

**Effects of Advertising on Market Structure, Product Quality search Goods
and internet**

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Abstract

This study investigates the contributions on the effects of advertising on market structure, product quality, search goods and the internet. This review is done both at the theoretical and empirical levels. In the analysis of the contributions of economists on the effects of advertising to market structure, we review the Dorfman-Steiner model; also is analyzed the Schmalensee model concerning the effects of advertising on product quality as well as the Butter's model concerning the effects of advertising on search goods. We also review the Chatterjee-Novak-Hoffman model for internet advertising. Our finding is that economists are more and more interested in using econometric tools in order to capture the effects of advertising on the economy and to analyze the behavior of consumers towards internet advertising.

1. INTRODUCTION

Some topics in economics generate passionate debates. The role of advertising in competition and in a monopoly context produces numerous areas of discussion, including the effects on companies' profitability, prices and product quality. Advertising is a subtle and difficult subject, with important effects that remain imperfectly understood.

For some economists, advertising is the mass paid communication, the ultimate purpose of which is to import information, develop attitudes and induce action beneficial to the producer. For others, including Kaldor (1950, 1951) and Stiglitz (1968), advertising has two distinct roles: to provide information and to act as a competitive tool. According to the above ideas advertising provides information concerning prices and qualities of goods and services available in the market. In the same approach, Shy (1995) defined advertising as a means of providing information about price, quality, and location of goods and services. Telser (1964), Nelson (1970, 1974) and Demsetz (1979) propose that advertising serves as a tool to transmit information from producers to consumers about differentiated brands, which reduces consumers' search costs. Thus, advertising informs consumers about products and product attributes. All these theories imply that advertising aims to increase profits. But in general, advertising is a collective term for public announcements designed to promote the sale of specific commodities or services. It is therefore a form of mass selling, employed when the use of direct, person-to-person selling is impractical, impossible, or simply inefficient. It is to be distinguished from other activities intended to persuade the public, such as propaganda and public relations.

Advertising techniques range in complexity from the publishing of simple straightforward notices in the classified-advertising columns of newspapers to the

concrete use of newspaper, magazines, television, internet, radio, direct mail, and other communications media in the course of a single advertising campaign. From its unsophisticated beginning in ancient times, advertising has burgeoned into a worldwide industry: consumer advertising directed to the ultimate purchaser, and trade advertising is then to persuade consumers to purchase the goods in question rather than to provide genuine information as to its value. In this sense, advertising helps consumers to differentiate products of one firm from those of its competitors. It is a method, therefore, of reducing the scope and effectiveness of price competition by attaching a strong element of 'goodwill' to each firm.

Both consumers and trade advertisers employ many specialized types of commercial persuasion. A relatively minor, but important form of advertising is institutional which is designed solely to build prestige and public respect for particular businesses considered as important to institutions of the Countries. Another form is cooperative advertising in which the manufacturer shares the expense of local radio or newspaper advertising with the retailer who signs the advertisement. National advertisers occasionally share the same space in magazine advertising. For example, makers of pancake flour, of syrup and of sausages sometimes jointly advertise this combination as an ideal cold-weather breakfast. We can also say that advertising differs from other forms of information outlets in two respects. First, the selling party transmits product information. Secondly, the purchasing party does not always have to pay to receive this information (or pays just a little in terms of the value of time spent on watching TV advertisement or on sorting out relevant advertising in a Sunday newspaper). In view of the current focus on advertising, it is important to mention that advertising did not capture the attention of most scholars two

centuries ago. The reason is that, in the 19th century, economists were busy putting the basics of the perfectly competitive market and did not think about developing a model of advertising.

The objective of this paper is to review the theoretical and empirical contributions of economists on the effects of advertising. We start by presenting the background of the history of advertisement, and then we review the theoretical contributions on the effects of advertising on the market structure, product quality, search goods and the internet. We also focus our attention on the empirical review related to these variables by analyzing some selected contributions of authors on the matter.

2. Background of issues

During the period of the technological advances in communication and transportation in late 19th and early 20th centuries, it became possible for manufacturers to achieve the scale economies that are associated with mass production. Large-scale brand advertising then began to appear, since it represented an important means through which a manufacturer could stimulate demand for its brand.

The first contribution on the topic came with Marshall (1890, 1919) who mentioned two distinct roles of advertising:

- 1) Providing information to consumers.
- 2) Serving the interest of the producer.

In this reflection, we notice that advertising has a positive role and a negative role, unfortunately, Marshall did not integrate those reflections in the context of microeconomic theory.

In his theory of Monopolistic competition, Chamberlin (1933) filled this gap by modeling advertising expenditures as a “selling” that shifts out the downward-sloping demand for the firm’s differentiated product. For him advertising may provide information to consumers, and can also be persuasive and work to alter consumers’ wants. Informative advertising enables consumers to better respond to price differences and thus increases the elasticity of demand, but persuasive advertising creates brand loyalty and thereby reduces the elasticity of demand. Scale economies play an important role in Chamberlin’s theory, and he argues that such economies may exist both in production and advertising. Working with these ingredients, Chamberlin argues for a monopolistically competitive equilibrium, in which the firm’s demand curve is tangent to its U-shaped average cost of production and selling. In this context, Chamberlin explains that the net effect of advertising on prices cannot be determined by theory alone, since the overall effect is influenced by the extents to which;

- 1) Advertising is informative or persuasive, and
- 2) Scale economies in production and advertising exist.

But in general there are three known competing theories; the “market power” school of thought, the information school of thought, and in between the complementary school.

According to the market power school, advertising reduces price elasticity and consequently shrinks the advertiser’s market power and alleviates competition (Comanor and Wilson, 1979). Ornstein (1977) contributed to the debate by identifying brand loyalty as the intermediary variable, which helps to explain how advertising lowers price elasticity. Thus advertising in this school of thought differentiates brands and creates “durables brand loyalty”. The advertised product thus faces a less elastic demand. This

elastic effect suggests that advertising causes higher prices, though this influence may be moderated by the presence of production scale economies. Going beyond Chamberlin's discussion, the persuasive view holds further that advertising may deter entry. Consumers are reluctant to try new products of unknown quality, and this experience-based asymmetry between established and new products may be exacerbated in the presence of heavy advertising by established firms, therefore consumers become less sensitive to price as they perceive fewer substitutes for the advertised brand. Advertising may be particularly effective in this regard if there are scale economies in advertising or production. Many economists have contributed to this school of thought, among whom Robinson (1933) believes heavy advertising expenditures required of potential competitors to overcome brand loyalty constitute a barrier to entry. Braithwaite (1928) developed the basic concept of this school (called the persuasive view) in a seminar paper. Kaldor (1950) extended the concept and added that advertising leads to a more concentrated market, due to the presence of scale economies in advertising. The first empirical work on the issue was offered by Bain (1956) and Comanor and Wilson (1967). The alternative theory, the "advertising as information" school, holds that advertising enhances price elasticity by exposing consumers to an increased number of alternatives (Nelson 1974, 1975). According to the informative school advertising affects demand by conveying information. The advertised product thus faces a more elastic demand. This elasticity effect suggests that advertising causes lower prices, an influence which is reinforced when production scale economies are present. The informative school suggests further that advertising may provide the indirect information that the quality of the advertised product is high. The informative view holds that advertising is not used by

established firms to deter entry; instead, advertising facilitates entry, since it is an important means through which entrants provide price and quality information to consumers.

Many economists who developed an economic theory of information revealed that a reduction in consumer's cost of obtaining price information would tend to reduce the mean and variance of prices. Since that time, economists have viewed the availability of price advertising as an important aspect of consumers' cost of obtaining price information and consequently are of the opinion that the introduction of that stimulation into a market would reduce the mean and variance of prices.

The foundation for the informative school was laid by Ozga (1960) and Stigler (1961). In an early empirical effort, Telser (1964) looks across U.S consumer goods industries and reports evidence that advertising serves mainly to facilitate entry. Stigler and Stiglitz (1968a, 1968b) of the University of Chicago led the information school of thought through many contributions. For them, advertising informs consumers about products and product attributes. Advertising makes entry possible for new brands by making consumers aware of new products and attributes. Nelson (1970) makes the distinction between experience goods and search goods. Nelson (1974) further explains that a high level of advertising provides indirect information that the advertised good is of high quality, for the three reasons given above. This signaling role for advertising is of particular significance for experience goods. As Nelson (1974, 1975) and Demsetz (1973) explain, a finding that profitability and advertising are positively associated may indicate only that firms of superior efficiency advertise more.

