WORKING PAPER
ALFRED P. SLOAN SCHOOL OF MANAGEMENT

Advertising and Market Structure

by

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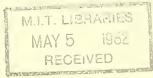
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WP#1294-82   April 1982

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This essay presents a selective overview of theoretical work on

the industrial economics of advertising. Models treating advertising

as a form of non-price competition, models assessing the optimality

of market-determined advertising levels, and models of the effects

of advertising on key elements of market structure are discussed.

Limitations of the existing literature and productive directions for

future research are highlighted.

I. Introduction

Manufacturers take many actions designed to enhance the demand for
their products. They generally deal with product design and packaging,
price structures at wholesale and retail levels, training and deployment
of sales personnel, and economic and contractual dimensions of the distri-
bution channels they employ. They may also engage in media advertising.
Retailers generally engage in most of these same activities. Consumer
purchase decisions are affected by many external stimuli. Consumers may take
into account their own experience, the experiences of friends and relatives,
conversations with salespeople and other experts, data on relevant prices,
and information about product attributes obtained from a variety of public
sources. Purchase decisions may also be affected by media advertising.[1]

Despite the complexity of firms' marketing policies and consumers'
purchase decisions, industrial economists have generally limited their
attention to two of the variables involved: price and media advertising.[2]
It is not clear that the economic significance of advertising generally
justifies this allocation of effort. In aggregate, media advertising
expenditures are impressive in most developed countries, particularly in
the US. Media advertising in the US is estimated to have been about $61
billion in 1981, for instance (Coen, 1982); this amounts to about 2.1% of
GNP that year and about 3.3% of personal consumption expenditures. But
these percentages are lower in most other countries, typically much lower in
developing nations.[3] Similarly, while advertising/sales ratios are high for
a few US manufacturing industries, they are quite low for many others, and
other selling expenses often equal or exceed outlays for advertising.[4]

Perhaps reflecting the traditional distaste for advertising in the
intellectual community, early discussions of advertising by economists were
generally critical, describing it as wasteful, manipulative, and intrinsically

anticompetitive. (Kaldor (1950) is a leading example.) The modern indus-
trial economics literature on advertising really began with Telser's (1964)
response to such critics. He portrayed advertising as a valuable mechanism
for providing costly information and thus tending to enhance competition.
Most of the subsequent literature has concentrated on choosing between these
two diametrically opposed viewpoints.

In what follows, I present a selective overview of theoretical work on
the industrial economics of advertising. I first discuss models in which
advertising appears as a form of non-price competition among rivals selling
differentiated products. I then consider the question of optimality of
advertising levels produced by such competition. Finally, I discuss the
effects of advertising on market structure, particularly on conditions of
entry.

II. Advertising as Nonprice Competition

Given basic conditions on tastes and technology, and given the key
elements of market structure, what does theory permit us to say about the
intensity of advertising and its competitive effects? For the purpose of
dealing with this question, it is probably sensible to treat advertising
simply as a demand-increasing expenditure; it does not seem necessary to
make specific assumptions about how advertising induces changes in buyer
behavior. Such analysis thus has fairly direct application to at least
some other forms of non-price competition.

Two specific issues seem to be of particular interest in this context,
and they are the focus of the rest of this section. First, how does adver-
tising competition affect profits? Do its effects differ in any basic way
from those of price competition? Second, how does advertising competition
affect the relative advantages of large and small firms? That is, how do

scale economies in promotion interact with those in production to determine
overall advantages of size?

