ADVERTISING QUALITY AND MARKET SHARE

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Abstract

This paper utilizes a signaling-game approach to advertising and concludes that advertising is a means of increasing profits and not an instrument of consumer preferences manipulation. It also concludes that advertised brands should offer to the consumer something original and if not, then offer what more or less the rival do. (JEL: L15, C79)

1. Introduction

Consider a market for a heterogeneous product, i.e. for a product of different brands and quality. The sales of a particular brand by a specific firm depend, inter alia, on its quality. If the brand is of good quality, it will sell well and there may be an excess demand for it. Conversely, if the brand is of poor quality, it will not sell well and there may be an excess supply of it. In real world such "brand-specific disequilibra" are the rule; brand-specific, in the sense that one brand may be experiencing excess demand and another brand may be facing excess supply. Market shares simply change constantly. In a two-brand industry, for example, an increase in one brand's market share at the expense of the other brand, (which will find itself with surpluses), may be possible temporarily via the use of inventories. If however, the increased demand for the former brand persists and production does not change, there will be in the next period a shortage for this brand and a surplus in the other (provided that neither the other brand has adjusted its output).

Such disequilibria should be distinguished from those arising in response to

the state of the economic activity, to the nature of the product, etc., because in these instances, a disequilibrium would be general rather than brand-specific. An excess e.g. demand would spread over all brands of an industry, which implies that business expansion would be possible without questioning the market shares of rival brands and hence, without an aggressive advertising campaign. Nevertheless, an excess demand for a certain brand at the expense of the competitors, implies that there are good chances for market share expansion and hence, that an advertising campaign should be launched. In our two-brands example, the seller of the brand with the increased sales does not know whether this increase will persist, and advertising is a means of promoting such an increase, so as to make a greater production volume worthwhile. Indeed, it is well documented that the enhancement of the profit margin, which accompanies an increased market share, induces competition on a non price basis such as in terms of advertising (see Buzzell and Farris, 1977, and Martin, 1993).

Note that such a perception of things views quality not as a static concept but as what consumers believe about a brand, belief manifested through the revealed consumer preferences. It is from this point of view, the view of brand reputation, that advertising fits into these considerations, since "a brand is a brand" but advertising can make a difference for a firm's profits. It follows that the terms "good" or "poor quality" should be interpreted accordingly. The nexus quality advertising-reputation is, of course, well-known to the theory of industrial organization (see e.g. Tirole, 1988, and Martin, 1993), and has formed the basis for the generalization of the concept of «reputation» by game theory (see e.g. Osborne and Rubinstein, 1994). Although this contribution of game theory is acknowledged, what is of concern here is the derivation of certain useful economic propositions. Therefore, our discussion is rather motivated by the literature on product differentiation, quality, and advertising, (for hifhlights of this vast literature see Schmallensee and Willig, 1989). As far as we know, a formal analysis of the question «When a firm should advertise quality in order to manipulate reputation as a means of expanding or maintaining its market share?» is nowhere to be found in the literature. This paper deals with this precisely question: It tries to analyse formally the considerations of the previous paragraphs[1]. In what follows, the next section studies the issue in hand by constructing a signaling game, i.e. via a method which is usually employed to tackle topics like ours. Section 3 concludes this paper with an informal discussion of the merits of our results.

2. The Analysis

Consider a market of a differentiated product. Each brand is of unique quality and is produced by only one firm, which is also its seller. At each point in time, each brand has its market share, and there is a probability ζ that the market share of a given brand will increase, and a probability $(1-z)$ that this share will decrease. The type of the change that actually occurs, reflects brand quality -reputation and is private information, i.e. known only to the seller of the specific brand, who is now called upon to decide whether to advertise or not the particular product. In the seller's effort to maximize profits, four possibilities may be contemplated, four from the viewpoint of the consumer who does not have information possessed by the firm:

Firstly, there is an increase in the market share and advertising is under-taken to ensure that this increase is permanent. Secondly, there is an increase in the market share, but no advertising on the grounds, for instance, that this increase is thought by the firm to be temporary. Thirdly, there is a decline in the market share and the product is advertised to eliminate the consequent excess supply and to restore the original market share. Finally, there is a decline in the market share, but no advertising because this decline is thought to be temporary. These possibilities are investigated by the consumer, because he rightly, is no far as our modeling is concerned, believes that firms attempt to avoid a would-be excess demand or supply . That is, advertising takes the place of price variation in clearing the market for a brand and 'enforcing' new market shares. Price variation would simply mean price war, since the price reductions of those brands experiencing excess supply would be followed by the well performing brands in order to preserve their shares, and the former brands would be eventu-ally driven out of the product market. We perceive in effect advertising as reflecting a strategy of «living and letting, live», save perhaps the case of the newcomers in a industry.