Finally, the complementary school of thought developed the theory according to which advertising influences the consumer's utility function. This theory distinguishes itself from the market power school in the sense that it holds that consumers possess a stable set of preferences into which advertising enters as one argument. Also, the complementary school is distinct from the information view since under the complementary view, advertising may affect consumer demand even if it contains no information. Another contribution of the complementary school is that, the fixed-preferences assumption permits a straightforward welfare analysis of seemingly persuasive advertisements.

The theoretical basis for this school of thought was put in place by Stigler and Becker (1977), although important elements of the theory are also found in Telser's (1964) and even Kaldor's (1950) work. The mechanism underlying both theories is the impact of advertising on the price elasticity of demand. Benham (1972), whose study results have been continually confirmed by Kwoka (1984) and Hass-Wilson (1986), suggests that advertising decreases price sensitivity at both levels (monopoly and duopoly) while controlling for quality. This study was conveyed in the eyeglasses market. In contrast, Gatignon (1984) found that advertising increases price sensitivity at the firm and industry levels. Also, advertising influences barriers to entry since it creates and reduces them. It also leads to economies of scale; by allowing only heavy advertisers it enables efficient firms and affects consumers' price sensitivity. Important contributions are also offered by Fisher and Mc Gowan (1979), Nichols (1985) and Hockman and Luski (1988). Becker and Murphy (1989) provide a thorough defense of the complementary approach.

Finally, the complementary school of thought developed the theory according to which advertising influences the consumer's utility function

3. THEORETICAL CONTRIBUTIONS ON THE EFFECTS OF ADVERTISING

3.1. Advertising and markets structure

3.1.1. The Dorfman and Steiner model

Dorfman and Steiner departed from Abbot's (1953) conclusion on the principles of quality competition, and approached the problem from a broader point of view using optimization techniques. Then, they set theorems (see first theorem and proof in Appendix 1) concerning the joint optimization of the advertising budget and price and the joint optimization of quality and price. According to these theorems, the optimal price-quality for a firm can influence its sales by modifying either the quality of its products or its price.

Thus, the general level of quality in any market depends on the relative magnitudes of two market characteristics and one technical characteristic of the product. Quality tends to be higher the greater the sensitivity of consumers to quality variation, and the lower the effect of quality changes on average costs. Dorfman and Steiner (1954) consider the endogenous determination of price, advertising and quality. They show that a profit maximizing firm sets advertising at a level so that the marginal revenue from advertising equals the ordinary elasticity of demand for the firm's product. Their work stands in contrast to the structure-conduct-performance approach, initiated by Bain (1956), which regards advertising more as a structural characteristic that determines the extent of product differentiation and thereby profits.

Once advertising is regarded as endogenous, however, it is apparent that other underlying structural features (low production costs, poor consumer information) may simultaneously determine advertising and profits. The result of Dorfman and Steiner (1954) was concentrated in this equation: $AS / PQ = \eta_s / \eta_p$.

This result shows that the profit-maximizing combination of price and advertising is one where the amount spent on advertising (AS) as a proportion of total revenue (PQ) equals the elasticity of demand with respect to advertising (η_s) divided by the elasticity of demand with respect to price (η_p).

3.1.2. Other contributions

Chamberlin and Kaldor introduce the notion of advertising scale economies. As Spence observed, advertising affects demand and prices, and for this reason, the formal definition of scale economies under advertising is subtle. Spence's approach is to think of advertising and output as inputs in a 'production function' that generates revenue. An overall economy of scale is then associated with the situation in which the cost per dollar of generating revenue is lower at higher levels of revenue. The presence or absence of such a scale economy in turn is determined by various demand and average-cost elasticity.

Schmalensee (1983) developed a strategic model in which the entry-detering implications of advertising may be directly analyzed. He considers a two-stage model. In period one, an incumbent firm sends out advertisements to consumers. The advertisements contain the incumbent's location and phone number, so that a consumer who receives such an advertisement is forever informed of the incumbent's existence and price. An entrant appears in the second period. The act entry involves a fixed cost. If the

entrant incurs this fixed cost, then it sends out its own advertisements, and the firms then engage in a post-advertising oligopoly game. Given that advertising is a durable investment and the entrant faces a fixed cost, it is tempting to reason by analogy with Dixit's (1980) famous entry-deterrence model and concludes that the incumbent over-invests in advertising in order to deter entry. But this analogy is false. The incumbent best deters entry with a reduced advertising expenditure. Intuitively, if the incumbent were to advertise extensively, there would be many consumers that were informed only of the incumbent's product. The incumbent would be tempted to price high (set a low output) and enjoy high profits on these "captive" consumers. The entrant would then rationally perceive that the incumbent would be a "soft" competitor for those consumers who are informed of both firms.

Bagwell and Ramey (1987) consider a model in which the incumbent's pre-entry pricing and advertising choices may signal its costs of production. Entry is profitable if and only if the incumbent has high costs. The low cost incumbent therefore seeks to signal its costs in the most profitable manner. If advertising is dissipative, then the low-cost incumbent signals most profitably by distorting its price downward and its advertising upward. Intuitively, an increase in demand is relatively appealing when costs are low, and so the low-cost incumbent signals most profitably by distorting price and advertising in demand-increasing directions. Limit pricing and demand-enhancing advertising can therefore deter (unprofitable) entry. This extends the famous Milgrom-Roberts (1982) limit-pricing model to include advertising.

Shaked and Sutton (1987) treat advertising and concentration as endogenous variables that are determined by the nature of technology and tastes and the size of the market.

They begin with a "fragmentation" result. Suppose that firms play a two stage game. In the first stage, firms enter or not, where entry requires that an exogenous sunk cost be incurred and entering firms choose as well a location along the line. In the second stage, entering firms compete in prices. As the market size (the total number of consumers) gets bigger, the market structure must fragment: all firms obtain a smaller market share. They next modify the first stage and suppose that firms choose horizontal and vertical attributes, where a higher vertical attribute is associated with an increased sunk cost. For example, advertising and product R&D may result in an enhanced vertical attribute, and the associated sunk cost is now endogenous. Conditions are then given under which the equilibrium market structure does not fragment. A large market size is thus compatible with a concentrated structure, for industries in which firm's can offer greater product value through increased advertising.

According to Bierman and Fernandez (1998, p.11), Nicholson (1995, p.679) and Waldman and Jensen (1997, p324), the duopoly market tends to diminish prices and the follow-on profitability in the non-cooperative case. For recent examples, see Bierman and Fernandez (1998, P.11), Nicholson (1995, p.679) and Waldman and Jensen (1997, p324). Devine and Marion (1979) demonstrates the negative correlation between mean and variance of prices and advertising. Both theories are subject to test by estimating sales response functions in different markets, followed by measuring the impact of advertising on price elasticity (Comanor and Wilson 1979). Consumers in the duopoly markets compare prices and inefficient firms are driven out. Prices decreased as competitors prevent firms from dictating prices.

3.2 Advertising and product quality

3.2.1. Schmalensee's model

Schmalensee's model presents a model with a single market in which goods of different qualities are sold and sellers advertise noncooperatively, knowing rivals' outlays and buyers' behavior patterns. Buyers react plausibly but not optimally to experience gained by purchasing and to sellers advertising. Various properties of equilibria are analyzed

Two opposed forces are central to the model. On the one hand, high quality brands by definition enjoy high (conditional) repeat-purchase probabilities. This increases the present value of returns and, *ceteris paribus* yields high markets share in equilibrium. On the other hand high quality brands have high unit costs if $\gamma > 0$ (unit cost). This makes advertising less profitable and tends, *ceteris paribus* to raise equilibrium shares. The most surprising result of this model is that poorer brands receive larger market shares if and only if elasticity of unit cost is greater than one ($\epsilon \gamma > 1$). In other words, if buyers read Nelson (1974), and seriously attempt to purchase the most heavily advertised brand, equilibrium is likely to be instable than if they are skeptical of advertising and behave accordingly. A universal belief that advertising conveys quality information may serve to worsen market performance. Subsequent discoveries showed that if equilibrium is perverse, better brands advertise less and earn more profits than poorer ones. Thus contrary to Nelson (1974), advertising levels do not necessarily provide correct information about quality. Since market share and quality are positively related in the absence of advertising and since there is equilibrium with advertising in which the relation is negative, the gross effect of advertising may be to worsen performance. Since advertising consumes resources, its net impact is *a fortiori* negative in such cases, and it

will cause a net loss even in those cases in which it promotes a positive association between quality and sales.