To address the first of these issues, let us briefly compare models
of advertising and price competition, respectively, in a market with product
differentiation. For the first model, suppose that $N \geq 2$ firms are selling
at a fixed price, P, with constant unit cost c.[5] If A_i and q_i are firm i's
advertising spending and unit sales, respectively, suppose that demands (with
fixed, equal prices) are given by

$$q_i = K[\sum_{j=1}^{N} (A_j)^\rho]^{\alpha/\rho}[(A_i)^e / \sum_{j=1}^{N} (A_j)^e], \qquad i = 1,\ldots,N. \qquad (1)$$

Here ρ and α are constants between zero and one, with larger values of ρ
indicating greater substitutability among firms' advertising in affecting
market demand, and α being the market elasticity of demand with respect to
advertising. The positive parameter e measures the sensitivity of firms'
market shares to differences among their advertising outlays, and K is a
positive scale factor. Profits are given by

$$\pi_i = (P - c)q_i - A_i, \qquad i = 1,\ldots,N. \qquad (2)$$

At a symmetric Nash equilibrium in the A_i, the following relation
holds:

$$A_i/(P - c)q_i = 1 - \pi_i/(P - c)q_i = e + (e - \alpha)/N, \qquad i = 1,\ldots,N. \qquad (3)$$

Following the analysis in Schmalensee (1976), one can show that (a) no
oligopoly equilibrium with non-negative profits exists unless $e \leq (2 - \alpha)$,
(b) if $(2 - \alpha) \geq e > 1$, profits are eliminated by entry at finite N, (c)
if $e = 1$, profits are eliminated by entry only in the limit as N increases
without bound, and (d) if $e < 1$, profits remain positive even in the limit.

In order to compare price and advertising competition, let us now consider a model in which products are differentiated, advertising outlays are fixed (and set to zero for convenience), and price is the instrument of rivalry. Let P_i be firm i's price, and let unit sales be given by the following equation, which has an obvious formal resemblance to (1):

$$q_i = K[(1/N) \sum_{j=1}^{N} (P_j)^{-\rho}]^{E/\rho} [(P_i)^{-e} / \sum_{j=1}^{N} (P_j)^{-e}], \qquad i = 1,\ldots,N. \qquad (4)$$

As before, K and ρ are positive constants relating to the scale of the market and the substitutability among products. E is the market price elasticity of demand, and the positive constant e measures the sensitivity of firms' market shares to differences in their prices.[6] Profits are given by

$$\pi_i = (P_i - c)q_i, \qquad i = 1,\ldots,N, \qquad (5)$$

where c is unit production cost, as before. At a symmetric Nash equilibrium in the P_i, the following relation holds:

$$(P_i - c)/P_i = \pi_i/P_i q_i = 1/[e + (E - e)/N], \qquad i = 1,\ldots,N. \qquad (6)$$

In both (3) and (6), the parameter e is a major determinant of equilibrium profitability. If market share is sensitive to either advertising or price, firms' attempts to expand their shares using either variable will serve to erode profits. The formal differences between (3) and (6) flow from the different ways the corresponding instruments of rivalry enter the profit functions in the two models. Those differences do not suggest that advertising competition is less effective than price competition at eliminating excess profit. Note in particular that (6) indicates that Nash equilibria in prices always involve positive excess profit for all N, while increasing N drives profits to zero through intensified advertising rivalry

in (3) as long as $e \geq 1$. Moreover, the argument that collusion on price is more likely than collusion on advertising for small N (Schmalensee, 1976) suggests that comparisons between (3) and (6), both of which assume non-collusive conduct, likely understate the relative impact of advertising rivalry on excess profits in oligopoly.

There is nonetheless a presumption in much of the relevant literature that advertising competition (and, indeed, non-price competition in general) is "softer" than price competition, in the sense of being less of a threat to excess profits. The analysis above suggests as a rough generalization that in order for this to be true, the value of e in (4) must exceed the value in (1). That is, speaking loosely, market shares must be more sensitive to price differences than to differences in advertising outlays. While this may indeed describe many markets, if consumers' brand choices in some particular market are strongly affected by advertising and only weakly affected by price, these models lead one to expect that price competition will be "softer" in that market than advertising competition. (If e is absolutely small for both price and advertising, of course, neither form of rivalry will effectively eliminate excess profits.)

Let us now turn to the second of the general issues raised above: the relation between scale economies in advertising and overall advantages of size. Even though Bain (1956, pp. 117-20) discussed this relation over a quarter-century ago, the first satisfactory formal analysis was only recently provided by Spence (1980). In the remainder of this section, I present a slight generalization of the Spence model and discuss some of its implications.

