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by

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1. Introduction

The basic assumption of the perfectly competitive model is that economic agents have complete information about their decision environments. This simplifies the exposition of the model since the two sides of the market can be constructed independently and then joined together to prove that an equilibrium exists and is unique. If complete information is lacking, interdependence exists among economic agents which must be taken into account when describing the market process. There are many ways in which uncertainty can be incorporated into an economic model. Therefore, it has not been possible to develop a single elegant model comparable to the static certainty model of conventional economics. The approach has been to describe an agent's optimal response to a particular type of uncertainty rather than to consider the effects of all forms of uncertainty on his decisions simultaneously. Even in those models that make the same assumptions about the nature of the uncertainty, the results are extremely sensitive to the other "rules of the game;" that is, the institutional setting involved. This is not surprising since even casual observation of actual economic activity tends to support the statement that an economic agent does not behave in the same manner in each market in which he participates.

One specific problem in this area which has received intense scrutiny by economic theorists concerns the search for the most favorable price for a good or service available at different locations. The interest in this problem formally began with a paper by George Stigler (1961). Since that time, a considerable amount of effort has been devoted to the analysis of the monetary and time costs associated with the dissemination, acquisition, and subsequent processing of information by market participants. The type of markets considered include: consumer durables, labor services, primary care physicians and residential housing.¹ The common feature of these models is that a costly search strategy is implemented by the agents on one side of the market. The results which emerge from these search models are quite diverse. The source of the diversity is due to the characteristics of the underlying commodity and the additional assumptions regarding the identity of the active searcher, the pricing strategy of the sellers, and the amount of information available to the buyers and sellers. Rothschild (1973) and Lippman-McCall (1976) have surveyed this search literature.

The concern over the search strategy is only relevant if the underlying commodity is considered to be expensive. The existing literature does not provide much insight into the operation of markets for goods or services where the purchase price of the good is so low that buyers find search activity too costly. Consider a good that is a relatively inexpensive component of a commodity bundle purchased at a given location. In this case,

the buyer would not necessarily postpone consumption of the entire bundle in order to seek a more favorable price on one of its minor components. In general, depending upon the buyer's income and relative price of the good, price may not even be a significant factor in the buyer's purchase decision. That is, the buyer's demand may be perfectly price inelastic within some relevant range. A buyer, therefore, adopts a different strategy when selecting an inexpensive good or service from that used when searching for an expensive good or service. The precise strategy that a buyer will use depends on additional characteristics of the market environment. There are many strategies available to the buyer for selecting a unit of the good or service: a random draw, previous experience, recommendations from friends, or information obtained costlessly from the seller. In general, the buyer assumes a passive role in the market process.

The seller of an inexpensive good or service may be forced to enlarge his strategy space in order to offset the passive behavior of the buyers. This may involve nonprice factors such as increasing the number of locations at which his product is available so that buyers have convenient access to the product or creating a brand identifying characteristic that the buyer can use in making his purchase decision. Ultimately, the seller may attempt to inform the buyer about the location of his product and/or the brand distinguishing characteristic. This information dissemination is accomplished through some form of advertising. Given that buyers are insensitive to price change and do not spend significant time gathering and processing information about

this product, the effective advertising message usually does not involve price, and it must be costless for the buyer to receive and understand. The seller thus needs a convenient symbol to use in advertising messages which informs buyers that his brand exists and persuades potential buyers to purchase his brand. One such device which can serve as the foundation of the advertising message is a trademark. If a buyer receives a copy of the brand's trademark, he knows the product exists. Even though the trademark itself contains no other information about the brand, the buyer's perception of the brand is enhanced through the realization that the seller incurred a cost to promote his brand. This does not mean that the use of trademarks is only relevant for sellers of inexpensive products. It simply means that in many cases trademarks constitute the only source of information a buyer gathers about an inexpensive product whereas he gathers information on price, quality, etc. . . . for expensive products.

The existence of trademarks may create competitive problems in some situations. For example, a trademark may become the common descriptive name for an entire product class; that is, it evolves into generic usage. The problems arise when the generic trademark is still legally protected as the name of a particular brand within the product class. It creates a great deal of confusion for both buyers and sellers as well as erects a barrier to competition in the market which may provide some sellers with the opportunity to earn excess profits. Consider the case that sellers of each brand in a product class choose advertising

strategies focused on their respective trademarks. If one brand has a generic trademark which is still legally protected, there may exist advertising spillover effects from the brand with the generic trademark to the other brands in the product class and vice versa. The nature of these effects is that some advertising by a given seller benefits his rivals, and the seller is unable to extract a price for this contribution to his rivals' sales. The seller of the brand with the generic trademark may try to minimize the benefits which flow to his rivals through activities such as a trademark protection campaign. The sellers without the generic trademark may be forced to incur additional advertising costs in order to counteract the effects.

This paper is concerned with describing these advertising spillover effects and the resulting implications for sellers' behavior. The remainder of the paper is organized as follows: a general discussion of trademarks and the process by which a trademark evolves into generic usage (Section II), a formal description of passive buyers' behavior and the sellers' advertising problem (Section III), an analysis of the impact of a generic trademark on the sellers' decisions (Section IV), and finally, a conclusion and outline of future work (Section V).