Next, if the consumer knew that the market share of a brand had increased, the quality of this brand would be believed by him to be good with a probability p, in the case of advertising, and with a probability q, in the case of no advertis-ing. It follows that $(1-p)$ and $(1-q)$ are the corresponding probabilities assigned to (Bayesian) beliefs as to poor quality, when the market share declines. Given these beliefs, the consumer must decide whether to buy or not the advertised brand. The criterion used by him is the maximization of the change in utility after the purchase (and consumption) of this brand vis a vis the purchase of a rival brand. This situation is depicted in Figure 1, where the dashed lines capture

the fact that the buyer does not know whether the market share has increased or decreased, i.e. these lines represent, in the jargon of game theory, buyer's information set. ΔU is the change in consumer's utility from consumption, with $\Delta U_1 > \Delta U_2$, >

$_3$ 0. To explain these inequalities, ΔU_2, will be the change in utility if the consumer buys the brand that is usually purchased by him or the majority of people instead of the advertised brand. If the latter brand is acquired and turns out to be of better quality than the former brand, (and according to our assumptions, it will be better in the case of a rising market share), the consequent increase in utility, ΔU_1, will exceed ΔU_2. If the advertised brand is proved to be of worse quality relative to the traditionally bought brand (s), (and it will be worse in the case of a falling market share), the subsequent change in utility, $\Delta U3$, will be less than ΔU_2. Hence,

$$\Delta U_1 > \Delta U_2 > \Delta U_3 \quad 0.$$

To determine the change of profits, $\Delta \Pi$, in response to buyer behavior, it is self evident that if the consumer chooses not to buy, $\Delta \Pi = 0$, in the case of no advertisement, while $\Delta \Pi < 0$ due to advertising costs when advertising is made. According to the Dorfman - Steiner condition, the extent of advertising should be such that the additional revenue earned by one more unit of money spent on advertising is equal to the price elasticity of demand. Therefore, if the consumer decides to buy, the change in profits will be positive but greater when an advertising campaign has been made; this is why

$$\Delta \Pi_1 > \Delta \Pi_2 > 0^3.$$

This in turn implies that advertising entails a price change, which, however, has nothing to do with the change in market shares per se[4]. These remarks concerning the seller, complete the formulation of our problem. Under such a formulation, buyers perceive advertisement as a signal of brand quality. That is, the consumer is interested not that much in the content of the advertisement as in whether a brand is actually advertised. The consumer is simply aware that no seller will ever speak against his product. This approach to the advertisement of quality is not only in line with the nexus between reputation and firm-specific disequilibria but yields also some non trivial results.

To obtain these results, note that our problem is a 'signaling game' with four candidate equilibria as possible solutions. The first solution is called «pooling equilibrium» of advertising regardless the direction of market share change. In this case, the consumer would choose to buy if,

$$p\Delta U_1 + (1 - p)\,\Delta U_3 > p\Delta U_2 + (1 - p)\,\Delta U_2 = \Delta U_2,$$

i.e. if the expected change in utility from choosing to buy exceeds the change in utility from not buying the advertised brand, and buying instead the well-known brand. To determine whether the seller is willing to advertise in both types of market share change, we have to know how the buyer would react if no advertising were taking place. If the buyer's response to no advertising is to buy, response that would be prompted were,

$$q\Delta U_1 + (1 - q) \Delta U_3 > q\Delta U_2 + (1 - q) \Delta U_2 = \Delta U_2,$$

it is still to the best interest of the seller to advertise regardless the direction of the market share change, because $\Delta \Pi_1 > \Delta \Pi_2$. But, if the buyer's response to no advertising is not to buy, the seller should not advertise in order to maintain $\Delta \Pi = 0$ and avoid $\Delta \Pi < 0$. Thus, if there is an equilibrium in which the seller advertises regardless to what happens to his market share, i.e. in which there is 'pooling on advertising', then the buyer's response to no advertising must be to buy. By the same token, 'pooling on not advertising' would constitute a second pooling equilibrium were

$$q\Delta U_1 + (1 - q) \Delta U_3 < \Delta U_2$$

and

$$p\Delta U_1 + (1 - p) \Delta U_3 < \Delta U_2,$$

i.e. were the consumer to choose not to buy anyway, since $\Delta \Pi = 0$ is better than $\Delta \Pi < 0$.