Consider a market with N sellers in which profits can be written as

$$\pi_i = B(m)y(a_i, q_i) - c(q_i) - h(a_i), \qquad i = 1, \ldots, N. \tag{7}$$

Here q_i denotes firm i's unit sales, with corresponding production cost $c(q_i)$, and a_i denotes that firm's real advertising, with corresponding advertising expenditures $h(a_i)$.[7] Thus the function h(a) reflects the technology and input prices relevant to the production and dissemination of advertising messages. The function y(a,q) is assumed increasing in both its arguments, B(m) is a decreasing function, and

$$m = \sum_{i=1}^{N} y(a_i, q_i). \tag{8}$$

Restrictions must be imposed on firm and market demand functions in order for (7) to hold. If firm i's revenue is to be increasing with respect to a_i, for instance, (7) implies that the elasticity of B with respect to its argument must exceed $(-m/y_i)$. For this to hold for all possible sets non-negative y_i, that elasticity must exceed -1. But this in turn implies that the market demand function is price-elastic, in the sense that increases in any q_i increase total market revenue. Still, (7) is a tractable special case that yields considerable insight.

Spence observes that in this case one can decompose firm profit maximization into two stages. First, compute the function $\phi(y)$, which gives the minimum value of total cost, c(q) + h(a), associated with each value of y. Then select y to maximize $[B(m)y - \phi(y)]$, taking into account rival behavior in whatever fashion is appropriate. The first stage is just cost minimization with two inputs. In whatever equilibrium results, large firms will have a larger ratio of profit to sales revenue than small firms if $\phi(y)/y$ is decreasing in y over the relevant range. Thus the elasticity of $\phi(y)$ with respect to its argument gives a (local) indicator of the advantages of size that incorporates scale effects in both advertising and production.

To see how these effects interact, we can follow Spence and consider

functional forms involving constant elasticities:

$$y(a,q) \;=\; y_0 a^\gamma q^\alpha, \qquad c(q) \;=\; c_0 q^{1/\beta}, \qquad h(a) \;=\; h_0 a^{1/\delta}, \qquad (9)$$

where y_0, γ, α, c_0, β, h_0, and δ are positive constants.[8] Following the development in Spence (1980), one can show that if (9) holds, the elasticity of $\phi(y)$ with respect to its argument is given by

$$\theta \;=\; \phi'(y)y/\phi(y) \;=\; 1/(\alpha\beta + \gamma\delta). \qquad (10)$$

If θ is less than (greater than) one, there are overall advantages (disadvantages) of size in that firms with larger y's, and thus greater sales revenue, than others will have higher (lower) ratios of profit to sales revenue.

Equation (10) makes clear that technical change that alters returns to scale in either production (β) or advertising (δ) will affect the net advantages of size (θ). Thus if, as many have argued, there are economies of scale in the use of network television advertising in the U.S., the coming of television served to raise δ in many industries and thus to increase net advantages of size across the board. Equation (10) shows that the impact of a change of this sort varies directly with the demand parameter γ. Roughly, the larger is γ, the more responsive sales revenue is to increases in advertising, the greater the optimal reliance on advertising to generate revenue, and the more likely it is that scale economies in advertising will produce overall advantages of size. Similarly, scale economies in production are more likely to imply θ less than one the larger is α. It is difficult to relate the demand parameters γ and α to observable demand elasticities, however, since the net response of revenue to changes in a and q depends on the function B(m), and neither y_i nor B(m) are directly observable. (Spence (1980) relates these parameters to m-constant elasticities of demand.)

If (9) holds, the problem of selecting a and q to minimize the cost of producing y can be immediately reformulated as an ordinary two-input Cobb-Douglas cost minimization exercise, with inputs $q^{1/\beta}$ and $a^{1/\delta}$. The exponents of these inputs in the resulting production function are easily seen to be $\alpha\beta$ and $\gamma\delta$, respectively. Equation (10) shows that the sum of these exponents determines returns to scale in exactly the ordinary way. It follows directly from this that the ratio of advertising expenditure to total (advertising plus production) cost must equal $\gamma\delta/(\alpha\beta + \gamma\delta)$ in equilibrium for all values of y. Scale economies in advertising in this model do not imply a decline in the ratio of advertising to total cost as market share increases. If θ is less than one, the ratios of both advertising expenditures and production cost to sales revenue decline with market share.