The model analyzed embodies a number of very strong assumptions. On the supply side, prices of competing brands differ in many markets, and quality may be endogenously determined by firms with different costs functions. Real buyers have better memories than buyers in this model though humans do forget and some forgetting may be sensible if product qualities are thought likely to change over time. Buyers may probably experience more than two degrees of satisfactions. If they are strongly dissatisfied by a particular brand, they may avoid purchasing it regardless of its advertising. The quantity purchased may depend on price and market experience. Finally, advertising is not the only information source that buyers employ to supplement their own experience.

3.2.2. Other contributions

With respect to the advertising-quality relationship, preliminary research on the issue indicates that there is generally no correlation between advertising expenditures and quality enhancement. However, perceived quality positively correlates with advertising spending, especially for frequently purchased goods (Moorthy and Zhoo, 1994). Advertising can convey quality information if data about a firm's sunk costs is indeed integrated into advertising expenditures.

As Kihlstrom and Riordan (1984) emphasize, a weakness of Schmalensee's formulation is that consumer behavior is ad hoc. They thus consider whether advertising signals quality in a model with rational consumers. In particular, they assume that quality is either high or low and that firms are competitive price takers, where the price that is "taken" may differ depending on whether a firm is perceived to offer a high or low

quality product. Advertising can be understood as an “entry fee” that is necessary to enter the high-quality market.

Milgrom and Roberts (1986) consider a monopolist that chooses advertising and price in order to signal its product quality. Their findings may be understood in the following terms. Suppose that the marginal cost of production rises with quality. When the monopolist raises its first-period price, its sales in the first period decline (holding all else constant). This first-period effect is less painful for a high-quality monopolist as the monopolist then has a higher marginal cost. The price hike also reduces sales, for the same reason. The price hike also reduces sales in the second period, since there are then fewer satisfied consumers that emerge from the first period. This second-period effect may be more painful for a high-quality monopolist, because a greater fraction of its first-period consumers would have had a satisfactory experience. Due to these offsetting effects, it may be that the cost of a price increase is equalized across the low and high-quality monopoly types. As both types also experience the same cost from advertising, the monopolist may have no better alternative than to use both a distorted price and a positive advertising expenditure when signaling high quality. By contrast, if the marginal cost of production falls with quality, then the cost of a price hike is greater for a high-quality monopolist. In this case, advertising is not used as a signal, since the high-quality product is best signaled with a low price.

Hertzendorf (1993) extends the analysis in another direction. He allows that consumers observe the monopolist’s advertising expenditure with error. By contrast, price is perfectly observed. If no advertising is observed, then it may be unclear whether the firm failed to advertise or the consumer failed to observe the advertising. When consumers are

unable to distinguish between these possibilities, if the monopolist's price reveals quality, then the monopolist will not use advertising as a simultaneous signal. Intuitively, if the monopolist were to use advertising, then it could deviate to a lower advertising level, without being detected and without altering the consumers' belief (since price already reveals quality).

Advertising may be used, however, when the monopolist's price is independent of quality. When repeat-business effects are sufficiently large and/or marginal cost does not rise too swiftly with quality, the high-quality monopolist advertises to a greater extent.

3.3 Advertising and Search goods

3.3.1. Butters' model

According to Butter (1977), one difficulty in developing the analysis is that there are many types of markets, varying according to the structure of information flow. The interaction of the factors below in parenthesis and others are involved in determining prices dispersion and it is not obvious which factors and interactions will be singled out as the building blocks of the model (the degree of centralization and the homogeneity of the good traded, the type of services provided jointly with the good together with the number of actual and potential buyers and sellers as well as the volatility of parameters affecting supply and demand and the time span of the market and the geographic location of the market).

His paper works within a context of a given market structure without questioning seriously why that particular structure exists. Specifically, he assumes there are many buyers and sellers of a homogenous good and that sellers set the price. One can picture a competitive retail market. He develops a model in which sellers have constant average

costs curve, buyers are transient and buy one unit each in a single purchase, and the only possible information flow is through advertising. He then introduces the possibility of consumer search, and discusses the market's efficiency in transmitting the information.

He also makes a number of assumptions:

- 1) Some sellers do not know the price distribution: they may believe that raising their price may drive away some customers.
- 2) Consumers do not know the price distribution
- 3) He drops the assumption of sellers' rationality, and then lets them have the possibility of subsidizing the customers or customers, may search elsewhere in reaction to the price rise.
- 4) Finally he assumes that some customers have zero search costs or some other sources of information.

In the model he assumes that advertisements are received and processed free of charge by consumers. In all variants of the model it turns out that there exists at least one Nash equilibrium. Advertisements are allocated randomly among consumers who simply choose the advertisements that offer them the lowest price. High-price sellers advertise more intensively than low-price sellers, partly because they must advertise more to get the same number of customers, and partly because the high prices generate sufficient revenues to pay for the extra advertising.

3.3.2. Other contributions

Grossman and Shapiro (1984) allow that firms are horizontally differentiated, so that advertising creates social surplus when a previously uninformed consumer learns of a product that is a better match. Firms fail to internalize the full consumer surplus gain that

is associated with their advertising, indicating that advertising is under-supplied. This is the only externality under monopoly, as in Shapiro's (1980) model. Robert and Stahl (1993) allow that consumers can also obtain price information by advertising, and consumers acquire price information by receiving advertisements and undertaking search. The unique price-dispersion equilibrium is characterized. In this equilibrium, the firm charges a high price that is not advertised or selects from an interval of lower prices. An interesting prediction is that advertising intensity is greater at lower prices i.e. Firms advertise products of lower quality more, for which they charge less prices and compensate these losses by charging high prices to high quality goods. Bagwell and Ramey (1994) consider the indirect information contained in non-price advertising by retail firms. Building on Nelson's (1974) insights, they note that advertising is most valuable to low-cost firms. Such firms also have the greatest incentive to offer low prices and large product variety.

Nelson (1970) distinguishes between two types of goods: search goods and experience goods. Search goods are those in which consumers can identify the quality and other characteristics of the product before the actual purchase. Note that this distinction is really clear-cut, since we cannot fully judge the quality of a tomato (commonly viewed as a search good) until we eat it, and we cannot fully judge the quality of the shirt until after the first wash. What Nelson claimed is that the effects of advertising may vary between these two groups of products, since consumers do not depend on information from the manufacturers to tell them about search products (because consumers find it by themselves).

3.4. Advertising and the internet

The unprecedented growth of the Internet has major implications for advertisers around the world. With the online population expanding at a rapid rate, the potential for online advertising has become huge. Strategies for success provide data and analysis concerning the growth of this new advertising channel and looks at the developing opportunities for online advertisers. According to the American Real Estate Society, "Already, in the US, there is an estimated online consumer population of approximately 94.8 million. This is forecast to increase to over 200 million in 2005. Similar levels of penetration are likely to be seen elsewhere with an estimated 189.3 million European consumers online in 2005..."

The unprecedented growth of the Internet has major implications for advertisers. The debate as to how successful internet advertising is consists of two separate issues: branding versus selling and impressions versus performance. Internet advertising is capable of branding because they are relatively simple to create. Even rich media banner advertising is still simple for programmers to create. Yet even the most simple banner advertising is a tool for creating brand awareness. Internet advertising is relatively inexpensive to develop. Not only are banners much less expensive to create than the television or radio advertising, but they even put direct mail to shame; and then there is the low cost of e-mail compared with traditional mail. Internet allows advertisers to access valuable background information on consumers through the use of cookies, click stream tracking, domain name recognition, and other means. The three major actions performed online: research, browsing, and purchasing all leave behind electronic trails of demonstrated interests that are incredibly valuable to advertisers.