A simple inspection of Figure 1 would suffice to arrive at these conclusion, because they are really a matter of common sense. The same holds for the so-called «separating equilibria». Indeed, a third strategy for the firm would be to advertise, when the market share expands, and not to advertise, when the market share shrinks. Under this separating strategy, the consumer's best response would be to buy, when there is advertising, and not to buy, when there is no advertising[5]. We would have a separating equilibrium if the consumer would not choose to buy were the seller to adopt pooling on advertising. Not buying means under separation that $\Delta \Pi = 0$, which is preferred to the $\Delta \Pi < 0$ of pooling on advertising. Nevertheless, a separating equilibrium will not exist, if the separating strategy is reversed. Advertising when the market share declines and not advertising when the market share increases does not make sense, since the consumer will choose not to buy, when there is advertisement; simply $\rho = 0$ and $q = 1$. Not buying means, under this type of separation, that $\Delta \Pi < 0$, which

is less than the $\Delta\Pi= 0$ of pooling on not advertising. In sum, if the brand has a good reputation, i.e. if consumers would buy it regardless the presence of advertising, then the brand's seller should advertise. If the brand has little reputation, its seller should either avoid advertising or follow the separation of advertising under a rising market share and refraining from advertising when the market share declines.

These results are important, because they suggest that advertising is a means of increasing profits in line, e.g. with the Dorfman - Steiner condition, and not a means of shaping consumer preferences. Advertising simply exploits these preferences to amnipulate the market share. Buying a brand regardless the presence of advertising, implies a price inelastic demand for it, and the seller of the brand exploits this fact in order to increase his profits via the use of the Dorfman-Steiner condition. On the contrary, if a brand does not sell well, advertising can do little in improving its image, i.e. it can not change the elasticity of its demand from low to high, and hence, it should not be pursued especially in view of its costline. The separation strategy is more flexible, because is takes advantage of the changing circumstances. Yet, the merits of this strategy should be reassessed by incorporating into the discussion the switching costs incurred by the consumer when shifting from one brand to another[6]. An additional insight into the nature of our findings may be obtained through the following arithmetic example. Fixing arbitrarily the values of ΔU to $\Delta U_1 = 20$ and $\Delta U_2 = 15$, and varying the values of ρ and q, one finds that the conditions,

$$p\Delta U_1 + (1 - p) \Delta U_3 > \Delta U_2$$

and

$$q\Delta U_1 + (1 - q) \Delta U_3 > \Delta U_2 ,$$

are satisfied by the values p>0.67 and q>0.67, when $\Delta U_3 = 5$, and by the values p>0.5 and q>0.5, when $\Delta U_3 = 10$. that is, the strength of consumer beliefs that makes advertising worthwhile, becomes weaker (p declines from 0.67 to 0.5) as the would-be disappointment from consuming the advertised brand becomes smaller *(ΔU_3 rises from 5 to 10)*. This suggests that advertised brands should really offer to the consumer something original, and if not, then offer what more or less the rival brands do[7].

3. Concluding Remarks

The theory of industrial organization rightly treats the issues of quality, brand, reputation, and advertising, as different entities, without denying the presence of similarities and connections between them. This paper was based on these similarities and connections to derive analytically certain empirically useful propositions. Each firm in an industry was supposed to be producing only one brand, and each brand was hypothesized to be of different quality; quality in turn was assumed to be what lends reputation to a brand. These assumptions were used next to examine via a signaling game the issue of when to advertise in order to manipulate the market share so as to maximize profits, and hence, so as to take care of shortages or surpluses for a brand. The main result of this examination has been that good reputation constitutes a prerequisite for a successful in terms of profits advertising. This and the other results of the analysis should be appreciated in the light of the assumptions that underlie them.