In interpreting or applying this model, one must be careful to distin-guish between y, which is not directly observable, and sales revenue, $R = yB(m)$. Let ψ be the ratio of profit, given by equation (7), to sales revenue. Consider the difference in ψ between two firms that in equilibrium have revenues that differ by a small amount, ΔR. Differentiating the ex-pression for ψ, treating m as fixed to compare two firms in the same market equilibrium, one obtains

$$\Delta\psi \simeq (1 - \psi)(1 - \theta)(\Delta R/R). \tag{11}$$

If rivalry is intense, so that ψ is generally close to zero, profitability differences will be larger than if rivalry is restrained, so that ψ is gen-erally near one. Hence even if θ is constant, observable net advantages of size will depend on the exact nature of market equilibrium; the cost minimi-zation exercise that yields $\phi(y)$ does not provide complete information. If θ is not constant, the intensity of rivalry may be even more important. If $\phi(y)/y$ is U-shaped, for instance, one might observe advantages of size in a

collusive equilibrium (with small y_i) and disadvantages of size when rivalry is more intense (and the y_i are larger).

While these analyses serve to deepen our understanding of advertising as a form of non-price competition, they obviously do not answer or even address all interesting questions. Since the relevant literatures do not suggest deep uncertainty as to the nature of sensible models in this area, further theoretical work on non-price competition along the lines explored here seems likely to be productive.

III. Advertising and Efficiency

Given basic conditions and market structure, do sellers provide the optimal amount of advertising? This question has attracted a good deal of attention over the years.[9] In this section, I discuss three important recent contributions to the optimality literature, each of which deals with a different polar-case model. In the first of these, Butters (1977) assumes that advertising is purely informative; it provides information that directly enhances efficiency. Dixit and Norman (1978), on the other hand, assume that advertising is purely persuasive; it merely changes behavior and has no direct impact on welfare or on the efficiency of resource allocation. Finally, Nelson (1974) considers uninformative advertising that may not be persuasive either. He argues that such advertising may enhance efficiency by providing consumers a signal about product quality.

In Butters' model, all consumers have the same reservation price, m, for some product. Sellers send out ads at random to buyers; the ads give price and location. In his simplest model, consumers buy one unit of the product at the lowest price for which they receive an ad, as long as that price does not exceed m. If they receive no ads, or if they receive only ads with prices above m, they buy nothing. Advertising thus creates social

gain by allowing mutually beneficial trades to occur.

Let c be unit production cost, let h be the cost of sending one ad to one (randomly selected) consumer, and assume c and h are constant for all sellers, with c + h < m. If A ads are sent at random to a population of B consumers, and both A and B are large, the fraction of consumers receiving no ads is approximately exp(-A/B). Let a = A/B. If all consumers who receive ads make purchases, net surplus per buyer is given by

$$W = (1/B)[B(1 - e^{-a})(m - c) - hA] = (1 - e^{-a})(m - c) - ha. \qquad (12)$$

It is easy to see that W is maximized when

$$a = a^* = \ln[(m - c)/h]. \qquad (13)$$

In a free-entry competitive equilibrium, Butters shows that all prices between c + h and m will be advertised. (There are no fixed costs in this model, so a continuum of firms can exist.) Let z(p) be the probability that an ad sent out announcing price p will generate a sale. Free entry implies zero expected profit, which in turn implies

$$(p - c)z(p) - h = 0; \qquad z(p) = h/(p - c). \qquad (14)$$

Since an ad that announces p = m will produce a sale only if it reaches a buyer who has received no other ads, it must be that z(m) = exp(-a). Setting p = m in (14), equating the two expressions for z(m), and solving for a, one finds that in a free-entry competitive equilibrium, a = a*. In this special case, the market generates exactly the optimal amount of advertising.