Nowadays everybody, therefore, has some thoughts on the subject. The tendency is to judge advertising as good or bad, to single out advertisements that one likes or dislikes, to

wonder if advertising is worth the large sums of money spent on it, to question the contribution advertising makes to social welfare, and so on. Advertising research also aims to answer these questions mainly within the fields of social science. Advertising revenues have become a critical element in the business plans of most commercial web sites. Despite extensive research on advertising in traditional media, managers and researchers face considerable uncertainty about its role in the online environment. The benefits offered by the medium notwithstanding, the lack of models to measure and predict advertising performance is a major deterrent to acceptance of the web by mainstream advertisers. Given the enormous potential of this dynamic medium, academic investigation is sorely needed before cost implications and skepticism endanger the ability of the medium to generate and maintain advertiser support.

3.4.1. Modeling the clickstream: the Chatterjee-Novak-Hoffman model

These authors (2000) develop a framework which formally models the commercial “clickstream” at an advertiser supported web site with mandatory visitor registration. Consumers visiting such web sites conceptualize a deriving utility from navigating through editorial and advertising content subject to constraints. The clickstream represents a new source of consumer response data detailing the content and banner advertising that consumers click on during the online navigation process. Clickstream data allow us to investigate how consumers respond to advertising over time at an individual level. Such modeling is not possible in broadcast media because the data do not exist.

The approach used by these economists is that of modeling consumer response to advertising at an advertiser-supported publisher web site. They develop an econometric model to examine and predict consumer response to advertisement at a web site. Finally they use clickstream data of consumer navigation activity to estimate the model

3.4.1.1 Modeling consumer navigation

Consumer network navigation during a particular session includes visit(s) to one or many web sites until the consumer exits the web environment. The time between the consumer entry and exit from a web site is defined as the visit duration (or session duration if only one site was visited during the session). Popular advertising supported sites carry advertising for many sponsors, and one or more passive advertising on any page. Passive advertising for each sponsor may be placed (sometimes dynamically) on one or more editorial web pages at the site. Every time a consumer clicks on an internal hyperlink a record or "hit" is made for each of the files comprising the destination document in the server's access log. The content organized on web pages at an advertising-supported web site can be classified into three categories: editorial (includes pages with passive advertising for sponsor k , pages with passive advertising for competing sponsors and pages with no advertising), focal sponsor k 's active advertising pages, and active advertising pages of other sponsors. Navigating through content at the web site can be conceptualized as conferring utility to the consumer by providing information or intrinsic enjoyment of the browsing activity. The consumer's utility function for soliciting information at the web during a visit is given by:

$$V_i(\text{clickAdk}, \text{Ed}, \text{Padk}, \text{OthclickAd}, \text{Othpad}, \text{VCi}, \text{Ai}) \quad (1)$$

Where ClickAdk is the number of active advertising (ad) pages accessed for sponsor k, and Ed is editorial content browsed by the consumer during a particular visit. PAdk is the number of passive ad exposures which may affect the utility a consumer may obtain from clicking on a passive ad. OthPAd and OthClickAd represent the number of passive and active ads of competing sponsors viewed by the consumer's utility by clicking on active k. Ai stands for consumer specific demographic and unobserved psychological factors in utility. The duration of a visit (VDuri) is the sum of time spent interacting with editorial pages, the time spent interacting with focal sponsor k active advertising ($tad \cdot ClickAdk$) and time spent interacting with other sponsor active ad pages ($tothad \cdot OthClickAd$). Hence consumers can be assumed to maximize their utility subject to the time constraint

$$VDuri = Z + (tad) ClickAdk + (tothad) OthClickAd + (ted) (Ed + (ad + OthPAd)) \quad (2)$$

Where VDuri is the total time spent at a site by consumer i during the present visit, tad is average time spent at each active advertising page for sponsor k, and ted is average time spent at an editorial page. The demand equations show that the continuous optimum is given by

$$ClickAdk^* = c(Pad, OthClickAd, OthPAd, VDur, Ed, A) \quad (3)$$

Thus, the observed decision to click on a passive ad (i.e., to interact with the active ad) is a function of number of passive exposures, other sponsor passive and active ad exposures, editorial content accessed at the site, visit duration, and unobservable consumer-specific factors.

3.4.1.2 The Click response Model

Let PA_{dikt} denote the event that consumer i is exposed to the passive ad for sponsor k during visit t . If CI_{dikt} denotes the passive ad click decision by consumer i conditional on the consumer being exposed to passive ad (banner) then $CI_{dikt} = 0$ if a Chatterjee, Novak and Hoffman passive ad for sponsor k was not clicked on visit and $CI_{dikt} = 1$ if the passive ad was clicked and active ad viewed. Chatterjee, Novak and Hoffman assumed that the consumer click on sponsor k is passive ad indicates that the balance of benefits in satisfying the consumer's navigational goals is positive and that not doing so indicates that the balance of benefits is negative. If the editorial page has passive ads for more than one sponsor, the probability of clicking on passive ad for sponsor k , conditional on passive ad exposure ($PA_{dikt}=1$) and consumer entry ($Rit=1$), can be modeled as a multinomial logit function,

$$\Pr (CI_{dikt} = 1 / PA_{dikt} = 1, Rit) = (\exp V_{ikt}) / (\sum_{j \neq k} \exp V_{ijt}) \quad (4)$$

Rit denotes the consumer decision to enter the site. Note that the consumer has a choice of clicking on a passive ad for any one of the j advertisers on that page or not clicking on any ad at all, resulting in $(j+1)$ alternatives. The most advantageous format for the advertiser is a single passive ad on a web page, thus eliminating proximity clutter at the level of the web page. Since the ad-supported web site in this study had only one passive ad (i.e., banner), each of the passive ad on a web page can be modeled with the binary logit function.

$$\Pr(CI_{dikt} = 1 / PA_{dikt} = 1, Rit) = \exp(V_{ikt}) / (1 + \exp(V_{ikt})) \quad (5)$$

where the deterministic component of click response utility, V_{ikt} , is written as

$$V_{ikt} = \beta_0 + \beta X_{ikt} \quad (6)$$

The parameter β_0 is an intercept term, and β is a vector of response coefficients for variables X_{ikt} .

In their paper, these economists have proposed a model for predicting advertising click response at an advertiser-supported web site using clickstream data gathered at the individual level. Empirical analysis of clickstream data was used to study the effect of other advertising stimuli encountered by the consumer. The results suggest that increasing the number of same passive advertising insertions will lead to negative returns initially and level off at higher level of exposures. The negative impact will increase with increases in frequency of visit to the site. The publisher can accommodate many different advertisers at his site without adverse effects as long as a single passive advertising is placed on a page.

3.4.2. Other contributions

Yunjae and Leckenby (2004) present a comparison of the results between multiple regressions and structural equation modeling (SEM) in developing the model of attitudes toward the internet retailer. The relationships between “attitude toward the Internet retailer” and the “design, entertainment and presence (telepresence)” which consumers experienced with the Internet retailer from whom they recently purchased have been tested.

SEM is a statistical tool used for estimating and specifying models of linear relationships among variables (MacCallum and Austin, 2000). There are two kinds of variables --

measured variables and latent variables. Hypothetical constructs that can be indirectly measured are called latent variables. A structural equation model is a hypothesized model of directional and no directional linear relationships among measured variables and latent variables. The greatest value of structural equation modeling lies in its potential to advance theory development and testing in the field by modifying the way we make assumptions (Mackenzie, 2001). SEM can examine a series of interrelated dependence relationships simultaneously, but multiple regressions are restricted to investigating one single relationship at a time. Though multiple regression is helpful to investigate the relationships between independent and dependent variables, it cannot directly show potential relationships in a model interpreted substantively by theories, and simultaneously fit the data, as shown in our results.

Junwei (1999) presents an agent-based social modeling and simulation approach to evaluate the effectiveness of advertising. In order to model consumer behavior, a psychological process is added between the information-exchanging process (1) and a decision-making process (2). A demo version of Simulation Environment of Advertising (SEA) is developed to study the effectiveness of banner advertising on the internet and provide sample simulation results.