Thus, in an industry, a single firm may be producing more than one brands, as was the case, for instance, with the industry of breakfast cereals in the United States, case that induced the intervention of the antitrust authorities and a theoretical analysis of brand proliferation by Schmalensee (1978). Also, two brands may be of the same quality, but differ with respect to e.g. the services offered to customers. For example, some computer companies offer a variety of free programming services; others do not. Moreover, in lines of products such as proprietary drugs, deodorants, frozen dinners, cosmetics, soaps, hair bleaches, cake mixes, dog and cat foods, etc., the difference in quality between two brands is usually negligible, and this is perhaps why these industries are accompanied by especially high promotional outlays (see e.g. Martin, 1993). Although the nexus brand-quality advanced in this paper is broad enough to cover cases like these, the last two examples illustrate the fact that reputation is not necessarily a matter of quality. Another example of this fact is the case of appliances, where the poor performance of any single appliance brand may affect adversely the reputation of the other appliances produced by a manufacturer.

Such in general considerations do not attest to our conclusion that reputation is a prerequisite for advertising, and if, in the bottom line, there were no trademarks and image differentiation, how would the consumer know which product(s) maintain adequate quality standards. This in fact is what leaves room for the advertisers to convey deceitful information about their products, since if the consumer knew the true qualities of an advertised commodity, its promotion should be designed accordingly. Finally, a central assumption behind our results

was the Dorfman-Steiner condition, and in general, the assertion that advertising is profitable whenever the consumer is inclined to buy a brand.

Such an assertion has a strong empirical backing, save the case of mutually canceling advertising by rival brand (see e.g. Scherer, 1980). Nevertheless, this exception and the other examples of this section suggest that further research into the subject matter in hand is needed in order to obtain some conclusive results. Indeed, this has always been the case with the theory of industrial organizational because of the complex nature of the issues studied by this area of economics.

Footnotes

1. To be more specific, the questions raised in this paper have been investigated empirically by focusing attention on whether it is the advertising that induces high profits (Comanor and Wilson, 1967) or the opposite (Buzzell and Farris, 1977). This paper starts its theoretical analysis by reconciling these two theses, by assuming that a temporary increase in profits induces advertising (in line with Buzzell and Farris) and then asking whether advertising can make this increase permanent (in line with Comanor and Wilson). There are two reasons why we can not follow the opposite route of assuming that advertising increases profits temporarily and then asking whether this increase can induce further advertising: Firstly, advertising is a means and not the target of seller behavior. Secondly, we would postulate beforehand that advertising can shape consumer preferences, and methodologically this is not desirable.

2. Shortages or surpluses are inconsistent with profit maximization.

3. For the Dorfan-Steiner condition see their 1954 seminar paper. This condition is a well-known theoretical proposition, which simply states that advertising is designed so as to be optimal from the viewpoint of profit maximizing. This is not the same as the empirical finding that advertising is profitable, a finding which, as explained in footnote 1, is inconclusive and can not be used here.

4. On this see e.g. Scherer (1980) or Martin (1993).

5. Simply $p=1$ and $q=0$.

6. The examination of this possibility lies beyond the scope of this paper, especially in view of the fact that the study of switching costs involves a different type of modeling (see e.g. Basu, 1993).