This turns out to be a very delicate result. When Butters (1977) modifies his simplest model to allow consumers who receive no ads to engage in search, he finds that equilibrium involves too much advertising and not enough search. It is not intuitively clear why this occurs. This over-

advertising result at least shows by example that the polar case assumption that advertising is purely informative does not suffice to establish the optimality of market-determined advertising expenditures, at least not in the presence of information sources not directly under sellers' control.

In sharp contrast to Butters, Dixit and Norman (1978) assume that advertising alters consumer behavior but has no direct effect on welfare or efficiency.[10] Advertising can be efficiency-enhancing in their model only by encouraging consumption and production of goods that are over-priced because of the exercise of untouchable monopoly power.

The core of their argument can be easily outlined in partial equilibrium terms. Let q be a monopoly's total output, p its price, and a its level of real advertising. Let $q(a,p)$ be the market demand function, increasing in its first argument and decreasing in its second, and let the increasing function $V(q)$ give the true, social value placed on different quantities of this product.

Without advertising, it is customary to assume that behavior maximizes individual welfare and to treat $V'(q)$ as equal to the observed inverse demand function. (This neglects income and distributional effects.) Dixit and Norman instead take $V'(q)$ to be the inverse demand function corresponding to some _fixed_ value of a. If advertising provided information that made the monopoly's product objectively more valuable or useful, V would logically be an increasing function of a, but this sort of effect is assumed away. Similarly, advertising might directly increase utility by raising the subjective value of a given consumption vector, but Dixit and Norman argue that it is improper to count such effects.

With c and h defined as above, the level of net surplus generated by the monopoly is given by

$$W = V[q(a,p)] - cq(a,p) - ha = \{V[q(a,p)] - pq(a,p)\} + \pi(a,p), \qquad (15)$$

where $\pi(a,p)$ is the seller's profit. Setting $p = p*(a)$, the price that maximizes profit for a given level of advertising, we can treat both W and π as functions of a alone. Differentiating, we obtain

$$dW/da \;=\; (V' - p)(dq/da) - q(dp*/da) + d\pi/da. \tag{16}$$

If dW/da is negative at monopoly equilibrium it follows that an exogenously forced reduction in advertising, with the monopoly adjusting p to maximize profit, would lead to an increase in welfare.

At monopoly equilibrium, the third term on the right of (16) is zero. In the second term, the sign of $dp*/da$ is not clear a priori. In the natural case of multiplicative separability, $q(a,p) = f(a)g(p)$, this deriv-ative is zero. It will be positive if advertising makes demand less elastic and negative if advertising raises demand elasticity. Having little con-vincing evidence on this factual issue,[11] let us suppose that this term is zero. This leaves us with the first term on the right of (16). Under almost any plausible assumptions, dq/da is positive. (Recall that this is the total derivative, taking into account the optimal reaction of p to exogenous changes in a.) We thus reach the conclusion that if demand is multiplicatively separable, dW/da has the sign of $(V' - p)$.

A necessary and sufficient condition for monopoly advertising to be excessive in the separable case is thus that $V'(q)$ be less than the cor-responding equilibrium value of p.[12] If one takes "true" tastes to be those reflected in demands with $a = 0$, this condition is satisfied and the conclusion of excessive advertising is immediate. But this reasoning is circular: the conclusion that there is too much advertising rests on the assumption that advertising inflates demand beyond what "true" tastes would justify. If one instead took "true" tastes to be those corresponding to demands with infinite advertising, so that increasing a merely moves

market behavior closer to welfare-maximizing behavior, it would be equally immediate that monopolies spend too little on advertising. Thus, even if advertising is assumed to be purely persuasive, it appears that one cannot conclude that it is generally excessive without making the explicit value judgement that (in equilibrium) advertising generates demand that is excessive when judged by the "true" tastes embodied in the social valuation function.