Using computer simulation technology to do advertising research aims to make other methods more efficient. To use agents to model the actors and agent negotiations to model interactions among these actors, Junwei mapped five kinds of agents: Consumer Agent (CA), Advertisement agent (AA), Product/service Agent (PA), Medium Agent (MA), and Environment Agent (EA). These agents negotiate with each other in the multi-agent system to simulate the interactions of actors in the real world. Each agent is

assigned with attributes and operations, which can be used to describe the agent's states and processes dynamically. The agents also need to retrieve model data from the databases. Traditional agents are supposed to be rational agents that can make decisions on when and how to negotiate with others and exchange information.

A modeling and simulation environment for advertising (SEA) is designed to implement the approach described in. The main components are the user interface, modeling tools, the simulation engine and the information filter.

4. EMPIRICAL CONTRIBUTIONS TO THE EFFECTS OF ADVERTISING

4.1. Advertising and market structure

For the theory to be useful, it must be helpful either in analyzing a particular industry or in identifying behavioral cross-industry regularities, (Shapiro 1989). Recent empirical work has tended to focus on the former, showing that firm's conduct and performance in a particular market can sometimes be explained using some chosen game-theoretic model. Representative example includes Bresnahan (1981), Slade (1987), Hendricks, Porter and Boudreau, Chang-Yang Lee. However, these ultra-micro studies remain unable to explain widespread empirical regularities.

The first important contribution came with the work of Comanor and Wilson (1967), followed by their review of many studies on the issue in 1979. Their 1967 findings are as follow: advertising has a statistically significant and quantitatively important impact upon profit rates which provide a measure of market performance as well as indicate the existence of market power. Their findings were in contradiction with Telsers' (1964) findings. This contradiction is a reflection primarily of differences in the conceptual and

statistical approaches adopted rather than differences in data or samples. With minor exceptions; they used the same set of industries and drew upon the same basic data for advertising outlays. As their survey indicates, a positive association between advertising intensity and profitability is observed in a number of studies, although there are important questions concerning the interpretation of this finding and there are also important issues associated with the measurement of profitability.

Gasmi, Laffont and Vuong (1992) launched a new methodology for studying rivalry between firms in pricing and advertising. They illustrate their approach using data on the Coca-cola and Pepsi-cola markets over the period 1968-1986. A demand function is specified for each product, where sales depend on own and rival prices and advertising selections. Marginal cost is assumed constant, and its value is specified to be linear in measurable input variables. Given demand and cost specifications the authors derive four first order conditions, corresponding to optimality conditions for each firm in price and advertising. Where the parameters of these conduct equations take different restrictions, different oligopoly games are deposited. Their analysis suggests that Coca-cola was a Stackelberg leader in price and advertising until a mid-sample period (1976), after which duopoly conduct is characterized by collusion in advertising and competition in price. In this contest, they report that Soft-drink advertising is quite predatory, as increased advertising by one firm tends not to broaden the cola Market and works rather to redistribute market share toward the advertising firm.

Sutton emphasizes the strategic choices of sunk costs in a simple and highly general framework, focusing on one simple relationship, the relation between market structure and market size. He uses cross-section econometric analysis and industry case studies to

test his predictions where the latter provide rather more qualitative evidence on the underlying competitive mechanisms. Homogeneous and advertising intensive (vertically differentiated) industries are analyzed. The general empirical results obtained complement and extend the ultra-micro studies. According to Sutton (1991), the experiences of individual industries can be mapped into special cases of a general theoretical model whose robust results drive the cross-industry regularities.

Reekey (1970) attempted to meet the first criticisms addressed to market structure in a study of thirty seven sub-market within the British pharmaceutical industry. What little heterogeneity was present in the industry was largely accounted for in a multi-variate analysis. The results obtained suggested that there was no relationship between market structure and advertising.

Sutton (1974) provided intuitively appealing arguments in support of the thesis that advertising intensity will be greatest at moderate levels of concentration and lower in unconcentrated and highly concentrated industries. On testing this hypothesis against data from samples of 25 and 22 consumer goods industries, he obtained statistically significant second degree equations, and coefficients of determination of 0.34 and 0.35 respectively. First degree correlation coefficients between the two variables were however negligible.

Kadiyali (1996) examines the U.S. photographic film industry over the period 1970-90. As she explains, Eastman Kodak Company had a virtual monopoly in this industry in the 1970s, but a mid-sample change occurred in the 1980s when Kodak accommodated entry by Fuji. Kadiyali constructs a data set that includes firm-level price, advertising, quality and input cost from the pre and post-entry periods. As in Gasmi, Laffont and Vouong

(1992), she puts forth a general model that specifies a demand equation, a pricing first-order condition and an advertising first-order condition for each of the two firms. For a posited game between the two firms, the parameters of the first-order conditions assume further restrictions, and so it is possible to determine the best-fitting game. Kadiyali reports evidence that Kodak maintained its monopoly position in the pre-entry period by using limit pricing and high advertising. As she notes, a possible explanation is that Kodak sought to signal low costs, as in the theories of Milgrom and Roberts (1982) and Bagwell and Ramey (1987). Kodak was compelled to accommodate Fuji by 1980, however, due to demand and cost advantages that Fuji enjoyed. In the post-entry period, estimates indicate that Kodak and Fuji were colluding in their price-advertising selections, with substantial weight given to Fuji's profits.

Slade (1995) analyses a dynamic model of price and advertising brand rivalry. Using weekly price, sales and promotional data for the brands of saltine crackers sold in grocery stores in a small town, she estimates demand and conduct equations, where the latter concern the probabilities of changes in prices and advertising efforts. Evidence is given that a brand's sales are decreasing (increasing) in own price (advertising), and increasing (decreasing) in rival-brand price (advertising). Slades argues that advertising is mildly predatory, in that rival-brand sales fall; however, it is not perfectly predatory in that total sales rise. The effect of advertising in the cracker market thus falls somewhere between the strong predatory effect of advertising in the soft drink industry that Gasmi, Laffont and Vuong (1992) report and the positive spill-over effect of advertising in the cigarette industry that Roberts and Samuelson (1988) report. Finally, Slades finds crossbrand

evidence that advertising efforts are strategic substitutes and prices are strategic complements.

In 1992, Bresnahan observed that industrial organization research was initially inductive in nature, with conclusions drawn from industry case studies. This changed with Bain, who articulated a deductive approach under which the implications of the theories would be tested across broad industry categories. This was followed by particularizing theory and then empirical work. Sutton following Bain adopts a deductive approach and looks for his key structural variables that yield predictions amenable to statistical evaluation. His structural variables are built on his work with Shaked, focusing on predictions that concern the manner in which the endogeneity of sunk costs and the toughness of price competition influence the relationship between market size and concentration.

In the food market, size varies considerably across countries and the food group includes industries with disparate advertising intensities, suggesting that sunk costs vary across industries. Bresnahan suggests a number of directions for new research and explained that Sutton find in this data much evidence that is consistent with his approach.

Chang (2002) derives a formal model of firm advertising behavior and applies it to the industry level to figure out the relationship between advertising and market structure. The firm advertising model shows that both consumer preference and firm-specific advertising competence jointly determine profit-maximizing advertising intensity. At the industry level, advertising intensity is represented multiplicatively by consumer preference and a measure of market structure, which reflects the joint distribution of the levels of advertising competence and market shares among firms. The new market

structure measure suggests that those single-dimensional measures of market structure such as seller concentration and the Herfindahl index are inadequate in explaining inter-industry differences in advertising intensity, and that the long debated advertising-concentration relationship differs depending primarily on the appropriability of advertising. An empirical analysis of 426 five digit Korean manufacturing industries suggests that an inverted U-shaped relationship between the Herfindahl index and industry advertising intensity for consumer goods but a weak relationship for producer goods industries.

4.2. Advertising and product quality

With respect to the advertising-quality relationship, preliminary research on the issue indicates that there is generally no correlation between advertising expenditures and quality enhancement. However, perceived quality positively correlates with advertising spending, especially for frequently purchased goods (Moorthy and Zhoo, 1994). Advertising can convey quality information if data about a firm's sunk costs is indeed integrated into advertising expenditures (Kihlstrom and Riordan, 1984). An extensive literature in information economics proposes that price and advertising will function as credible signals as long as sellers do not profit from conveying false market signals, for example, charging high prices for low quality.