11. Brand Identification Through Trademarks

Akerlof (1970) pointed out that when buyers are unable to distinguish good quality from bad in a given product class, the average quality of the product declines. This ultimately reduces the size of the market and has negative implications for the

welfare of buyers and sellers. Various economic institutions have arisen to deal with this type of quality uncertainty; for example, private or government testing, guarantees, licensing practices, chains, and brand names. These last two institutions are quite similar in that they act as signals to buyers that the associated product meets a particular quality standard. In this regard, trademarks play a crucial role. A trademark is a word, symbol, letter, design, etc. . . . which allows buyers to distinguish goods or services provided by one source from those provided by another.² Buyers can use trademarks as a substitute for search and a convenient device for classifying information about the brands in a product class gained through search or experience. Trademarks allow buyers the opportunity to gather information about the individual brands in the product class as opposed to information about the product in general.

The mere presence of trademarks does not mean that quality differentials exist among the brands in a product class. The use of trademarks by all sellers of a product may mean that the brands in the product class satisfy a particular high quality standard. Or, it may mean that the sellers of uniform (high or low) quality products are able to use trademarks to create an artificial distinction among brands. Trademarks make it possible for a seller to improve the buyers' perception of his brand, thus providing an opportunity to charge a higher price for that brand.³ There is no evidence at this time, however, on the magnitude of this price premium.

Although trademarks have historically been afforded legal protection, there may exist situations in which their net economic benefit is negative. The seller may have to incur costs in connection with promoting the brand and buyers may incur monetary and time costs related to acquiring and processing information about the various brands. These costs may lead to adverse economic consequences. For example, the costs of promotion may constitute a barrier to entry into the market; this provides the established brands with some degree of market power. Prices may be higher than in a corresponding market without trademarks. Buyers may use the level of promotion as a direct signal of quality and, thus, prefer the heavily promoted brands independent of whether or not actual quality differentials exist among brands.⁴ There are additional problems concerning the truth of the information disseminated about the various brands and the extent to which a seller uses multiple trademarks to increase the time and monetary costs incurred by buyers. This last issue is discussed by Conant (1973).

The set of available remedies for trademark abuses includes compulsory licensing with or without quality standards, cancellation of trademark protection, and official certification (either government or private) of quality. Each of these remedies has positive and negative implications for social welfare. A detailed discussion of these remedies is provided by Beales et al. (1979).

A generic trademark is one that has become the common descriptive name for an entire product class rather than the

symbol for the specific brand within that class it was originally designed to represent. If a generic trademark exists but is still legally protected as the symbol for a particular brand, buyers and sellers are unable to communicate efficiently. This may lead to the buyers receiving a low quality product or paying a price premium for the brand with the generic trademark. There is clearly a need for a well-defined public policy for dealing with generic trademarks. Cancellation of the trademark is the remedy which has been applied to such names as linoleum, aspirin, cellophane, cola, escalator, trampoline, and yo-yo.⁵ The obvious advantage of cancellation is an improvement in the communication among buyers and sellers. This reduces the problems associated with substitution among brands and may ultimately result in lower prices through an increase in competition. Cancellation may cause some confusion for those buyers who continue to interpret the trademark in the way it was originally intended; however, most of the existing evidence indicates that this is only a temporary problem. Few arguments are offered against cancellation of a trademark that is actually generic. Disagreement usually does exist over the issue of whether or not a particular trademark is generic. There are many issues which must be resolved before cancellation including: the extent of generic usage, the importance of the trademark in a buyer's decision environment, the magnitude of the price premium, if any, received by the seller, alternative trademark remedies which may also be effective, and the precise method used to prove that a

trademark is preventing buyers and sellers from adequately describing the product.

It is important to note that a trademark is not generic from the moment of its initial use as a brand distinguishing mark. A trademark evolves into generic usage. The evolutionary process is generally due to a combination of factors.

(1) A generic trademark may develop for a brand that maintains a monopoly position in the relevant market for a certain period of time. The historical first firm in the industry usually has this type of monopoly position. It is possible that buyers become accustomed to regarding the trademark of the associated brand as a symbol for the entire product class. It is difficult for buyers to change their historic interpretation of a trademark in this situation. In addition, the first firm to sell a product may be able to establish its brand reputation at a lower cost than later entrants. This barrier to entry restricts buyers' potential choices and thus reinforces the tendency to identify the trademark as a symbol for the entire product class.

(2) Another closely related explanation for the evolution of a generic trademark is the "habit effect". That is, buyers making repeat purchases of a good or service at a constant price may continue purchasing under very familiar circumstances even though more preferable conditions may actually exist. For the buyer the cost of sampling another brand may be greater than the expected benefits. In other words, a trademark signals a satisfactory level of utility for the buyer so that he does not want to incur

the monetary and time costs associated with searching for another brand nor expose himself to the risk of purchasing an unsatisfactory product. It is possible that the brand and product ultimately become indistinguishable for the buyer. If this phenomenon is widespread among buyers in a market, the trademark of a particular brand may become generic.