Finally, Nelson (1974) argues that advertising that is neither informative nor persuasive may nonetheless enhance welfare by serving as a signal through which high quality brands can inform consumers of their superiority. Nelson is concerned with "experience goods", the quality of which by assumption cannot be ascertained prior to purchase. All else (including price) equal, he argues plausibly, consumers are more likely to repurchase a high quality brand than a low quality brand. Thus firms selling high quality brands, he contends, are willing to spend more to persuade buyers to sample their wares, and they will thus have larger advertising budgets in equilibrium than low quality brands. If buyers then select brands to try on the basis of advertising budgets, either because they are sophisticated and can unscramble quality signals or because they are naive and do what they are told most often to do, high quality brands will be advantaged and efficiency will be enhanced.

Nelson's analysis is informal, and it cannot support any claim of optimality. If multiple qualities remain on the market at the same price, the situation is clearly not optimal. Cheaper signals (if any could be devised) would dominate advertising in this framework. Further, since one expects lower quality brands to have lower costs of production, they would be expected to have higher markups, all else equal. This tends to enhance the value of initial purchases of such brands and thus to raise their optimal

advertising. Under extreme conditions, this second force can overwhelm that stressed by Nelson and produce "perverse" equilibria in which the lowest quality brands are the most heavily advertised (Schmalensee 1978a). More importantly, the existence of this second force rules out the generic optimality of market equilibria in this context. Thus, while Nelson (1974) may have identified a mechanism by which uninformative advertising can generate gross benefits, he has not shown that the amount of such advertising is optimal in equilibrium or even that it generates net benefits.

I do not think that further theoretical work on the optimality of market-generated advertising levels is likely to be enlightening. For tractability, advertising's effects must apparently be simplified to the point of unpersuasive caricature, and even then general results are not easily obtained. Since imperfect information or monopoly power must be assumed in order to generate advertising, the intrinsic second-best features of the problem make formal derivation of workable policy prescriptions unlikely.

IV. Advertising as a Determinant of Market Structure

How do sellers' decisions about advertising spending affect the evolution of market structure, particularly conditions of entry? Discussions of this question in the industrial economics literature have been dominated by two extreme views. Advertising's critics stress its persuasive nature and contend that it is generally anticompetitive. They often point to markets for liquid bleach and other products in which heavily advertised brands command substantial price premia over physically identical alternatives (Scherer, 1980, pp. 381-3). Advertising's defenders emphasize its informative role and argue that it is generally procompetitive. They frequently cite Benham (1972), who finds that state laws prohibiting eyeglass advertising are associated with higher than average eyeglass prices.

Since advertising is an aspect of seller conduct, which in turn is

affected by market structure, it is not surprising that it has been difficult
to choose empirically between these two positions. Moreover, measurement
problems in this area are severe.[13] At a more fundamental level, as I have
argued elsewhere (Schmalensee, 1982c, sect. 4), it is likely that neither
of the two extreme views is correct. As the examples in the preceding para-
graph might suggest, the impact of advertising on market structure probably
depends on product attributes, the nature of advertising, and consumer
information.[14]

The classical elements of market structure are seller concentration,
product differentiation, and conditions of entry. The first two of these
can be dealt with briefly. Seller concentration is generally assumed to be
positively related to the importance of economies of scale, and the model of
Spence (1980), discussed in Section II above, is the first to relate scale
economies in advertising to overall advantages of size. That model has
testable implications, and alternative models can be developed. Product
differentiation exists whenever rival brands are not viewed as perfect sub-
stitutes; it is more important the smaller, on average, are cross-price
elasticities of demand. In order to analyze the effects of advertising on
these elasticities in a persuasive fashion, it would be necessary to employ
a tractable, generally accepted micro-model of the effects of advertising on
buyer behavior. No such model now exists, though the empirical literature
on consumer behavior may be rich enough to permit its construction (Engle,
Blackwell, and Kollat, 1978).