However, the difficulty associated with modeling the issue explains why very few studies have tested directly the impacts of advertising on price and quality, both in monopoly and in duopoly markets. Eskin (1975) and Baron (1977) report negative interactions between advertising and price in an analysis of variance of field-market test data. The theoretical association between advertising and product quality is dependent upon the manner in

which marginal costs vary with quality. Direct tests are thus difficult, since marginal cost may not be easily observed. Nevertheless, the validity of Nelson's (1974) reasoning can be indirectly assessed by examining the actual correlation between advertising and quality in the market place. An early empirical study is offered by Tellis and Formell (1988). Using PIMPS (Profit Impact of Market Strategies) data, wherein a firm's product quality is measured on the basis of a (confidential) self-assessment, they find that advertising, market share and profitability are all positively associated with product quality, where the relationships are particularly strong in the later stages of the product life cycle. This evidence is broadly consistent with Nelson's reasoning.

Caves and Greene (1996) arrive at a different conclusion. For almost 200 product categories, they evaluate the correlations between brands' product quality ranking and advertising expenditures, where quality rankings are measured using consumer report data. They find that advertising and quality are generally uncorrelated among brands. Caves and Greene also convened a focus group, which provided ratings on the importance of different types of information that buyers can use when selecting a brand of each product category.

Thomas, Shane and Weiglet (1998) offer a careful assessment of the advertising quality relationship, using data from the U.S. automobile industry. They find that models priced higher than the full information price level tend to have higher advertising levels. Drawing on theoretical work by Bagwell and Riordan (1991) and Milgrom and Roberts (1986), the authors emphasize that these actions are consistent with the hypothesis that manufacturers of high-quality models signal unobservable quality attributes by setting prices above full-information levels and advertising expenditures beyond those incurred

by manufacturers of low-quality models. The signaling interpretation is further supported by the finding that these relationships are weaker for older models, about which consumers are already well informed. Finally, consistent with the repeat-business effect, they find that automobiles that experience higher sales 5 years after introduction are characterized by greater advertising in the current period.

Ginger and Leslie (1998) examine the effect of an increase in product quality information to consumers on firms' choices of product quality. In 1998, Los Angeles County introduced hygiene quality grade cards to be displayed in restaurant windows. They show that the grade cards caused:

- 1) restaurant health inspection scores to increase,
- 2) consumer demand to become sensitive to changes in restaurants' hygiene quality,
and
- 3) the number of food borne illness hospitalizations to decrease. They also provide evidence that this improvement in health outcomes is not fully explained by consumers substituting from poor hygiene restaurants to good hygiene restaurants. These results imply the grade cards caused restaurants to make hygiene quality improvements.

4.3. Advertising and Search goods

Consumers may conduct external search of personal and impersonal sources of information. Situation determinants that can constrain information search include the quantity and availability of information in the market place and time pressure (Beatty and Smith, 1987). Other factors that influence search behavior are product determinants and consumer determinants.

Product determinants include a variety and a type of product features. For example, if consumers perceive great differences between products, they are likely to make more comparisons. Also, products characterized by innovations may require consumers to update their knowledge since the last purchase through an information search process. For example, the relatively high price of real estate will create concerns about the financial risks involved in the purchase and lead to greater search (Kiel and Layton, 1981).

Benham (1972) showed that much can be learned from a well-designed empirical study. In the 1960's, important variations existed across the U.S. with regard to the legal status of advertising related to eyeglasses. Some States had no restrictions, other States prohibited price advertising but allowed non-price advertising, and some States prohibited all advertising. Comparing across States, Benham finds that prices were lower in States that had no restrictions than in States that prohibited all advertising. He also observes that prices were only slightly higher in States that prohibited only price advertising than in States that had no restrictions. These findings are consistent with the predictions of Bagwell and Ramey (1994).

Similar findings have been reported for variety industries. For example, Cady (1976) examines the effect of state-level restrictions on advertising on the retail price of prescription drugs. Like Benham, Cady finds that retail prices are significantly and positively related to advertising restrictions. In another study, Kwoka (1984) considers whether the ability to advertise results in a deterioration in product quality. Looking at the optometry industry, Kwoka compares the prices and qualities offered by advertising and non-advertising firms in the market where advertising is allowed with the prices and

qualities that emerge in markets where advertising is restricted. When advertising is allowed, non-advertising and especially advertising firms reduce price; furthermore, advertising firms decrease quality but non-advertising firms increase quality. Overall, average quality is higher in markets that allow advertising than in those that do not.

Some of the consumer determinants that affect individual search behavior include knowledge, involvement, beliefs and attitudes, and demographic characteristics. Studies found that product knowledge may be positively or negatively related to the amount of search (Beatty and Smith, 1987; Kiel and Layton 1981; Newman and Staelin 1972; Puni and Staelin, 1983; Urbany, Dickson and Wilkie, 1989). Knowledge can allow the consumer to rely more heavily on internal information, but it can also enhance search by enabling more effective use of newly acquired information. When consumers feel more confident about their ability to judge products, they will typically acquire more information (Duncan and Olshavsky, 1982). This implies that there may be an inverted-U relationship between knowledge and external search (Bettman and Park, 1980). Consumers with extremely limited knowledge may feel incompetent to undertake an extensive search and analysis on their own. Instead, they may rely heavily on others such as friends, relatives, or salespersons. Moderately informed consumers possess sufficient knowledge to explore and understand more information, but their knowledge is not so great that they feel comfortable relying on memory and experience, so they will undertake more extensive external search on their own.

Milyo and Waldfogel (1999), in an impressive study using longitudinal data on liquor products, found that Rhode Island prices declined insignificantly, relative to Massachusetts prices, after Rhode Island's ban on liquor price advertising was lifted.

While the prices of advertised products fell by over 20 percent at the stores that advertised them, other prices did not change on average under the advertising regime. They found that stores' responses to rival price advertising vary by their own advertising status. Newspaper-advertising stores tend to reduce their prices of rival-advertised products, while non-advertising stores do not. When a product is advertised by a rival, a store advertising the same product sets its price substantially lower than if the store alone advertised the product's price.

Their results were interesting in two ways. First, using longitudinal data on an exogenous policy change, they found significant overall effects of the price-advertising regime on prices charged in the first year that the price advertising is allowed. This result stands in sharp contrast with existing results based on cross-sectional studies. Second, their results on stores heterogeneous responses to rival stores advertising suggests that price advertising affects stores differently.

4.4. Advertising and the internet

The Interactive Advertising Bureau (IAB) and Prince Water house Coopers (PwC) released "the internet ad revenue report" including final figures for fourth quarter and full year 2002. These figures demonstrate an even more pronounced improvement in both years over and quarter over quarter revenue results than the estimated numbers released in April 2003, with internet advertising revenue in the U.S. totaling \$6.0 billion for 2002, down 16 percent from 2001. Internet advertising revenues totaled \$ 1.6 billion for the fourth quarter of 2002, up from the previous fourth-quarter estimate of \$1.5 billion, and up 9 percent from the third quarter 2002. The increase in 2002 fourth quarter actual revenues from the previous estimate primarily reflected stronger than expected results

from the top ad sellers. The IAB sponsors the "internet revenue report", which is conducted independently by the New Media Group of PwC. The full report is issued twice yearly for full and half year data and top-line quarterly figures are issued for the first and third quarters. IAB issued top-line 2002 revenue figures in April 2002. "A number of factors that had been negatively impacting revenue growth seem to be turning favorable, including a modest rebound in overall advertising spending.

Also, sellers are no longer cycling through lost revenue from the dot com fall-out, and the sharp growth in high-speed internet access adoption is providing more opportunities for large traditional brand advertisers to experiment with more opportunities for large traditional brand advertisers to experiment with the successful larger and more creative ad formats," said Pete Petrusky, director (PwC). "History shows that advertising ultimately follows the audience, and with 66% of all Americans having regular access to the internet, we believe advertising budgets will continue to shift more online as long as the online medium continues to gain shrew of overall media consumption," said Tom Hyland, Chair (PwC) new media group. The 2001 and 2000 full year revenue data were adjusted to reflect revenue restatements reported in public filings by several individual companies. Those reported restatements totaled \$77 million in 2001 and \$138 million in 2000; historical revenue figures are now adjusted to \$7.134 billion in 2001 and \$ 8.087 billion in 2000.

