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Comments on "Firm-specific Differentiation and Competition among Multiproduct Firms"

My remarks are divided into three sections: Katz's model, equilibrium, and product line competition.

I. Katz's Model

The main innovation here is the simultaneous consideration of both "quality" attributes and "location" attributes. Katz interprets the former as a product's quality and the latter as brand image (reputation of the firm). Hitherto, the product-differentiation literature has considered each of these attributes in isolation: Examples of quality models are Mussa and Rosen (1978), Gabszewicz and Thisse (1979, 1980), Stokey (1980), and Moorthy (1982*a*); examples of location models are Hotelling (1929), d'Aspremont, Gabszewicz, and Thisse (1979), and Novshek (1980). The immediate practical result of considering both product quality and brand image is that even if two firms produce the same quality of product, they may each enjoy positive profits in price equilibrium: some consumers prefer one brand, some the other. In particular, unless one brand's image dominates the other's (that is, one firm is more reputable than the other), profits for each firm increase as the consumer's brand sensitivity increases.

Another distinguishing feature of this paper is the restriction that each firm produce the same number of product qualities as the number of consumer quality sensitivities (t in Katz's notation).[1] One doesn't expect the number of product qualities to be greater than the number of types, but it can be lower—in fact, we expect it to be lower. The reason is not only fixed costs of producing new product varieties but also the self-selection constraints. In Section III*A* of the paper, where Katz analyzes the quality choices of a monopolist, the first-order con-

1. I shall henceforth refer to these quality sensitivities as "consumer types."

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ditions (8) are not sufficient: the solution to the first-order conditions must satisfy $q_1 \leqslant \ldots \leqslant q_t$ (qualities increase with sensitivity to quality) in addition to the usual second-order conditions. In fact, Moorthy (1982*a*) and Mussa and Rosen (1978) have shown that, even with constant returns to scale in production, one generally gets a pooling of consumer types: two or more types are assigned the same quality. Why does this happen? The reason is that the distribution of consumer types (and the preference and cost structure) may be such that the monopolist finds it impossible to control the switching of higher-quality-sensitive consumers to lower-quality products by prices alone—the variety of products must be reduced as well. If fixed costs limit the product variety further, then a central result of the no-fixed-costs case—all consumer types except the highest type get less than efficient quality—may fail. In Moorthy (1982*b*) I show that with a continuum of consumer types, the monopolist's choices for a fixed number of products are all efficient.[2]

II. Equilibrium

Katz's analysis of the price equilibrium in the case where the quality variants form independent submarkets does not consider the possibility of nonexistence of an equilibrium. What we have here is nothing but the Hotelling (1929) model: we interpret the brands as "stores" and consumers' ideal brands as their "locations." It has been known for some time now that there may not be a pure price equilibrium in the Hotelling model.[3] The reason is the possibility that "undercutting strategies" may be more lucrative to either firm than strategies that involve sharing the market (see d'Aspremont et al. 1979). In Katz's example in Section III, if the brand image of firm 2, b_2, is ¾ and the brand image of firm 1, b_1, is greater than ¼, there exists no pure price equilibrium. The proof is obvious from figures 1 and 2. The "local price equilibrium" with sharing of the market is $p_1^* = (|z|/3)(2 + b_1 + b_2)$, $p_2^* = (|z|/3)(4 - b_1 - b_2)$—but for certain values of b_1 and b_2, the profit to firm 1 (and similarly for firm 2) from charging the price $p_2^* - |z|(b_2 - b_1)$ (thereby undercutting firm 2 out of the market) is greater than the profit under the local equilibrium.

Equilibrium existence problems also arise if one were to consider quality-price competition where the number of consumer types is greater than the number of quality variants that can be chosen by any firm. In the continuum case, for example, there exists no equilibrium

2. This applies only to the linear preference structure considered in Katz's paper (and in Mussa and Rosen). In Moorthy (1982*b*) I present an example with nonlinear preferences where the monopolist places one product at more than efficient quality.