A great deal has been written on the possible effects of advertising on
conditions of entry. Most of this work is empirical and is apparently moti-
vated by Bain's (1956, p. 216) empirically-based assertion that product
differentiation advantages of established brands are the most important
source of entry barriers. Some of the literature that supports Bain's

assertion argues that such advantages derive from the durability of adver-
tising's effects on consumer behavior. But the durability of investments
in advertising does not by itself seem to be any more of a barrier to entry
than the durability of investment in plant and equipment (Schmalensee, 1974).[15]

Bain (1956, p. 143) himself does not argue that advertising is the
basic source of product differentiation advantages. A number of his observa-
tions point to the importance of uncertainty about product quality (Bain,
1956, pp. 116, 140, 142). I have recently constructed a model that is con-
sistent with these observations and with some recent empirical work
(Schmalensee, 1982a). In that model, "pioneering" brands of subjectively
uncertain quality have a permanent advantage over later entrants of equally
uncertain quality. Buyers who have invested in learning about the pioneer
and are satisfied with it are rationally less willing to experiment with
later entrants than they were with the pioneer. If scale economies are
present, the pioneer can use its advantage to deter later entry. Advertising
does not appear in this model. It may be that there are similar irreversible
changes associated with exposure to advertising that give early entrants a
long-lived advantage, but I know of no persuasive theoretical or empirical
explorations of such phenomena.

Recent work on barriers to entry has found that it may be optimal for
an established seller to make irreversible pre-entry commitments that affect
its post-entry incentives in such a way as to deter potential entrants
(Dixit, 1982). A decision to sink costs by investing in long-lived pro-
duction capacity, for instance, alters a firm's future short-run cost function.
Several studies have found that it may be optimal for an incumbent seller
to over-invest in capacity in order to deter entry, especially in the presence
of economies of scale in production.[16] It is natural to ask whether long-
lived pre-entry investment in advertising can play a similar role in the

presence of scale economies in promotion.[17]

It seems sensible in this context to focus on introductory advertising,
which by definition is undertaken when a brand is launched in order to make
buyers aware of its existence. Such advertising is clearly a sunk cost, and
its effects on demand can be reasonably assumed to be long-lived. If a
large, fixed amount must be spent on introductory advertising, regardless of
subsequent sales, a nonconvexity is present that can deter entry. (See
Schmalensee (1978b) for an application of this point.) But in fact the
amount a seller invests in introductory advertising is not fixed: the more
it chooses to spend, the more people are informed, and the greater its pro-
duct's sales potential. By analogy with investment in production capacity,
one might conjecture that in the presence of scale economies in advertising,
over-investment in introductory advertising could be used to deter entry.

I have recently constructed a model (Schmalensee 1982b) in which this
conjecture is false. A brief examination of a greatly simplified version of
that model will serve to indicate how this can occur and should also serve
to emphasize the dangers of reliance on apparent analogies between investment
in advertising and investment in production capacity.

Consider two firms, A and B, capable of producing identical brands of
some new product. There are two possible buyers, 1 and 2. If informed of
the existence of the product, both buyers have flow demand functions $q = 1 - p$.
There are zero production costs. In order to inform one or both buyers, a
fixed cost F must be incurred. It then costs c_1 to inform buyer 1 and c_2 to
inform buyer 2, with $c_1 < c_2$. To capture the general inability of late
entrants to avoid informing some buyers who know of earlier entrants, sup-
pose that buyer 1 must be informed before an ad can be sent to buyer 2.

If A enters first, informs only buyer 1, and charges the monopoly price
($p = 1/2$) thereafter, its present value will be $[(1/4r) - c_1 - F]$, where r is

the relevant discount rate. Suppose that $F + c_1 < 1/4r < c_2$, so that this is optimal behavior if there is no threat of future entry. (Note that this implies diseconomies of scale; the necessary nonconvexity derives from buyer lumpiness. In Schmalensee (1982b) there are economies of scale over a range and a continuum of buyers.) Under these assumptions, I want to argue that it is never optimal for A to over-invest in advertising by informing buyer 2 in order to deter B's entry.