This type of behavior is merely a generalized form of risk aversion in a world characterized by product heterogeneity and divergence of opinion. The buyer will not purchase another brand unless it is sold at a price lower than his usual brand. One problem is the determination of whether the "habit effect" is operational or the brand in question is a higher quality product. In the former case, the buyer may be better off with additional low cost information about other brands. In the latter case, the existing firms must improve quality or exit from the market.

(3) The primary factors in the evolution of a generic trademark are the historical first entrant and habit effects; however, the process could be reinforced by the choice technologies of the buyers. Prior to selecting a brand, a buyer can obtain information from surveys of friends and relatives or consumer magazines. Suppose, for example, that a potential buyer describes to friends and relatives the general characteristics of a product he feels will increase his satisfaction, and his contacts respond with the trademark of a brand in the product class. The probability that the new buyer selects the brand identified by the trademark is greater than if the contact responded with the

name of the product class. If confusion exists over the distinction between the trademark and the name of the product class and if many new buyers are entering the market, the tendency to use the trademark to identify the product class and, possibly, the market power of the owner of the trademark increases.

The nature of the buyer's choice technology can influence the magnitude of the effects of a generic trademark. This technology depends to some degree on the underlying product. A buyer of a durable good will generally acquire more information about the product class than the trademarks of the brands in the class. He may choose to sample many brands in the class. This same buyer may not choose to incur the costs associated with information acquisition and processing when participating in the market for an inexpensive good. In other words, the more information that a buyer gathers, the less likely that a generic trademark evolves.

(4) In the above examples, the seller has been passive in the development of a generic trademark. This is not necessarily a realistic interpretation of the seller's role. The actions of a seller can significantly influence whether or not his trademark becomes generic. This does not necessarily mean that the seller intentionally seeks to develop a generic trademark even if excess profits result. Specifically, a seller that promotes his brand through advertising may, for some reason, be more successful than his competitors. There are various types of advertising strategies which could lead to a trademark evolving into generic usage:

- (a) The seller may devote relatively more resources to promotion of his trademark so that buyers do not perceive a distinction between the brand and the product class.
- (b) The seller may develop an advertising strategy which erects a barrier to entry into the market, thus increasing his market power and the use of his trademark as a symbol for the product class.
- (c) The seller may be able to persuade buyers that his trademark represents a product which is of a higher quality than that of his competitors; consequently, a buyer may use the trademark as a symbol for the entire subset of high quality brands in the product class.

If one brand in a product class has a generic trademark but retains legal protection as a brand distinguishing mark, the flow of information among economic agents is inhibited. Suppose buyers and sellers conduct transactions through a broker. That is, buyers place orders with brokers who then contact the appropriate seller. If a buyer uses a trademark as the name for a product class when placing his order with a broker, he may receive the brand represented by the trademark. The seller may be able to exploit the buyers' inability to accurately describe the product class by charging a price premium for his product. The buyer may also miss the opportunity to consume a higher quality product. Alternatively, if a buyer uses the trademark as a symbol for the associated brand, the broker may interpret this

as an order for any brand in the product class. The buyer may not receive the brand requested. There may even exist an incentive for the broker to substitute a lower cost brand but charge the high cost brand price.

In general, if the meaning of the trademark is unclear, there is a positive probability that a buyer will receive a brand that does not yield maximum satisfaction or pay a price premium for the brand he actually receives. There is also a barrier to entry into the market. Potential entrants may interpret buyers' use of a trademark as a manifestation of their preferences for that brand. Consequently, a potential entrant, unable to produce an exact substitute or uncertain about being able to persuade buyers loyal to the brand with a generic trademark to try another brand, will be discouraged from actually entering the market. The cost of establishing a reputation comparable to the existing seller with the generic trademark may appear higher than is actually the case. In some markets, all the established brands may take advantage of this barrier by charging higher prices than would obtain in the absence of the generic trademark. In other words, a generic trademark provides a price umbrella to cover all the existing brands. The seller of the brand with the generic trademark may try to capture as many of the benefits from the communication problem for himself. This may involve spending resources on trademark protection activities. In the context of the above example with the transactions being conducted through a

broker, the seller could attempt to ensure that when a buyer uses the trademark to request an element of the product class, he actually receives the brand identified by the trademark. This is accomplished by the seller threatening the broker with legal action if the broker does not satisfy the buyer's request with a unit of the trademarked brand. The expenditure for such activities is clearly an inefficient use of scarce economic resources.

If the underlying product class is such that sellers have an incentive to adopt advertising strategies focused on their respective trademarks, then the communication problem that exists as a result of a generic trademark may take the form of advertising spillover effects from the generic brand to the other brands or vice versa. That is, the advertising by one brand may increase the likelihood that a buyer chooses another brand. The nature of the benefit to the rival brand is such that the seller cannot extract a price for the benefit. In other words, these spillover effects resemble externalities. The welfare implications of these spillover effects are unclear. The next two sections describe a framework for examining the impact of advertising spillover effects on the advertising strategies of all sellers in the market.

