

The Economic Effects of Advertising

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The Economic Effects of Advertising

Abstract

This paper reviews the main theoretical models of advertising as well as the main empirical results.

The following points are emphasized. (1) It is important to distinguish between informative and persuasive advertising, which generally have conflicting effects on price, product differentiation and social welfare. (2) The recent literature suggests that product differentiation is a critical determinant of advertising. Moreover, the degree of product differentiation impacts on the relationship between advertising and price as well as the relationship between advertising and quality. (3) Advertising can increase or decrease prices. Broadly speaking, informative advertising is negatively related with prices while persuasive advertising is positively related with prices. In addition, the non-monotonic advertising-price relationship interacts with product differentiation. (4) Advertising can directly inform quality and/or indirectly signal a high quality product. The relationship between advertising and quality varies across circumstances. Besides, the non-monotonic advertising-quality relationship interacts with product differentiation. (5) Advertising can deter or facilitate entry. The theoretical findings seem inconclusive and empirical work offers mixed support.

Keywords: Advertising, Product differentiation, Quality Signaling, Entry.

1. Introduction

Advertising is communicated to consumers via mass communication media, including TV (network, local, spot and cable), broadcast (radio), print (newspaper and magazines), direct mail, and Internet. It can also reach consumers via sales promotions.

Advertising is generally understood as a mean of information transmission about price, quality and the location of products and services. It is a non-price competitive tool used by firms to introduce new products, maintain brand awareness/image, and enhance sales/profits. Advertising campaigns are often carried out between leading firms of an industry, taking Coca-Cola & Pepsi, KFC & MacDonald, GM & Volkswagen, IBM & HP as examples. Retail industries such as cosmetics, detergents, beer, and cigarettes traditionally have a high advertising intensity.¹ Advertising expenditures in developed countries generally represent 2% of their GNP. For example, the US currently spends around 2.5% of its GNP on advertising.² While in this paper we focus on the economic aspects of advertising, it should be kept in mind that it has also important psychological, sociological and legal aspects.

“Advertising is a topic that sits uneasily with economists”.³ It is a long-debated topic, in view of the development of its theory, models and empirical evidence. Ongoing debates of advertising concern its impacts on demand, price, quality, welfare, and market structure. Some of the questions studied are: Does advertising directly increase demand? Is it a source of information or does it merely aim at persuading

¹ Nelson, 1974; Shy, 1995; Bloch and Manceau, 1999.

² Shy, 1995.

³ Church and Ware, 1999, p. 561.

buyers? Is there too little or too much advertising? Does it increase or decrease profits and welfare? Does advertising signal high product quality? Can it constitute a barrier to entry? The answers to these questions are often complex and mixed.

The purpose of this paper is to review the theoretical and empirical literature on the economic effects of advertising. The paper is organized as follows. Section 2 studies the distinct informative and persuasive roles of advertising, its relation with product differentiation, and its impact on welfare. In Section 3, the relationship between advertising and price is considered. Section 4 reviews the advertising-quality relationship. Section 5 addresses the role of advertising on entry. Finally, Section 6 concludes and presents suggestions for further study.

2. Advertising, product differentiation and welfare

2.1 Informative versus persuasive advertising

In the literature on advertising, a major distinction is made between *informative* and *persuasive advertising*. The informative role of advertising is generally pro-competitive. It conveys direct messages on product price, quality and location, and has a direct effect on demand. *Informative advertising* improves product matching, reduces product differentiation in the absence of information, promotes competition by increasing the elasticity of demand, reduces prices, and facilitates entry. In contrast, the persuasive role of advertising is generally anti-competitive. *Persuasive advertising* intends to alter consumer preferences, create perceived product differentiation and brand loyalty, decrease the elasticity of demand, raise prices and profits, and thus

increase the market power of firms, deter entry, and reduce social welfare.

