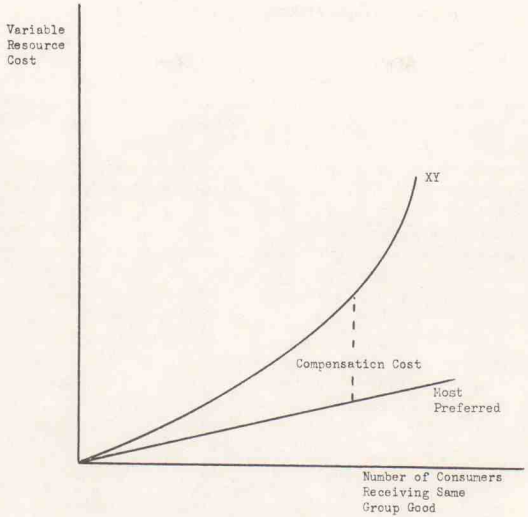

FIG. 2.—Compensation cost

sating ratio as the equivalent of transport costs. However, the cost of physically transporting a good is not the relevant analogue to the cost of compensation.

Rather than dealing with Lancaster's compensating ratio ($h[u]$), define the cost of compensation as the difference in the minimum variable resource cost of achieving specified utility levels when only a single group good rather than each individual's most preferred good is available. The uniform-preference assumption implies that the variable costs of achieving the specified level of utility if each individual receives his most preferred good is equal for all individuals. Hence, given the uniform density, the total variable cost of the most preferred product mix will be a linear multiple of the cost to those preferring the actual good supplied, X. This is shown in figure 2 by the curve labeled "most preferred," which is tangent to the XY curve at the origin.

The compensation cost is now shown in figure 2 and is simply the vertical distance between the XY and the "most preferred" curves. This cost indicates the additional resources required to supply those at a given segment location, because X rather than their most preferred good is produced. The optimal product variety could now be described by the condition that additional variety is supplied as long as (and only

if) the savings in compensation costs equal or exceed the fixed cost of an additional brand.

The *exact* same analysis and diagram are applicable to the spatial location, linear-transport-cost models. Note that, unlike transport cost itself, there is a positive, increasing compensation cost as consumers move more distant from a producer's location regardless of whether the quantity the consumers purchase falls. In both the geographic-location-variation case and the taste-variation case, the identical "transport" cost is the cost of *not* being supplied an alternative good (location) rather than a cost of physically moving goods. While there is a fundamental distinction in that the taste-variation (Lancaster) case twists and shifts indifference curves as consumer identities change, while the spatial case rotates the budget line as identities change, construction of the appropriate pair of taste parameters and transport-cost functions will lead to identical quantitative results.[5]

Given the identical nature of Lancaster's analysis and the existing location models, we should suspect that many of Lancaster's results were anticipated by earlier writers. Indeed, this is the case. For example, Lancaster writes, "contrary to the received wisdom . . . perfect monopolistic competition may . . . lead to a less than optimal degree of product variety" (p. S100). Yet Stern (1972) reached the identical conclusion. Basing his analysis upon Stern, Meade analyzed market incentives to provide product variety, concluding that "the number and variety of products produced may in fact turn out to be greater or to be less than optimal" (1974, p. 359). (And, I add, may turn out to equal the optimal.)

While the mechanics are cumbersome and difficult, the ambiguity of the magnitude of market variety vis-à-vis optimal variety is quite consistent with economic intuition. Any variance between market and optimal production must rest upon the failure of some economic decision maker(s) to incorporate changes in some producers' or consumers' welfares into their decision calculus, that is, upon an externality. In this case, implicitly assumed transactions costs support two "externalities." First, firms' inability to identify consumers' marginal valuation schedules precludes collection of the full value of new product introductions.[6] Second, a firm that considers introducing an additional product faces a demand prefaced on consumers' marginal valuations given the "high" prices of existing substitutes—that is, prices above the marginal cost of producing the substitutes.

5. Some of Lancaster's qualitative results (such as the relationship between market variety and the elasticity of substitution) are dependent on the particular utility function utilized. Additional research is certainly indicated on the effects of alternative taste assumptions.

6. In addition, with competing firms providing close substitutes, the areas under the demand curves do not indicate (are less than) consumer valuations of the products.

These two external effects act in opposition. The inability to collect full value of a new product leads to a market with too little variety, while a market valuation of a new product based on monopolistically competitive prices elsewhere leads to too much variety. Depending on which effect quantitatively dominates, there can be too little or too much variety in the competitive market.

Identical logic makes the relationship between the level of variety under monopoly and that under monopolistic competition obvious. A single seller of substitute products will set higher profit-maximizing prices for those products than would competing sellers. This effect increases consumers' marginal valuations of an additional variety and hence by itself leads to greater variety under monopoly. However, the monopolist also internalizes the negative profit effects on its existing products from the introduction of a new variety. This tends to reduce the monopoly variety vis-à-vis that under monopolistic competition. These opposing forces operating at the same time lie behind Lancaster's finding of an ambiguous relationship between the level of product variety in these two market structures.