III. Advertising Strategies

It is not clear if "rules of thumb" can be developed which indicate the likelihood that a product class contains a brand

with a generic trademark. However, given that a generic trademark exists, it is easier to analyze the effects by examining specific types of product classes. This is due to the fact that the behavior of economic agents is influenced by the nature of the product.

Consider an inexpensive product; that is, one with a price so low that search activity for the buyers is too costly. For this type of product the buyer may merely select a brand at random and continue purchasing that brand if it provides a satisfactory level of utility. In the extreme case that the brands are indistinguishable, the buyer may always select a brand at random. Sellers may find it advantageous to create some degree of brand differentiation. Since a buyer is reluctant to devote resources to the processing of information about this product class, one possible strategy for the sellers is to identify each brand with a trademark and use advertising focused on their respective trademarks. The two crucial issues are the content of a message and the buyers' reaction to an advertising message. These problems will be discussed separately.

III.1. Buyers

In order to describe the operation of the market for an inexpensive product, it is necessary to provide a characterization of passive buyer behavior.⁶ Suppose that a buyer arrives at a given location and is offered M choices (brands) in a particular product class. To each brand, the buyer assigns a

number $r_i > 0$ where $\sum_{i=1}^M r_i = 1$. That is, r_i represents the probability that the buyer chooses brand i ($i=1, 2, \dots, M$). This can be described in terms of the traditional "fair spinner" notion of probability where

$$r_i = \frac{\text{Area of the Sector Associated with Brand } i}{\text{Total Area of the Circle}}$$

The value of r_i represents the individual buyer's evaluation of the available information from past and present sources. Each buyer has an interpretive filter through which "raw" data is converted into subjective judgment. The precise specification of this screening device for a buyer will yield the fair spinner mechanism for that buyer.

There are many types of filter processes for inexpensive products. For example,

- (1) If the buyer is indifferent as to the particular brand purchased, then $r_i = \frac{1}{M}$
- (2) If the buyer, for some reason, is loyal to brand 1, then $r_1 = 1, r_2 = r_3 \dots = r_M = 0$.
- (3) If the buyer surveys m friends and relatives seeking recommendations about a product class and m_i is the number of times brand i is recommended, then $r_i = \frac{m_i}{m}$ for $i = 1, 2, \dots, M$, and $m_1 + \dots + m_m = m$.
- (4) If the buyer takes into account the advertising messages he receives about each brand, then one possibility is

$$r_{ij} = \frac{A_i}{A}$$

where A_i denotes the number of advertising messages the buyer

receives concerning brand i and A is the total number of advertising messages received by the buyer for all brands in the product class. In this case, the buyer does not take into account past consumption; he merely receives messages about various brands and determines a probability distribution based on the frequency with which messages arrive. If $A_i = 0$, then $r_i = 0$; that is, the buyer will not purchase a particular brand if he is not informed of its existence. Information is thus acquired without any direct action on the part of the buyer. This is the characterization of passive buyer behavior which will be used in the following discussion.

III.2. Sellers

Given that all sellers of the inexpensive product are aware of the passive buyer behavior, a seller adopts a strategy which is aimed at influencing the buyers' construction of their respective fair spinner mechanisms. For example, a seller may be able to exert some control over the location of his brand. This includes the number of places where the brand is sold as well as the display of the brand at a given location. This control may involve such activities as contractual agreements granting exclusive rights to a particular location or attempts to maximize the number of locations where the particular brand of the product is sold. There are means other than availability of product by which a seller can influence a buyer's choice technology. For

example, quality of brand i, the price for brand i, the selection of a trademark for brand i, the level of informative and/or persuasive advertising for brand i, the type of warranty offered for brand i, the extent to which barriers to entry into the industry restrict the consumers' choices (i.e., the number of brands), etc.

Improvements in a brand relative to the other brands in the product class will have only limited benefit for the seller in a world of incomplete information unless buyers are aware of the improvement and are able to identify the brand at the time of purchase. A seller, therefore, may develop certain signals to convey information to buyers. Given the nature of the product in question, buyers are unwilling to incur costs to acquire or process the information from the seller. This places severe restrictions on the type of signals available to sellers. Trademarks emerge as useful tools for sellers in those situations in which buyers passively respond to the quantity of advertising messages. An advertising message, then, consists of a copy of the trademark for a particular brand. These messages are delivered to buyers who determine their respective fair spinner mechanisms as outlined in Section III.1., example 4. Messages of this form fulfill the two functions traditionally assigned to advertising; that is, the first message informs buyers that a brand exists and subsequent messages persuade buyers to purchase the brand represented by the trademark.

III.3. Decision Problem

Buyers behave passively and sellers use trademarks and advertising to inform and persuade buyers to purchase their respective brands. Since advertising is costly, there are bounds on the number of messages that a given seller can send to buyers. Therefore, the problem which must be solved is the determination of the number of advertising messages that a seller sends to buyers so that his expected profits are maximized conditional on the strategies used by the other sellers.

In order to focus on this decision, it is necessary to make some simplifying assumptions.