Recent studies suggest that information can be direct or indirect.⁴ Advertising may directly inform product characteristics and/or indirectly inform (signal) quality to the uninformed consumers.⁵ Part of the signaling literature on advertising assumes that advertising is dissipative (Kihlstrom and Riordan 1984; Milgrom and Roberts 1986). *Dissipative advertising* may be used to signal high quality for experience goods. Dissipative advertising has no direct effect on demand unless it changes consumers' beliefs about product quality, and it is associated with burning money in advertising campaigns. Consumers infer quality by observing price and the advertising expenditure level of a firm.⁶ Another type of advertising is "complementary" to the consumption of the advertised good (Becker and Murphy 1993). Unlike persuasive advertising, *complementary advertising* does not change consumers' preferences but it is treated as part of stable (given) preferences. It is directly entered (along with other goods) into the consumer's utility function and affects the consumer's utility derived from consuming the advertised goods. Also, complementary advertising may or may not contain information. Note that it doesn't involve indirect information (signaling) but may create social prestige or image effects that affect a consumer's utility. Complementary advertising can be a good or a bad, depending on whether it raises or reduces consumer utility (i.e. the marginal utility of advertising is positive or negative). A good advertising is given away for free

⁴ Nelson, 1974.

⁵ See Section 4.1.

⁶ Dissipative advertising refers to "advertising that potentially signals quality to consumers within the context of a signaling game. Firms essentially burn money to make a point. This is in contrast to other roles that advertising might serve such as directly conveying information" (Hertendorf and Overgaard, 2001, p. 2). For explanations of dissipative advertising, see also Milgrom and Roberts (1986) and Linnemer (2002).

to consumers such as direct mail advertisements and the advertised firm determines the quantity of advertising. Alternatively, a bad advertising is usually jointly sold to consumers with other advertisements and goods, such as with TV/radio programs and newspapers.⁷

Recent work links the pro-competitive and anti-competitive effects of advertising. In a (dynamic) differential game framework of duopolistic rivalry, Piga (1998) considers that advertising has both cooperative⁸ and predatory⁹ effects as a strategy tool. First, when advertising is purely cooperative, firms tend to under-supply advertising. Piga shows that the under-provision problem is reduced in the presence of a dominant firm (i.e. firms' cost differences in production are significant), since a higher efficient firm is associated with a higher market share and heavier advertising. Also, market size increases with the difference in firms' production efficiency. Second, given cooperative advertising, the under-provision problem is reduced in the presence of predatory advertising, since "the under-investment effect due to the public-good nature of advertising is offset by the incentive that firms face in attempting to increase their market shares".¹⁰ Empirically, Trembley and Trembley (1995) study the welfare impacts of U.S. cigarette advertising, considering informative, persuasive and image-creating advertising (i.e. advertising has a desirable image effect which enhances consumer utility). They show that advertising

⁷ See Bagwell (2003) for a related discussion of complementary advertising.

⁸ The cooperative effect of advertising is to increase market size. Cooperative advertising "increases demand for rival firms' products as well as those of the advertising firms" (Church and Ware, 1999, p. 566).

⁹ The predatory effect of advertising is anti-competitive, where a firm steals market share from its rival. Predatory advertising "increases demand for the advertising firm only by attracting customers away from its rivals" (Church and Ware, 1999, p. 566).

¹⁰ See Section 6 for a related discussion of cooperative advertising.

significantly increases market power in the U.S. cigarette industry. They further find that both purely persuasive and informative advertising significantly reduce consumer surplus, while image-creating advertising insignificantly increases consumer surplus. Nevertheless, advertising doesn't significantly affect total surplus.¹¹ Capturing the idea of Becker and Murphy (1993), Akerberg (2001) empirically study informative and prestige / image effects of advertising on a newly introduced yogurt, Yoplait 150, a non-durable experience good.¹² In his model, the informative effect of advertising (i.e. to indirectly signal product quality) affects new users, while the prestige or image effect of advertising influences both new and existing users. He shows that significant informative effects of advertising to inexperienced users prevail, in contrast to the insignificant prestige effect on experienced users. Therefore, the primary effect of advertising is to provide indirect information to inexperienced users.