A study conducted by e-stat revealed that, compared with traditional media, internet has a very small level of advertising content. Newspapers are traditionally 62% advertising and 38% content. Magazines are 52% advertising and 48% content. Television is about 25%

advertising and 75% content. At 9% advertising and 91% content, internet currently has a lower percentage than all of these traditional media.

On the same vein, investigations conducted on US advertising spending in 1998 show that about 50% of advertising spending is wasted, so its effectiveness is more concerned by the media research industry.

Chatterjee-Novak-Hoffman developed (2004) an empirical analysis of clickstream data collected over a seven year period at an ad-supported site. This data was used to study the effect of other advertising stimuli encountered by the consumer during navigation and heterogeneity in within-visit and across-visit click behavior at the web site. The results suggest that increasing the number of same passive ad insertions will lead to negative returns initially and level off at higher level of exposures. The negative impact will increase with increases in frequency of visits to the site. The publisher can accommodate many different advertisers at the site, without adverse effects as long as a single passive ad is placed on a page. Their research answers the call by other researchers for testing advertising theories in realistic contexts (Stewart and Furse, 1986).

5. CONCLUSION

This paper reviewed the theoretical and empirical effects of advertising on the market structure, product quality, search goods and the internet. The paper started by presenting an historical review of advertising since the 18th century: thus, contributions of Marshall (1890, 1919) and Chamberlin have been put forward. Then, the paper reviewed also the different schools of thought in the area of advertising. In the third part, the paper

analyzed the reflections of economists who contributed to the advancement of the theory of advertising. Leading models such as the Dorfman-Steiner model of advertising and market structure, the Schmalensee's model on the effects of advertising on product quality, the Butters' model on search good and the Chatterjee-Novak-Hoffman model for internet advertising are reviewed; Computer simulation has proved useful for modeling phenomena of traditionally social scientific interest (Juwei,1999). At the same time, the traditional structural equation modeling (SEM) or the multiple regression models have often been used in analyzing internet advertising (Yunjae and Leckenby; 2000). In the fourth part of this work, we went through the empirical evaluation of selected papers by leading economists in the domain of advertising. As a whole, advertising aims at increasing the sales, and therefore the profitability of the firm at the expenses of the consumer.

Although much has been accomplished since the beginning of the reflection on the issue, there is still much work to do in the area of advertising modeling: there is a great conflict between the classical view directed by Broadbent (1990), who believe that all econometric models of advertising are insignificant (3) and the professional econometricians (Steaward, 1990) who believe that advertising effects can be tested by econometric tools (4), although Steaward admits that improvement need to be made and this will be the main focus of research in this area. The click stream model concentrate only on click behavior of consumers at one advertiser-consumer web site. Investigation across a network of sites would provide more realistic results. This aspect of the research will also be the main focus of the development of the click response model in the near future.

Footnotes:

(1) Some of the information must be exchanged between the actors. Information exchanging is the basic process, which can stimulate the psychological process and decision-making process. Also, new information exchanging process can be started by the result of decision-making process.

(2) Not all of the psychological processes can result in a decision-making process. There are different kinds of decision-making process, but the results (e.g. consumer's behavior) are all taken as interactions of actors and simulated as negotiations among agents. The decision is made based on the model data, the information received and current psychological states.

(3) Implications of Broadbent concerning econometric modeling of advertising:

1. All econometric models are insignificant variations on his 'classical model'.

2. All econometric models can measure only short term effects, i.e. 'blips'.

3. Econometric models usually show that cutting advertising would increase its contribution.

4. An advertiser is likely to stop advertising altogether; an econometric model shows that a reduction in advertising would be profitable.

(4) Steaward reacted to the implications of Broadbent by saying that econometrics is capable of performing the task with certain adaptations.

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APPENDIX 1 (Dorfman and Steiner, 1954):

Joint Optimization of advertising budget and price

Theorem: “A firm which can influence the demand for its products by advertising in order to maximize its profits choose the advertising budget and price such that the increase in gross revenue resulting from a one dollar increase in advertising is equal to the ordinary elasticity of demand for the firm’s product”.

Proof: they consider a firm which chooses the price of its product and the amount of its advertising budget. Assuming this to be so, the relationship between the quantity the firm can sell per unit of time, q , its price, p , and its advertising budget, s can be denoted by the formula

$$q = f(p,s). \quad (1)$$

They assume that $f(p,s)$ is continuous and differentiable.

In order to determine the optimal price-quantity advertising they took two steps:

The change in the level of sales will be the total differential of equation 1.

$$dq = \frac{\partial f}{\partial p} dp + \frac{\partial f}{\partial s} ds$$

In order for quantity not to change as a result of these variations, dp and ds must be chosen in such a way that they have equal and opposite effect on quantities. So that $dq=0$, that is:

$$dp = -\frac{\frac{\partial f}{\partial s}}{\frac{\partial f}{\partial p}} ds, \text{ with } \frac{\partial f}{\partial p} \neq 0$$

The net effect on profit is therefore:

$$qdp - ds = - \left[q \frac{\frac{\partial f}{\partial s}}{\frac{\partial f}{\partial p}} + 1 \right] ds$$

Then they show that the positive level of advertising cannot be optimal unless the quantity in parenthesis is zero, then they got a necessary condition for the profit maximization at any level of output.

$$q \frac{\frac{\partial f}{\partial s}}{\frac{\partial f}{\partial p}} + 1 = 0 \text{ if } s > 0, \text{ or } \geq 0 \text{ if } s=0$$

They define the elasticity of demand to be $\eta = -\frac{p}{q} \frac{\partial f}{\partial p}$

And the marginal value of product advertising to be: $\mu = p \frac{\partial f}{\partial s}$

This last concept is simply the rate of increase in gross receipts as advertising expenditure increases, price remaining constant. Substituting these concepts for the partial derivatives in equation (4), we have:

$$-q \frac{\frac{\mu}{p}}{\frac{q}{p} q} + 1 = 0 \text{ if } s > 0 \text{ or } \geq 0 \text{ if } s = 0$$

Canceling the p's and q's, multiplying through by η and transposing,

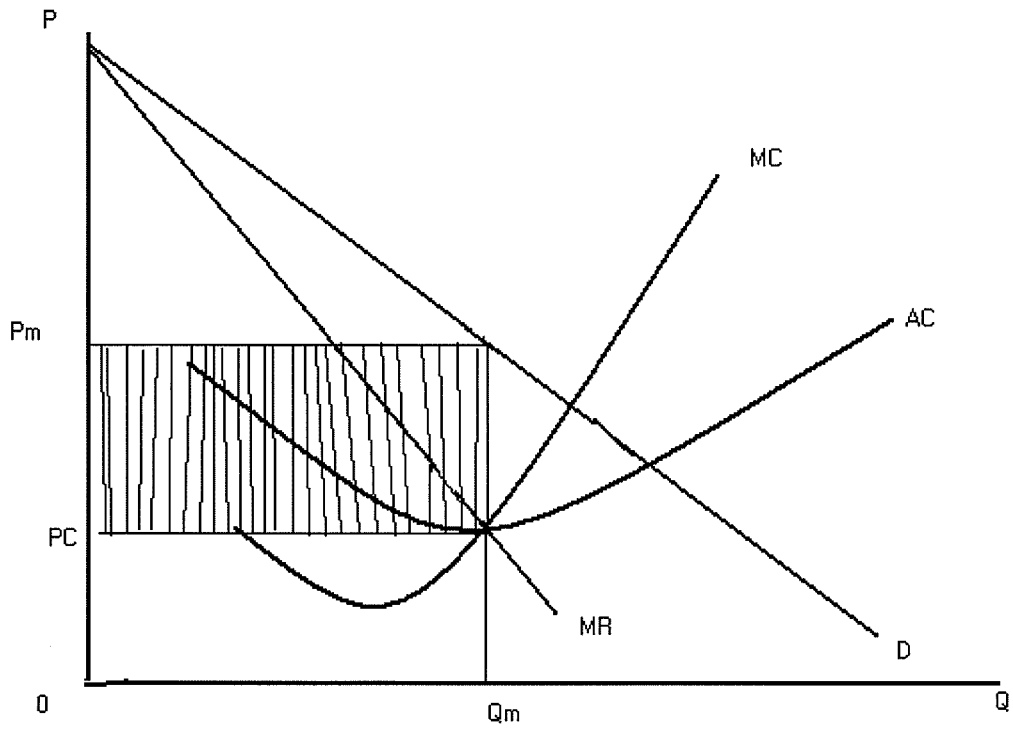
They got:

$$\mu = \eta \text{ if } s > 0 \quad \text{Or} \quad \mu \leq \eta \text{ if } s = 0$$

This equation proves the theorem.