3. Dasgupta and Maskin (1982) have shown recently that a mixed equilibrium exists in the Hotelling model.

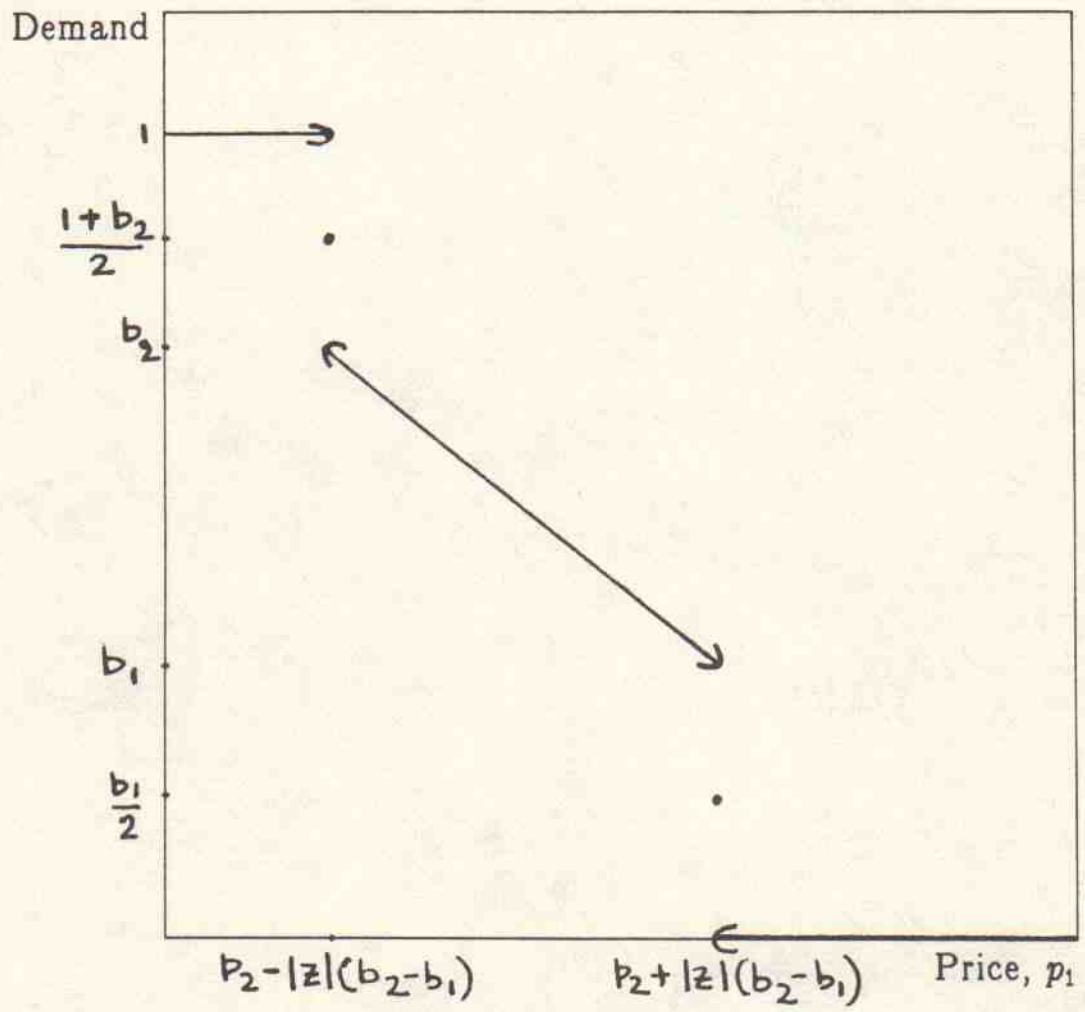

FIG. 1.—Firm 1's demand function

with quality and price chosen simultaneously by each firm: there cannot be an equilibrium with firms pricing at marginal cost because then it pays some firm to distinguish its product quality and/or raise its price; nor can there be an equilibrium with distinct products priced above marginal cost because then a firm can raise its profit by moving close to some other firm and undercutting it. One way to get around the existence problem is to require firms to choose products *before* prices (see Bresnahan 1981; Moorthy 1982*b*). Another way is to model competition in the Cournot sense: firms respond to product-quantity choices of the other firms (see Moorthy 1982*b*).

III. Product Line Competition

The "meat" of Katz's paper is to be found in Section IV, where he studies the effect of a firm's brand image on its quality choices. The brand images themselves are taken to be fixed exogenously, either symmetrically—so that even if two firms were to charge identical prices for identical qualities, some consumers prefer one firm and some the other—or asymmetrically—so that one firm dominates the other.

