MONOPOLY AND PRODUCT SELECTION

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It is shown by example that, even if there are fixed costs, a monopolist may provide more than the socially optimal number of products.

It is well known that if a monopolist serving a market of substitute products can perfectly price discriminate, the socially optimal set of products (or 'characteristics') will be supplied. This follows since the profits of the perfectly discriminating monopolist are equal to the consumers' surplus. Thus the monopolist will provide the product selection that maximizes consumers' surplus [see White (1977), Stewart (1979), Guasch and Sobel (1979)].

When the monopolist does not have the ability to discriminate, the presumption has been that fewer than the socially optimal number of products will be offered [see Lancaster (1975), Leland (1977) 1]. The idea is that in the absence of discrimination the monopolist is concerned not only with the profitability of each additional product, but also with the effects a new product has on the profitability of the old ones. Since the introduction of a new product does not directly reduce the surplus generated by existing products, but may reduce the profitability of those products, it is tempting to conclude that the monopolist will provide fewer than the socially optimal number of goods. In fact, Lancaster (1975, p. 584) states the following theorem: 'Under increasing returns to scale, monopoly control of a market sector will lead to a lesser degree of product differentiation over that sector than is socially optimal'. We claim that this need not be the case. In an earlier work, Guasch and Sobel (1979), we showed that it is possible for a profit maximizing monopolist to provide a strictly larger set of products than is socially optimal. However, that paper assumed a constant returns to scale technology. The purpose of this note is to show that even with fixed costs, i.e., increasing returns to scale, the monopolist may provide a larger number of products than is (including the) socially optimal.

1 Leland's (1977) analysis was undertaken using the characteristic approach to consumer theory.
Rather than presenting a general model, we shall restrict attention to an example that demonstrates our point.

Example. There is a population of consumer types indexed by \( \alpha \), uniformly distributed on \([1,2]\). A consumer of type \( \alpha \) has a reservation price of \( a_{\alpha i} \) for product \( i \). It is assumed that each consumer purchases at most one unit of at most one product.

The monopolist is able to produce two products, indexed by \( i \). The technology is characterized by a constant marginal cost of producing product \( i, c_i \), along with a fixed cost \( K \). Thus, the total cost of producing \( n \) units of product \( i \) is \( K + nc_i \).

Let \( u_1 = 1, u_2 = 2, c_1 = 0, \) and \( c_2 = 1 \). The monopolist has three possible strategies: to produce only product one, to produce only product two, or to produce both products.

If the monopolist produces only product one he selects \( A \) and \( p \) to solve

\[
\max_A \int_0^1 p \, d\alpha - K \quad \text{subject to} \quad A > p, \quad A \geq 1.
\]

This problem has the solution \( A = p = 1 \) and yields profits \( 1 - K \).

If the monopolist produces only product two he selects \( A \) and \( p \) to solve

\[
\max_A \int_0^1 (p - 1) \, d\alpha - K \quad \text{subject to} \quad 2A > p, \quad A \geq 1.
\]

The solution to this problem is \( A = 5/4, p = 5/2 \), and yields profits \( 9/8 - K \).

Finally, if the monopolist produces both products he selects \( A, B, p_1 \) and \( p_2 \) to solve

\[
\max_A \int_0^B p_1 \, d\alpha + \int_B^2 (p_2 - 1) \, d\alpha - 2K,
\]

subject to

\[
A > p_1, \quad 2B - p_2 = A - p_1, \quad 2 > B, \quad A \geq 1.
\]

This problem has solution \( A = p_1 = 1, B = 3/2, p_2 = 5/2 \) and yields profits \( 5/4 - 2K \).

By comparing the profitability of these alternatives, it is easy to see that both products will be produced by the monopolist provided \( K < 1/8 \). On the other hand, observe that \( \alpha = a_{\alpha 1} - c_1 \leq a_{\alpha 2} - c_2 = 2\alpha - 1 \) for all \( 1 \leq \alpha \leq 2 \). It follows that, provided aggregate surplus exceeds fixed costs \( K < 2 \), it is socially optimal to produce only product two. \(^2\)

\(^2\) It is not hard to show that in our example the social optimum will be arrived at if free entry is permitted. If \( 0 < K < 1 \), an equilibrium will consist of a single firm producing product two, and selling it at price \( p = K + 1 \). However, it is easy to give examples in which free entry is insufficient to guarantee the socially optimal product selection.
It is interesting to note that, in this example, requiring the monopoly to produce only product two will reduce the welfare of all consumers relative to the unconstrained monopolist’s price-product selection. If the monopolist can produce only product two he will sell it for a price of $5/2$ and consumer surplus will be equal to 0 for $1 \leq \alpha \leq 5/4$ and to $2\alpha - 5/2$ for $5/4 < \alpha < 2$. On the other hand, if both products are produced, the surplus is $\alpha - 1$ for $1 \leq \alpha \leq 3/2$ and $2\alpha - 5/2$ for $3/2 \leq \alpha < 2$.

In conclusion, all that can be said is that the presence of a monopolist in a market for close substitutes leads to a general reduction of welfare. The above example shows that a monopolist may take advantage of potential products to increase profits. Thus there should be no presumption that monopoly leads to a restriction on diversity or choice. The only statement that can be made is that the monopoly induces distortions away from the optimal selection of products and prices.

References

Stewart, M.B., 1979, Monopoly and the choice of product characteristics, Economics Letters 2, no. 1, 79–84.