Appendix 2

Figure 1: The monopoly market without advertising



Appendix 3

Figure 2: Effects of price and product quality on advertising

Q1 is the monopoly quantity before advertising.

Q2 is the monopoly quantity after advertising.

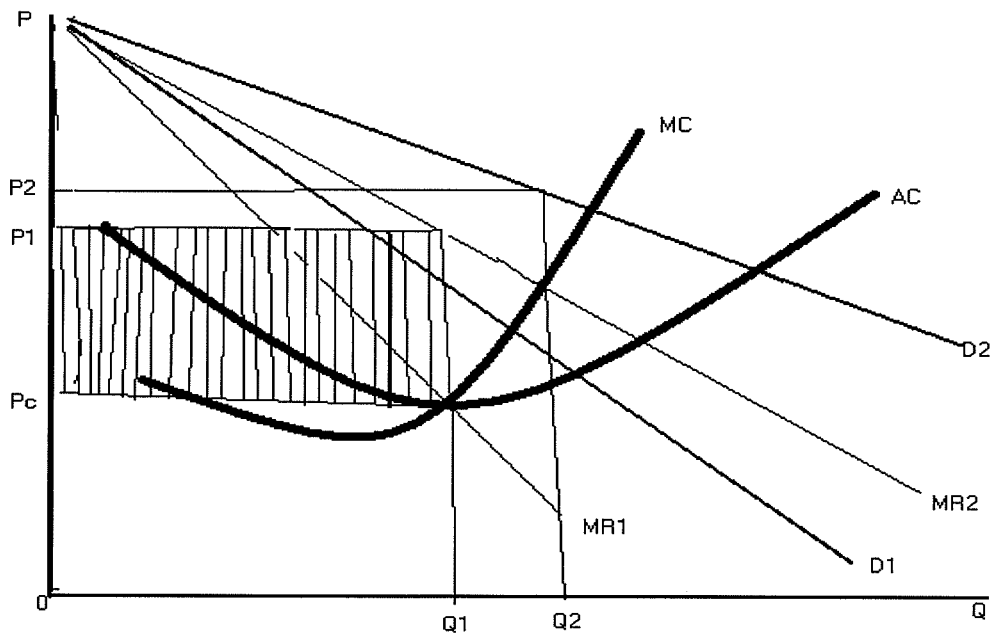
MR1 is the marginal revenue of the monopoly before advertising

MR2 is the marginal revenue of the monopoly after advertising.

AC is the total average cost of the monopoly

P1 is the monopoly price before advertising

P2 is the monopoly price after advertising quantity increase.



Assuming production cost is constant regardless of production quantity, the total unit cost of production must increase with an increase in advertising.

Figure 2, $(Q_1 - 0)(P_1 - P_c)$ is the monopoly profit before advertising. $(P_2 - P_c)(Q_2 - 0)$ is the monopoly profit after advertising. Excess profit, which results from advertising, is the difference between post-advertising profit and prior-advertising profit. (See details in numerical calibration) or the area $P_1P_2 \times Q_1P_1 + Q_1Q_2 \times Q_2P_2$ or $P_1P_2 \times 0Q_1 + Q_1Q_2 \times Q_2P_2$. Q_1 and P_1 identify the monopolist quantity and price, respectively. Q_2 and P_2 denote the quantity and price after advertising. MR_1 (DA_0) and MR_2 (DA_1) define marginal revenue before and after advertising. The rectangular area $(P_1 \times Q_1)$ represents the profit before advertising; the rectangular area $(P_2 \times Q_2)$ is the profit after advertising.

Calibration and comments:

The purpose of using calibration as an analytical tool is to attempt to numerically evaluate the effect of advertising on profitability in the monopoly case. We would have done the same for the duopoly, had it not been so complicated, due to the reaction of the rival firm together with the unpredictable reaction of consumer behavior. We will merely calibrate the profitability of the monopolist following a change in price and quantity because of advertising.

Following figure 2, let

$Q_1=50, Q_2=55; P_1=10; P_c=6; P_2=12$. The profit before advertising is:

$$\pi_1 = 0Q_1 * P_c P_1 = (50 * 4) = 200$$

The profit after advertising is:

$$\pi_2 = 0Q_2 * P_c P_2 = 55 * 6 = 330$$

The extra profit triggered by advertising is

$$\pi^* = \pi_2 - \pi_1 = 330 - 200 = 130$$

Following figure 2.2 the situation will be different:

$$Q_1=50; Q_2=105; P_1=10; P_2=8;$$

Profits before and after advertising will be:

$$\pi_1 = Q_1 - 0_1 * P_1 - P_c = 200$$

$$\pi_2 = Q_2 - 0 * P_2 - P_c = 105 * 2 = 210$$

$$\pi^* = 210 - 200 = 10$$

We observe that in the case where advertising leads to an increase in price and quantity, the profit will go up from 200 to 330. The increase rate is 65%, which indicates that the monopoly market sacrifices consumer welfare and is not to the benefit of customers.

Considering the second situation, price declines upon the introduction of advertising, while units sold increase. Assuming quantity before advertising was 50 and it accelerated to 105 after advertising demonstrates a positive effect of advertising on quantity produced. This two-way movement has boosted profit from 200 to 210, although the increase is less than in the previous situation. /-

Appendix 4:

Our contribution on market structure theory

Advertising is a strategy influencing the shape or position of the demand curve for a firm's product. This implies that demand may change at different price levels even without a change in the physical characteristics of a product. To realize the ultimate profit-maximizing objective, a firm has to compare the maximum profit (total revenue minus production and advertising cost) to each pair of demand and cost curve. The effects of advertising on price in a monopoly market are twofold: advertising either increases the price or decreases it. Expectedly, following advertising, a firm will increase its production quantity because of the excess demand. However, advertising is expensive; to cover the advertising cost, the monopolist has to raise the price at the same time to maximize profit as shown on the diagrams (figure 1 and 2 in appendices 2 and 3).

If advertising decreases the selling price, it has to increase the quantity sold. As well, either unit profits decline or unit production costs must decline with increases in output, as shown in Figure 2. The problem now is to figure out whether the post-advertising profit is greater than initial profit without advertising (the calibration will help to clarify this issue). In addition, advertising may bring in new consumers who are more price-sensitive than retained customers are. In this case, the optimal price level will decrease.

It is noteworthy that the statement 'advertising reduces prices' is invalid unless the aforementioned conditions are satisfied. Thus, the presence of an increase in demand and its resulting scale economies do not guarantee that advertising will lower prices. How can we explain that high advertising intensity directly relates to reducing prices without market concentration?

We recall that one of the well-known approaches to analyzing the impact of advertising on profitability of a firm is the prisoner's dilemma game. We simply assume that the corresponding numerical 2*2 profit (payoff) matrix is such that for any firm the profit is higher if neither of them advertises.

In the duopoly case, we have to distinguish between the non-cooperative case and the cooperative case. In the non-cooperative case, any decision made by one company in order to increase its profitability will generate retaliation by the other firm, which will return the demand level to the original state. In this instance, advertising will simply raise the price of the product in question at the expenses of consumers. Both firms will make a higher profit because of the tacit collusion between them.

In the cooperative situation, both businesses will act accordingly to spend as much or as little in advertising and impose a collusive price on consumers. This price may be higher than the initial one; if so, the duopolists will realize a "super profit". Alternatively, this price could be lower than the original if they perceive price difference as influencing consumers.