7. This result is really a variant of Hotelling's (1929) well-known «principle of minimum differentiation» in location economics.
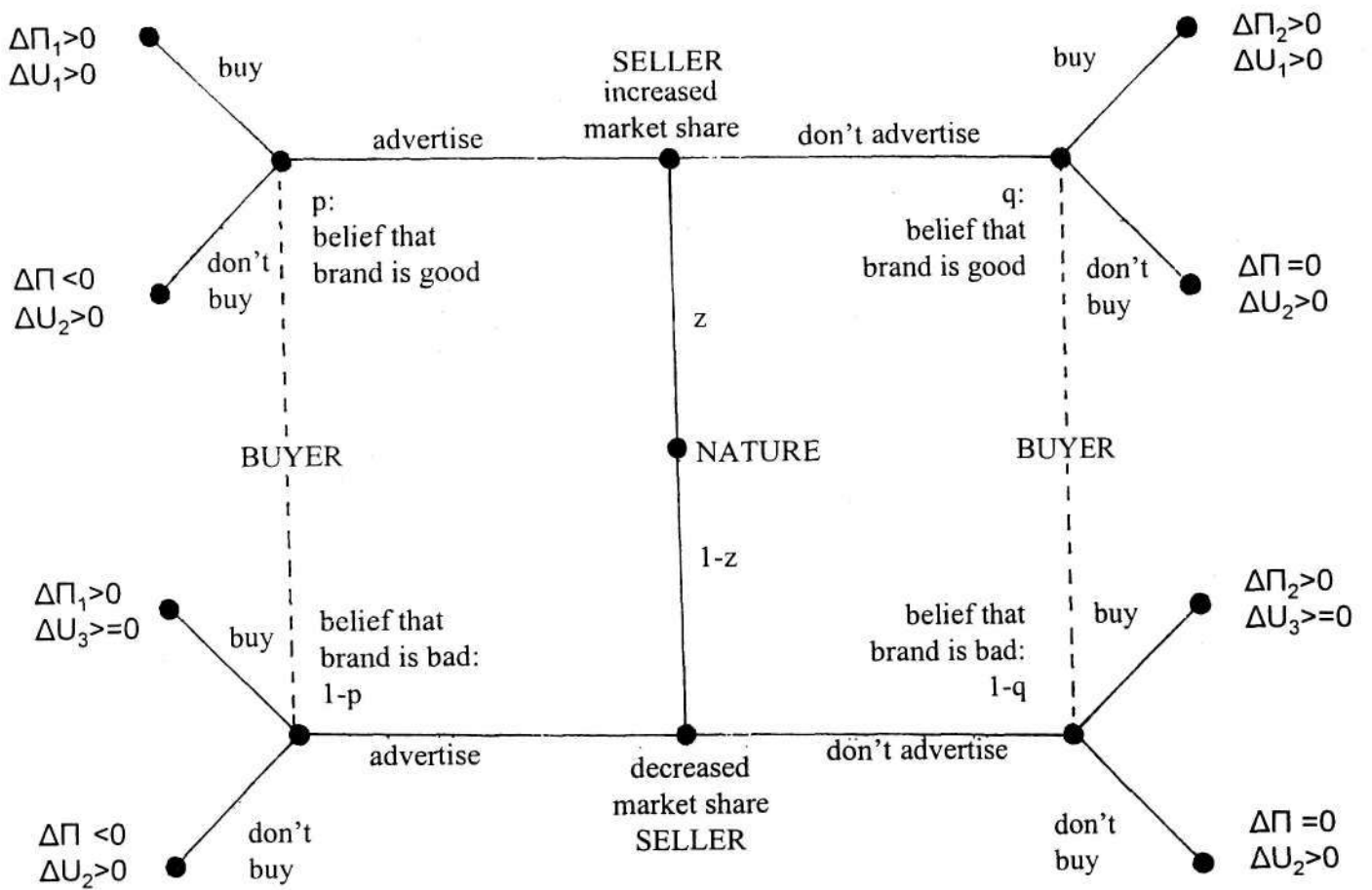
$\Delta\Pi_1 > 0$
$\Delta U_1 > 0$

buy

SELLER
increased
market share

advertise

don't advertise

buy

$\Delta\Pi_2 > 0$
$\Delta U_1 > 0$

p:
belief that
brand is good

q:
belief that
brand is good

$\Delta\Pi < 0$
$\Delta U_2 > 0$

don't
buy

don't
buy

$\Delta\Pi = 0$
$\Delta U_2 > 0$

z

BUYER

NATURE

BUYER

1-z

$\Delta\Pi_1 > 0$
$\Delta U_3 >= 0$

buy

belief that
brand is bad:
1-p

belief that
brand is bad:
1-q

buy

$\Delta\Pi_2 > 0$
$\Delta U_3 >= 0$

advertise

decreased
market share
SELLER

don't advertise

$\Delta\Pi < 0$
$\Delta U_2 > 0$

don't
buy

don't
buy

$\Delta\Pi = 0$
$\Delta U_2 > 0$

Figure 1: A Signaling Game of Advertising and Markets Share

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