- (1) There is a homogeneous product which is exchanged for money.⁷
- (2) There are $N > 0$ identical buyers who eventually purchase a unit of the product.
- (3) There are $M > 1$ brands (sellers) in the product class and each brand is sold at the same price p . The sellers are unable to influence the total demand for the product. Each seller knows the total demand for the product but is uncertain about his own share of the demand.
- (4) There is only one location where transactions take place. Buyers can purchase any brand in the product class at this location.⁸ A buyer merely communicates his choice of a brand⁹ to an unbiased agent who contacts the appropriate seller to complete the transaction.

- (5) All sellers incur a constant cost of production c ($< p$) per unit. Production is instantaneous so that the seller is not concerned with loss of goodwill resulting from the failure to satisfy a buyer.
- (6) Each seller maximizes expected profits conditional on the strategies used by the other $M-1$ sellers. Sellers are aware of the effect of advertising on the buyers' fair spinner mechanisms.¹⁰ Expected profits are a function of the number of advertising messages A (copies of trademark) that are sent to buyers. The cost of a message is constant (call it s). Each seller takes as given the behavior of the other $M-1$ sellers.¹¹
- (7) buyers have no recollection of past consumption nor alternative sources of information. They determine their fair spinner probabilities based solely on the advertising messages received prior to the purchase decision. Each buyer is aware of all the messages sent by a given seller.¹²
- (8) Each seller determines a subjective measure of advertising effectiveness. That is, seller i ($i = 1, 2, \dots, M$) determines f_i where $f_i(A)$ denotes the probability that A advertising messages result in a sale to buyer j ($j = 1, 2, \dots, N$).¹³ This measure is conditional on the strategies of the other $M-1$ sellers. It is a probability measure so that $0 \leq f_i(A) \leq 1$. The other properties are: $f_i'(A) > 0$ and $f_i''(A) < 0$ for $A > 0$.

Given these assumptions, the problem for seller i is to select A in order to maximize expected profit. Formally,

$$\max_{A \geq 0} [E\pi(A) = pf_i(A)N - cf_i(A)N - aA].$$

Let $f(A)N = q \leq N$.¹⁴ Since f is invertible, $A = f^{-1}\left(\frac{q}{N}\right)$.

A is the number of advertising messages which the seller believes will generate q sales. Advertising and production costs are:

$$\xi(q) = cq + aA = cq + af^{-1}\left(\frac{q}{N}\right).$$

The marginal cost of production and advertising:

$$\xi'(q) = c + \frac{a(f^{-1})'\left(\frac{q}{N}\right)}{N} = c + \frac{a}{Nf'(A)}.$$

Since the price of a unit of the product is constant, the marginal revenue is p . Therefore, the seller selects an optimal level of advertising A^* such that

$$p = c + \frac{a}{Nf'(A^*)}$$

or

$$p - c = \frac{a}{Nf'(A^*)}.$$

This last equation is the equality of the difference between marginal revenue and marginal cost of production with the expected marginal cost of advertising. Since f is invertible,

$$A^* = f^{-1}\left(\frac{q^*}{N}\right).$$

The advertising effectiveness function is merely the operational analog of the seller's interpretive filter. It reflects the seller's perception of his decision environment including the

behavior of his rivals. In a dynamic setting, this function will be revised in response to actual sales and the observed levels of advertising by rivals. There are a number of tools available to model this process. Probably the most frequently discussed is the Bayesian analysis. (See the Appendix for an illustration).

In order to provide more insight into the seller's decision problem consider the advertising effectiveness function

$$f_i(A) = \frac{A}{A + K_i} \text{ where } K_i \text{ is seller } i\text{'s estimate of the total}$$

number of advertising messages distributed by his rivals ($i = 1, 2, \dots, M$). The problem for this seller is:

$$\max_{A > 0} [E \pi(A) = (p - c)N \frac{A}{A+K} - aA].$$

The first order condition, then, becomes

$$(p - c)N \frac{K}{(A^*+K)^2} - a = 0$$

or

$$(p - c) = \frac{a}{N} \frac{(A^*+K)^2}{K}$$

The optimal number of advertising messages A^* is:

$$A^* = -K + \sqrt{\frac{(p-c)NK}{a}}.$$

Note that $A^* > 0$ if $(p - c)N - aK > 0$. That is, the seller will send out advertising messages if he expects that excess profits will exist in his absence. The seller advertises up to the point at which the expected excess profits are eliminated. Once a buyer receives a single message about each brand, the informative function of advertising messages is fulfilled. Thus, depending on the magnitude of the difference $p - c$, there may exist an

excessive amount of persuasive advertising. The buyer may be better off with a lower price and the sellers would still earn a normal profit.

It is doubtful that an equilibrium in pure strategies exists for this model without some additional assumptions regarding the estimates of K . If all sellers choose the same value for K , then each seller will select the same number of advertising messages to send to buyers. This is an equilibrium since no single seller can increase his expected profit by changing only his advertising strategy. In addition, inspection of the formula for A^* indicates that the number of advertising messages is directly related to the price of the product and the number of buyers but inversely related to the cost of production and advertising. These are all intuitively obvious and logically consistent results. This model thus reinforces some of the traditional verbal analyses of advertising behavior. It also provides the foundation for the discussion of generic trademarks.