Lancaster's analysis is also relevant to settling the numerous, always confused arguments about excess capacity in a monopolistically competitive equilibrium (see, e.g., Demsetz 1959; Barzel 1970; Ohta 1977). Lancaster clearly demonstrates that monopolistically competitive firms operate at a point where average production cost (including selling cost) is downward sloping. However, such a traditional (as used by Chamberlin) notion of excess capacity is irrelevant to the question of whether consumer welfare could be improved by a decrease in the number of firms coupled with an output expansion by the remaining firms. Monopolistic competition occurs only because product characteristics (including location and/or information) differ. In this situation, production efficiency requires minimization of the average resource cost of supplying given welfare levels (as at N^* in fig. 1), not minimization of average production and selling cost. As discussed above, free-entry market equilibrium with monopolistic competitors may result in too few firms (deficient capacity) or too many firms (excess capacity), or even the optimal number of firms. When the relevant sense of efficient capacity refers to the industry level of fixed cost (or number of plants), Lancaster's analysis confirms Demsetz's claim of the ambiguity of the relationship between efficient and monopolistically competitive capacity.[7]

7. Demsetz's (1959) analysis is, however, irrelevant to the issue of the efficiency of monopolistically competitive equilibrium capacity, though his concept of the "mutatis mutandis" average revenue could be a groping for a marginal valuation curve that takes into account the "cost" of additional purchasers facing a less preferred good. Ohta (1977) appears to argue that monopolistic competition will necessarily achieve "full productive efficiency." His argument is in fact, however, only an assertion of the Coase (1960)

II. The Use in Marketing of Equilibrium Models of Product-Variety Equilibrium

Lancaster's analysis follows a long tradition in economics of ignoring the difficulties actually facing decision makers. The assumptions of a well-defined goal (profit maximization) and known (either with certainty or probabilistically) technologies and demands make the problem one of creative modeling and mathematics. Within this environment, equilibrium describes a hypothetical situation in which all decisions have been implemented and no incentives for further (product variety) action exist. Undoubtedly, no one actually concerned with product management has observed or would recognize such an equilibrium situation. Skepticism by those entrusted with product-introduction decisions as to the relevance of the economic method of analysis is both expected and encountered. Is an academic description of the world, such as Lancaster's, of only (at most) policy relevance, or is it possible to derive useful positive "advice"?

Models describing static equilibria describe situations toward which (smooth, continuous) economies tend. Knowledge and utilization of Lancaster's model of market equilibria product variety allow firms to manipulate and alter the tendencies. Lancaster's model does not analyze in any manner the actual entry decision of firms; rather, the free-entry assumption begets the "constraint" of zero profits. Nevertheless, as shown in the spatial context by Prescott and Visscher (1977), recognition that entry is in fact sequential results in the location or product-position decision of one firm influencing the entry decisions of all subsequent entrants.[8] Clever managers can therefore make use of the model to analyze the effects of alternative product strategies on their part.

While the marketing literature has developed sophisticated methods for locating currently unserved "holes" in the product space,[9] the analysis has not taken account of the reactions of competitors to product-positioning decisions. Lancaster provides the complete picture necessary for determination of how the immediate and longer-run returns are affected by changes in the characteristics of new product introductions.

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zero-transactions cost-efficiency tautology and is not applicable to any market equilibrium with positive transactions cost.

8. Prescott and Visscher (1977) claim that "foresighted sequential entry" guarantees positive wealth to some entrants. However, competition in searching out such profitable locations or products will presumably ensue to dissipate such profits. Any equilibrium rents would only be rents to superior ability in strategic product-variety selection.

9. See, e.g., Kuehn and Day (1962). Srinivasan (1975) provides a sophisticated technique for estimating consumers' taste for yet-to-be-produced brands. The only additional information required to "estimate" the long- and short-run profits from a product introduction is cost data for alternative products for various firms. Cost estimates for one's own firm may provide a reasonable indication of industry cost conditions.

Lancaster also presents a perceptive analysis of numerous, realistic market structures in addition to single-product monopolistic competition. Again, use of his framework should guide managers facing the various structures. For example, assume a manager anticipates growth in the demand for a product group in which a number of firms currently have randomly dispersed product varieties. Lancaster presents an interesting strategy of producing "boundary stakes," that is, contiguous products that effectively isolate a single product from the close substitutes of competitors.[10]

To summarize, regardless of the market structure, the formulation of a firm's viable, profitable strategy must incorporate the effects on competitors' entry decisions. The economic concept of equilibrium describes the state toward which a market can be expected to move. The effects on competitors' incentives can therefore be analyzed by comparison of equilibria under alternative strategies. While Lancaster's paper is couched in normative errors, it thus carries an implicit positive message.

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10. This "boundary stake" policy has been anticipated in the marketing literature (see Kuehn and Day 1962). Lancaster's analysis of firms' incentives to produce a variety of brands is quite relevant to current policy debates about brand proliferation as an entry barrier. See Schmalensee (1978) for a discussion of possible entry-retarding effects of new brand introduction. Schmalensee's analysis relies on informational advantages for already-producing firms about the demand for new products to explain extant firms' greater incentives to produce new products. Lancaster's analysis requires no such ad hoc assumption since the producing firms will internalize the profit losses from possible entry and therefore perceive greater benefits from introduction of a boundary brand than would some outside firm.

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