Importantly, the literature suggests that advertising has differential (positive/negative) effects on price, product differentiation as well as welfare, and the dominant effect depends on product, consumer and market characteristics.

2.2 Advertising and product differentiation

Horizontal product differentiation means that consumer preferences are distributed differently regarding product characteristics such as location, and the product is a better match for some buyers than for others. On the other hand, vertical product differentiation refers to consumers' preferences that are distributed in the same way regarding the differentiated quality, i.e., there is a unanimous agreement on the

¹¹ See Section 2.3.2.

¹² Akerberg (2001) uses panel data at the consumer level and the exposure of TV advertising and employs a reduced form discrete-choice model.

ranking of the products.

The early literature suggests that advertising is a source of product differentiation. Pro-competitively, informative advertising reduces product differentiation due to a lack of information, making consumers better informed and prices lower. Conversely and anti-competitively, persuasive advertising convinces consumers to buy by creating (perceived) product differentiation and changing their valuation of products.

Recent studies increasingly suggest that structural change (i.e. product differentiation) has significant impacts on advertising, as a cause, and not only as a consequence. For example, Hertzendorf and Overgaard (2001) and Soberman (2002) highlight that the degree of vertical (horizontal) product differentiation may result in a non-monotonic advertising-quality (advertising-price) relationship, as they study dissipative advertising signaling and informative advertising respectively.

2.2.1 Informative advertising and product differentiation

Soberman (2002) extended the model of Grossman and Shapiro (1984)¹³ to study the interaction between horizontal product differentiation and the (informative) advertising-price relation. The model predicts a non-monotonic advertising-price relationship as a function of product differentiation, where it is negative with low differentiation, positive with moderate differentiation, and there are no effects from advertising to price at high levels of product differentiation.¹⁴ Soberman assumes that advertising increases as the cost of advertising falls. He emphasizes that changes in

¹³ See section 2.3.1.

¹⁴ Soberman's model builds on earlier studies. It follows Salop (1979) in that there is location differentiation between firms that are uniformly distributed in a circular spatial market. It is also similar to Grossman and Shapiro (1984) that "advertising is represented as a series of messages received randomly by consumers in the market and consumers only have interest in a product if they have seen advertising about it" (Soberman, 2002, p. 2). Soberman also assumes that advertising informs about product attributes but not about prices.

horizontal product differentiation lead to different impacts of advertising on competition, and accordingly, on price, profits and welfare. Firstly, under low horizontal product differentiation, an increase in advertising stimulates higher price competition since consumers are informed about many choices available and inclined to purchase from firms in vicinity. As a result, higher advertising lowers prices and profits, which is consistent with the pro-competitive view of informative advertising.

Secondly, if product differentiation is moderate, the alternative choices of consumers are from adjacent firms and competition is among the firm concerned and its two adjacent competitors. Soberman suggests that the equilibrium price is a function of firms “balancing” the needs of distinct groups of consumers who have observed their advertisings.¹⁵ There are four groups of consumers, including consumers who are informed about only one firm n and they are located either between firm $n-1$ and n or between firm n and $n+1$, and consumers who are informed about two firms (either $n-1$ and n or n and $n+1$). Soberman finds that as advertising increases, the equilibrium price to consumers who are informed about two firms is higher than the price to consumers who only see the advertising of one firm. Unlike the first case, higher advertising drives prices and profits up. He explains that as advertising increases, “a greater percentage of all consumers in the market have seen advertising from both adjacent firms and this causes the equilibrium price to rise”.¹⁶ This result seems consistent with the anti-competitive view. However, the net effect on welfare is positive. The explanation is that when differentiation is modest and

¹⁵ Soberman, 2002, p. 2.