IV. Generic Trademarks

This section is concerned with the sellers' behavior given that a generic trademark exists. Assume the trademark for brand 1 is generic. As discussed earlier, problems arise if the trademark is legally protected as the symbol for brand 1 since the flow of information among economic agents is inhibited. If buyers and sellers behave as described in Section III, it is

possible to characterize this information problem in terms of advertising spillover effects. They operate to diffuse or reinforce the advertising effectiveness of the sellers. Specifically, some advertising by the seller of the generic brand may actually increase the probability that a buyer assigns to a rival's brand, or advertising by the sellers of the nongeneric brands may increase the probability that a buyer assigns to the selection of the generic brand. It is no longer the case for a seller that, given the number of messages sent out by his rivals, the probabilities that buyers assign to selecting his rival's brands are inversely related to the number of messages that he sends.

The relative strengths of these effects is an empirical question. However, it is possible to examine the consequences of the effects separately in the context of the example given in Section III. Suppose the spillover effects are of the first type. There are two possible representations of the effects: multiplicative and additive. For the simple multiplicative effect, there exists $r \in (0,1)$ which measures the reduction in the effectiveness of the advertising for the generic brand. The objective for the seller of brand 1 (generic trademark) is:

$$\max_{A > 0} [E\pi(A) = (p - c)N \frac{A(1-r)}{A + \bar{K}_1} - aA]$$

where \bar{K}_1 is seller 1's estimate of the total number of advertising messages sent by the other $M-1$ sellers. The optimal level of advertising \bar{A} satisfies:

$$\frac{(p - c)N(1 - r)\bar{K}_1}{(A + K_1)^2} - a = 0$$

or

$$\bar{A} = -\bar{K}_1 + \sqrt{\frac{(p - c)N(1-r)\bar{K}_1}{a}}$$

If seller 1 has the naive belief that his rivals have the same advertising strategies as in the example of a market without a generic trademark ($K = \bar{K}_1$), then he will send fewer advertising messages to buyers ($\bar{A}_1 < A^*$). The ultimate impact on his expected profits is unclear. The reduction in the number of advertising messages also reduces the total cost of advertising but the seller may choose to incur additional costs for a trademark protection campaign designed to stop the flow of advertising benefits to his rivals. The number of units that this seller expects to sell \bar{q}_1 is also reduced ($\bar{q}_1 < q^*$).

If the spillover effects for the generic brand are additive, then there exists a constant R which measures the reduction in advertising effectiveness as

$$\frac{A - R}{A + K} \text{ where } R \leq A_0 \text{ and } A > A_0 > 0 \text{ (} A_0 \text{ constant).}$$

The seller's objective function is

$$\max_{A \geq 0} [E\pi(A) = (p - c)N \frac{(A - R)}{A + \bar{K}_1} - aA]$$

where \bar{K}_1 is the seller's estimate of his rival's advertising with additive spillover effects. The optimal number of advertising messages \bar{A} satisfies:

$$(p - c)N \left[\frac{\bar{K}_1 + R}{\bar{A} + \bar{K}_1} \right] - a = 0$$

or

$$\bar{A} = -\bar{K}_1 + \sqrt{\frac{(p-c)N(\bar{R} + \bar{K}_1)}{a}}$$

In this case, if $\bar{K}_1 = K$, the seller of the generic brand will increase the number of advertising messages that he sends to buyers ($\bar{A} > A^*$), but expected sales \bar{q}_1 decline relative to the case without a generic trademark ($\bar{q}_1 < q^*$).

The nongeneric brands experience an increase in their expected sales as a result of the advertising of the generic brand if this type of spillover effect obtains. The decision problem for seller i ($i \neq 1$) is

$$\max_{A \geq 0} [E\pi(A) = (p-c)N \frac{(A+b)}{A+\bar{K}_1} - aA]$$

where b denotes the benefit gained from the advertising of the generic brand and \bar{K}_1 is seller i 's estimate of the number of messages sent by rivals. Again, for purposes of illustration, assume that the benefit to seller i is constant and less than \bar{K}_1 . The optimal number of advertising messages for seller i , \hat{A}_i satisfies:

$$(p-c)N \frac{(\bar{K}_1 - b)}{(\hat{A}_i + \bar{K}_1)^2} - a = 0$$

or

$$\hat{A}_i = -\bar{K}_1 + \sqrt{\frac{(p-c)N(\bar{K}_1 - b)}{a}}$$

Clearly, if $\bar{K}_2 = \bar{K}_3 = \dots = \bar{K}_M = K$, then $\hat{A}_1 < A^*$ for $i = 1, 2, 3, \dots, M$. It is possible that each seller sends fewer advertising messages in the presence of a generic trademark than in the case without the generic trademark. This is actually a disequilibrium creating force given that the expectations about rivals' advertising remain the same. The special case of multiplicative spillover effects for brand 1 and $\bar{K}_1 = \bar{K}_2 = \dots = \bar{K}_M = K$ yields the result that $\bar{A} < A^*$ and $\hat{A}_1 < A^*$. This means that excess profits will exist and may invite entry. However, if the spillover effects apply only to the established brands, successful entry may be prohibited. The spillover effects, therefore, could constitute a barrier to entry.