Let us consider the results of B's entry. Suppose that B informs only buyer 1. No Bertrand equilibrium exists here or in the cases examined below. We thus assume a Cournot post-entry equilibrium. Both sellers would then have present values of $[(1/9r) - c_1 - F]$. Now suppose that A has informed both buyers and that B enters and informs only buyer 1. It is easy to show that in Cournot equilibrium A sells only to buyer 2, B sells only to buyer 1, and the some price prevails as in the preceding case. The two firms divide the larger market created by A's advertising; customer 1's perfect information disciplines both sellers. B's present value in this case is $[(2/9r) - c_1 - F]$. A's over-investment in advertising would raise, not lower B's post-entry profits, and such over-investment can obviously not be used to deter entry. Because $c_2 > 1/9r$, if A informs only buyer 1, B's best strategy if it elects to enter is also to inform only buyer 1. Whether or not it deters entry, A's best policy prior to B's appearance is the unconstrained monopoly strategy.

We lack satisfactory models of the impact of advertising on important elements of market structure. Theoretical work to date seems to raise as many questions as it answers. Additional effort seems called for, but in order to be persuasive it must rest on empirically defensible assumptions about the effects of advertising on consumers. Moreover, as the Introduction sought to indicate, the traditional exclusive focus on advertising, to the neglect of other marketing decision variables and other forces affecting purchase behavior, may produce misleading results.

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Footnotes

1. For introductions to the marketing literatures on firm decision-making and buyer behavior, see Kotler (1980) and Engle, Blackwell, and Kollat (1978), respectively.

2. Important work on product selection has been done by Dixit and Stiglitz (1977), Salop (1979), Spence (1976), and others, and Porter (1976) has stressed the importance of non-advertising information sources in some markets.

3. For international comparisons, see Advertising Age (1980) and Simon (1970, ch. 7).

4. This is clear in the Line-of-Business data compiled by the U.S. Federal Trade Commission; see Advertising Age (1981).

5. This model is a slight generalization of the one used in Schmalensee (1976); see also Schmalensee (1977). For alternative approaches, see Stigler (1968) and Spence (1977a).

6. This differs from the demand structure in Dixit and Stiglitz (1977) in that E is assumed locally constant here, while the restriction $e = 1 + \rho$, derived from individual utility maximization, is imposed on market demand there.

7. Spence (1980) does not employ this distinction, so that $h(a) = a$ in his analysis and the function y embodies both consumer behavior and the cost function for advertising messages. For more on this distinction, see Schmalensee (1972, esp. pp. 231-7).

8. Spence (1980) sets $\delta = 1$, and his β and γ are the reciprocals of those here.

9. Important earlier contributions include Kaldor (1950), Telser (1964, 1966), and Steiner (1966).

10. For additional discussion of this paper, see comments by Fisher and McGowen (1979) and Shapiro (1980) and replies by Dixit and Norman that follow them.

11. Lambin (1976, pp. 138-40) suggests that advertising is most likely to lower price elasticities, and Dixit and Norman treat this as the expected case. But Lambin's evidence is hardly conclusive, and there have been few other studies.

12. Dixit and Norman (1978) find that this is a sufficient but not necessary condition for oligopoly with a fixed number of sellers. Oligopolies carry advertising beyond the profit-maximizing point, so that the third term on the right of equation (16) is negative. I have not been able to develop an intuitive understanding of the Dixit-Norman analysis of monopolistic competition; I suspect that results for this case are highly dependent on choices of functional forms.

13. For discussions of the empirical literature, see Comanor and Wilson (1979), Demsetz (1979), and Scherer (1980, ch. 9 and 14).

14. For discussions of this sort of heterogeneity, see Nelson (1974), Porter (1976), and Comanor and Wilson (1979).

15. Moreover, most investments in advertising may not be especially long-lived; see Comanor and Wilson (1979, pp. 462-7).

16. The seminal work is Spence (1977b). Dixit (1980) and Schmalensee (1981) assume different post-entry behavior and highlight economies of scale.

17. Spence (1977b) focuses on longevity. Spence (1980) treats scale economies in this context but neglects durability and pre-entry commitment issues.