¹⁶ Soberman, 2000, p. 23.

advertising increases, the higher percentage of buyers who are informed about two adjacent firms is more relevant, compared with the lower percentage of buyers who only see the advertising of one firm. Higher prices result in lost sales, but advertising cost savings and gains from more buyers outweigh, increasing welfare. Thirdly, when product differentiation is high, increases in informative advertising have no impact on prices. In brief, horizontal product differentiation considerably affects the non-monotonic advertising-price relation.¹⁷

On the other hand, there are studies considering how advertising induces product differentiation. For example, Meurer and Stahl (1994) propose another type of informative advertising that increases product differentiation and market power of the firm.¹⁸ In their horizontally differentiated duopoly model, buyers know the prices of products but initially are uninformed about which product offers the best match, and consider that “both firms are equally likely to be their best match”. Also, “an ad (if received by a buyer) fully informs the buyer of her best match”.¹⁹ It is assumed that fully informative advertising conveys product attributes of both a firm and its rival. On the one hand, advertising improves the matching between buyers and advertised products. On the other hand, buyers now know the actual product differentiation, can separate a good match from a bad match, and hold stronger preference toward the matching good. In this sense, buyers have fewer satisfactory alternatives, the demand

¹⁷ See Section 3.3 for a related discussion of advertising and pricing. See also Section 2.3.1 for its welfare implication. Soberman (2002) also allows a firm to target its advertising to consumers, see Section 6 for a detailed discussion.

¹⁸ Meurer and Stahl (1994) indicate that there are three types of informative advertising: 1) The conventional type of informative advertising improves the matching between buyers and products and reduces product differentiation. 2) The second type of informative advertising increases market size without affecting substitutability, which is under-provided as a public good. 3) The third type of informative advertising, in their model, increases product differentiation by reducing product substitutability.

¹⁹ Meurer and Stahl, 1994, p. 3.

become less elastic and informative advertising increases product differentiation. Accordingly, advertising increases brand loyalty and the firm's market power. Note that in the model of Meurer and Stahl, informative advertising doesn't reduce but raises product differentiation.²⁰

2.2.2 Persuasive advertising and product differentiation

A branch of the literature analyzes the effects of persuasive advertising in Hotelling duopoly markets with horizontal differentiation. For example, Von der Fehr and Stevik (1998) employ a model where persuasive advertising and pricing are determined sequentially. They assume that persuasive advertising affects consumers' tastes in three ways: it increases consumers' willingness to pay, changes ideal product variety and increases perceived product differences.²¹ They find that the equilibrium level of persuasive advertising is decreasing with product differentiation only if persuasive advertising increases perceived product differences, while the equilibrium level of advertising is increasing with product differentiation if persuasive advertising changes ideal product differences.

Hertendorf and Overgaard (2001) study how the degree of vertical differentiation affects the relationship between dissipative advertising signaling and quality in a duopoly setting.²² There are high- and low- quality firms in the market. When the degree of vertical differentiation is large, pure price signaling without advertising

²⁰ See Section 2.3.1 for further discussion of the welfare effects of informative advertising.

²¹ 1) Advertising increases consumer's willingness to pay if "advertising may simply enhance the value of a product in the eye of the consumer". 2) Advertising changes ideal product variety if "each firm tries to convince consumers that what they really want is its particular variety". 3) Advertising increases perceived product difference if "advertising may lead consumers to attach more importance to those differences that already exist between products" (Von and Stevik, 1998, p. 2).

²² For simplicity, Hertendorf and Overgaard (2001) assume that marginal costs are independent of quality, in contrast to the popular assumption that marginal costs depend on quality.

distorts prices of both firms upwards. When vertical differentiation is smaller, dissipative advertising and pricing jointly signal high quality, and prices of both firms are distorted downwards.²³ Dissipative advertising decreases prices because “the effect of the high elasticity of demand and the interaction between the signals makes it optimal for the high-quality firm to lower its price below the associated full information level”.²⁴ It is shown that the advertising signal is most effective with modest vertical differentiation. When vertical differentiation is zero, the high-quality firm has no incentive to advertise. Hence, the relationship between dissipative advertising signal and quality is non-monotonic.²⁵

Moreover, in a duopoly model with homogeneous goods, Tremblay & Polasky (2002) relate advertising with subjective (not real) horizontal and vertical product differentiation. In their model, advertising may create subjective horizontal and vertical differentiation by influencing consumer perceptions of product differentiation, and raise the market power of firms. They find that when advertising creates subjective vertical differentiation, there is an asymmetric equilibrium in which the perceived higher quality firm charges a higher price, captures more market share and advertises more heavily than its rivals.