Suppose the spillover effects operate in the opposite direction; that is, advertising by sellers of the brands without the generic trademark reinforces the advertising of the generic brand. In order to incorporate this into the framework of Section III, suppose there exists $s \in (0,1)$ such that the advertising effectiveness function is augmented:

$$f_1(A) = \frac{A + sK'}{A + K'}$$

where K' is the estimate of the number of advertising messages sent by the $M-1$ sellers of brands without generic trademarks. The problem for the seller of the generic brand is

$$\max_{A > 0} [E\pi(A) = (p - c)N \frac{(A + sK')}{A + K'} - aA].$$

The optimal number of messages A' for the seller to send to buyers is

$$A' = -K' + \sqrt{\frac{(\bar{p} - c)N(1 - s)K'}{a}}$$

Again, if $K' = K$, then $A' < A^*$. This may ultimately lead the seller to respond by charging a higher price for his product. This does not, however, follow from this model.

One conclusion that is apparent after extending the framework of Section III to include the spillover effects that may exist as a result of a trademark evolving into generic usage is that even with a simple model the results are ambiguous. The effect on the behavior of the seller with the generic trademark depends on whether the spillover effect enters his advertising effectiveness function in an additive or multiplicative manner. If it is additive, the optimal response is to increase advertising; but if it is multiplicative, the seller will decrease advertising and possibly engage in trademark protection activities. The expectations formation mechanism is also a source of ambiguity. With the naive assumption that expectations do not change once a trademark evolves into generic usage, the aggregate level of advertising by the sellers of the nongeneric brands declines. There is an obvious dynamic problem related to the impact this reduction in advertising has on the estimate of \bar{K} used by the seller with the generic trademark. An appropriate concept of equilibrium must also be developed which takes the independence among sellers into account. Finally, the seller's attitude toward risk must be formally introduced into the model.

V. Conclusion

Trademarks are more often the subject of policy discussion than theoretical analysis. This is due, in part, to the failure of traditional economic theory to deal adequately with questions of quality choice by economic agents. However, some insight into trademark issues is possible even if the underlying product is not subject to quality variation. Suppose the product is such that buyers passively respond to advertising messages disseminated by sellers rather than actively seek information about the various brands in the product class. The type of product considered is one with a low purchase price so that buyers find any sort of sampling activity too costly. In this case, trademarks and advertising strategies become important tools for those sellers interested in informing buyers that their brands exist and creating brand identification among buyers. An advertising message is merely a copy of the seller's trademark. When a buyer receives the message, he is aware of the brand's existence. If the level of advertising for a brand is directly related to the probability that the buyer assigns to selecting that brand, then it is possible to incorporate informative and persuasive advertising into a single model (Section III).

In some situations, a trademark can evolve into generic usage. The evolutionary process is propelled by a combination of first entrant effects, habit, buyers' information gathering techniques, and sellers' advertising strategies. Once a generic trademark exists, there is a possibility that the flow of

information among economic agents, initially facilitated by trademarks, is inhibited. Advertising by the seller of the generic brand may increase the probability that a buyer selects one of the nongeneric brands or vice versa. There then exists a distortion in the allocation of advertising resources among sellers and the brands among buyers. In other words, some sellers are providing benefits to their rivals for which they do not receive compensation. Buyers are not able to assign the correct probabilities to their "fair spinner" mechanisms so that the distribution of brands among buyers is distorted. This may have significant welfare implications if there are quality differentials among brands which are not apparent prior to purchase. This confusion about the meaning of a trademark may cause other problems such as providing the seller with the generic trademark an opportunity to charge a price premium for his brand. A barrier to entry may actually be erected by a generic trademark, thus allowing all established sellers in the market to come under the price umbrella of the generic brand.

Section IV presented a characterization of these advertising spillover effects for one particular type of advertising effectiveness function. Even in this simple framework, the results are ambiguous. It is possible to show that a generic trademark does distort the advertising strategies of the sellers. However, the relative strengths of the effects and the magnitude of the distortion remain unclear. There are many additional problems which must be resolved before the model is useful for

policy analysis. These include the effects of: price and quality differentials, an expectations hypothesis which allows for learning,¹⁶ buyers' active search for information, seller's selection of a combination of promotional strategies, and advertising which shifts the market demand curve. Finally, the issue of the welfare implications of a generic trademark must be examined. It is not clear that the allocation induced by a generic trademark is Pareto inferior. For example, suppose the generic trademark belongs to the first seller to enter the market and the spillover effects diffuse his advertising. If this seller gained market power as the first entrant, the power may be reduced as a result of his trademark becoming generic.