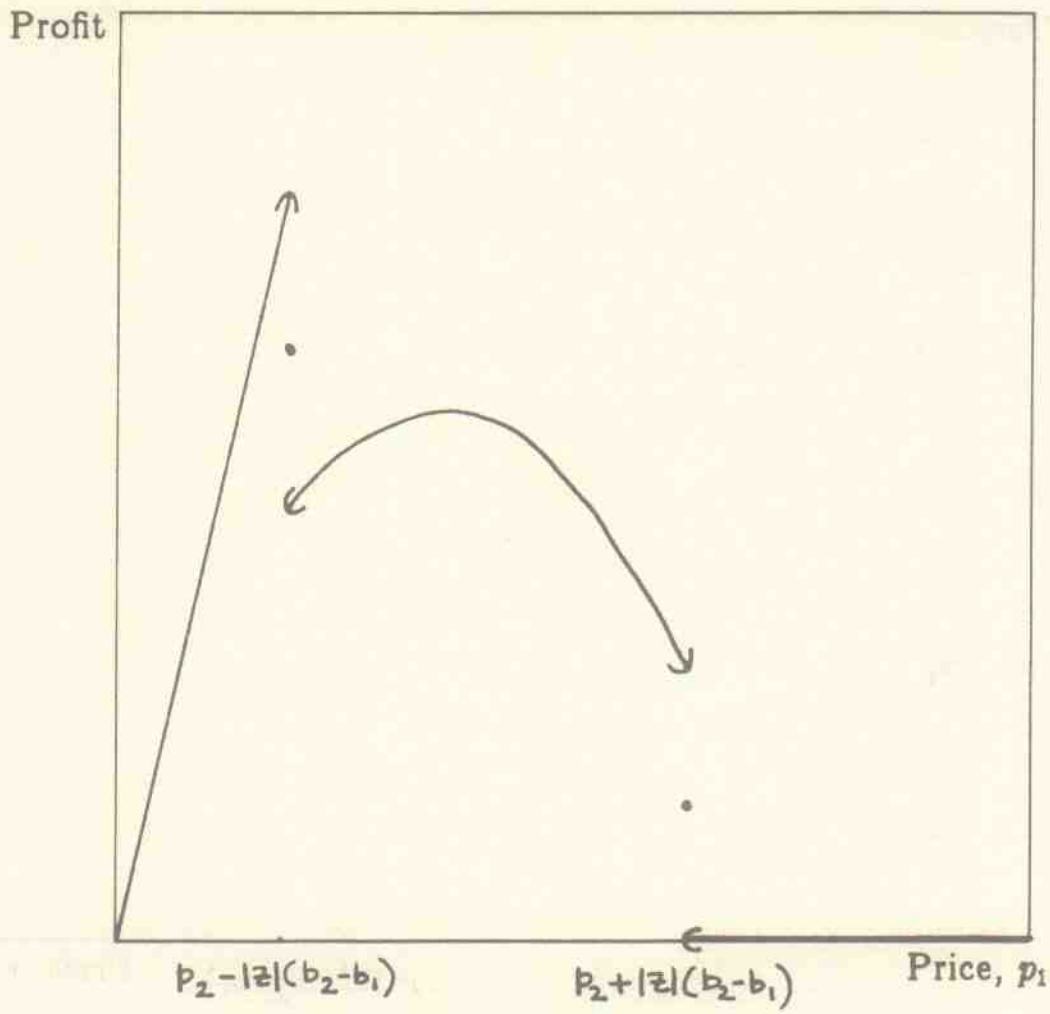

Fig. 2.—Firm 1's profit function

Despite the equilibrium existence problems discussed above, there are some interesting observations here. First is the observation that if consumers were not brand sensitive, the competition between the firms would be perfect—efficient qualities produced and priced at marginal cost. (The self-selection constraints are not binding, unlike the monopoly case. Also, we do not have an equilibrium existence problem because each firm is restricted to produce as many product qualities as there are consumer types.) However, if consumers are brand sensitive and their brand sensitivities are positively correlated with their quality sensitivities, then each firm would like to charge prices above marginal cost for the higher qualities (purchased by the higher-quality-sensitive consumers), but self-selection constraints limit the extent to which they can do this.[4] (Of course, the caveat here is that a pure equilibrium may not exist.) Finally, putting the first two observations together, if one brand has a uniformly better reputation than the other brand—the asymmetric case—it may pay the higher-reputation brand to specialize

4. If we interpret brand images as just another attribute that can be chosen by a firm, this would imply that a monopolist could utilize the correlation between the attribute evaluations to discriminate better.

at the high-quality end of the market, leaving the low-quality end to the less reputable firm.

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