This preliminary analysis suggests that it is necessary to examine specific trademarks that have evolved into generic usage in order to have insight into the impact of the advertising spillover effects on the behavior of economic agents. The goal should be to develop sufficient conditions under which the spillover effects operate. It may then be possible to explore the implications of the spillover effects for economic welfare and to discuss the appropriate remedy. Cancellation may not be the only remedy. Advertising constraints directed toward preserving the informational content of a trademark but limiting the deceptive effects of a generic trademark should be imposed in those situations where a trademark is approaching generic usage.

Appendix

In order to determine an advertising strategy, each seller must estimate the effectiveness of his advertising messages conditional on the behavior of the other $M-1$ sellers. In a dynamic setting, these estimates may be revised on the basis of information that becomes available about actual sales and rivals' advertising. One method of describing this process is the Bayesian technique for consistent monitoring of the subjective inputs into a decision problem.

For purposes of illustration, assume the advertising effectiveness function for seller 1 is $f_t(A) = \frac{A}{A + K_t}$ where K_t is an estimate of the total number of advertising messages distributed by the other $M-1$ sellers in period t . The seller must estimate $\sum_{i=2}^M k_t^i$ where k_t^i is the number of messages sent by seller i in period t ($i = 2, \dots, M$). Assume k_t^i are normally and identically distributed through time. That is, seller 1 assumes each rival's selection of an advertising strategy is a draw from the same distribution. Define the distribution of the actual number of messages sent by the other $M-1$ sellers in period t by

$$g(k_t) = N(k_t^*, \sigma_t^2)$$

where k_t^* and σ_t^2 denote the mean and variance, respectively. Assume the seller knows σ_t^2 but does not know k_t^* . The seller has subjective knowledge of k_t^* , that is, there exists a prior probability distribution which is assumed to be normal

$$\bar{g}(k_t^*) = N(\bar{k}_t, \bar{\sigma}_t^2)$$

where \bar{k}_t and $\bar{\sigma}_t^2$ are the subjective mean and variance, respectively. This is thus a summary of the seller's views concerning the uncertainty of his rivals' behavior. From g and \bar{g} , the seller's subjective probability distribution of the actual number of advertising messages can be written

$$h(k_t) = N(\bar{k}_t, \gamma_t)$$

where $\gamma_t = \sigma_t^2 + \bar{\sigma}_t^2 + 2 \text{cov}(k_t, k_t^*)$.

During period t , seller 1 estimates K_t as $(M-1)k_t$ and observes the $M-1$ advertising strategies of his rivals. Let \hat{k}_t denote the mean of the $M-1$ numbers observed during this period. Using Bayes theorem, the posterior distribution for k_t^* is again normal; that is,

$$g'_t(k_t^*) = N(k'_t, \sigma_t'^2)$$

where

$$k'_t = \left[\frac{\frac{1}{\bar{\sigma}_t^2} \bar{k}_t + \frac{M-1}{\sigma_t^2} \hat{k}_t}{\frac{1}{\bar{\sigma}_t^2} + \frac{M-1}{\sigma_t^2}} \right]$$

and $\frac{1}{\sigma_t'^2} = \frac{1}{\bar{\sigma}_t^2} + \frac{M-1}{\sigma_t^2}$.

The seller now has a new estimate of the mean of the number of messages to be sent out by each rival in period $t+1$. If the seller views all rivals as identical, $K_{t+1} = (M-1)k_t$ and

$$f_{t+1}(A) = \frac{A}{A + K_{t+1}}$$

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Footnotes

*The author benefited from discussions with Edward Gallick and John Hilke on the economic function of trademarks.

1. See Stigler (1961), McCall (1970), Satterthwaite (1979), and Ioannides (1975).
2. If a seller identifies his units of the product with a single trademark, then he is selling a brand of the product. A trademark is used to distinguish a particular brand from the other brands in a product class.
3. Embodied in the trademark is the seller's reputation.
4. See Nelson (1970).
5. Cancellation means that the owner of the trademark loses the legal right to its exclusive use. The FTC Improvements Act of 1980 prohibits the FTC from using its funds (through fiscal 1982) to petition the Commissioner of Patents for cancellation of a trademark on the ground that it has become the common descriptive name for a product class.
6. This is referred to as a description of the buyer's choice technology.
7. The problem of selecting a quality level is ignored.
8. There is no search activity on the part of the buyers and the probability that a particular brand is not available at the given location is zero.
9. This choice is determined by means of a "fair spinner" mechanism.
10. All buyers are identical in their responses to advertising.
11. A seller assumes that his rivals will not alter their respective strategies in response to his actions.
12. If no messages are received, the buyer will not purchase. Since all N buyers eventually purchase a unit of the commodity, advertising messages can be viewed as signs posted by sellers at the entrance to the market place.
13. This represents the probability of success. If there are N buyers, the seller is performing N trials of a Bernoulli experiment where the probability of success is $f_1(A)$. The expected number of sales in N trials is $f_1(A)N$.
14. The subscript is deleted.

15 Generic brand refers to the brand with the generic trademark (brand 1). In some contexts, such as discussions of the drug industry, the term generic is associated with indistinguishable output from several sources.

16 A description of the Bayesian approach is given in the Appendix.