Overall, the literature suggests that product differentiation is a substantial factor influencing the effects of advertising. In particular, it has important implication for the advertising-price, advertising-quality and advertising-welfare relationships.

2.3 Advertising and social welfare

²³ In the model, prices are strategic complements because of the underlying Bertrand competition.

²⁴ Hertzendorf and Overgaard, 2001, p. 5.

²⁵ See Section 4.1 for a related discussion.

Disagreements exist as to the welfare implication of advertising. They turn around whether advertising is inadequate, optimal or excessive, and whether welfare increases or decreases with advertising. Theoretically, the goal is to evaluate whether the social gains from advertising (e.g. increasing output / reducing price / reducing the search costs of consumers) outweigh its social costs. The trade-off depends on the type of advertising, changes in prices, output as well as consumer utility, and market structure. The often-difficult task is to infer the net impact of the conflicting effects of advertising.

2.3.1 Informative advertising and social welfare

Holding the pro-competitive view, some authors suggest that informative advertising is insufficient and also improves welfare, if the social gain exceeds the private return (LeBlanc 1998; Soberman 2002). However, purely informative advertising of horizontally differentiated goods can be excessive in oligopoly with a very large number of firms whereas it can be inadequate in monopoly (Grossman and Shapiro 1984). Hence the comparison between the socially optimal level of informative advertising and the market outcome may hinge upon market structure. Moreover, there is the possibility that social surplus is non-monotonic in informative advertising (Meurer & Stahl 1994).

Grossman & Shapiro (1984) study purely informative advertising in a circle model²⁶ where firms are differentiated in locations. They remarkably introduce the “market size” effect, the “matching” effect and the “customer-capture” effect of

²⁶ In a model with imperfect information, Grossman and Shapiro (1984) assume that firms locate around a circle, the number of firms is fixed, and consumers are uniformly distributed around the circle. They also assume that informative advertising fully and truthfully informs consumers about product price, location and attributes.

informative advertising. The social gain of advertising comes from the “matching” effect, while the private (firm) return of advertising arises from the “customer-capture” effect allowing a firm to steal market shares from its rivals. Under monopoly, the “market size” effect results in advertising being under-provided. But in oligopoly with a sufficiently large pool of firms, advertising has no marginal effect on the market size and the “customer-capture” effect dominates the “matching” effect. Thus, despite the beneficial effect of advertising, advertising is excessive in oligopoly.

However, Meurer & Stahl (1994) find the impact of advertising on social surplus to be non-monotonic.²⁷ In their model with a duopoly market, informative advertising has beneficial matching effects but also increases product differentiation and market power. Informed consumers value the good match product as V and the bad match as 0 ; uninformed consumers value either product as $V/2$. Consequently, firms increase the price to V to the informed buyers who find a good match, but uninformed buyers will not buy at price V , so sales fall. The positive matching effect conflicts with the negative sales-loss effect, making social surplus non-monotonic in advertising. Competition for the uninformed declines as the pool of loyal informed buyer increases. Intuitively, total surplus increases with advertising when the matching effect dominates, falls when the sales-loss effect dominates, and again increases when no sales are made to the uninformed, so that the matching effect again dominates. They also find that advertising may be excessive or insufficient.

On the other hand, there is evidence in support of the pro-competitive view of

²⁷ See Section 2.2.1.

informative advertising. LeBlanc (1998) develops a Hotelling duopoly model with a fixed market size for an established product.²⁸ The central result is that informative advertising increases the firm's profit and social welfare. Also, the level and distribution of advertising costs determine the advertising intensity. He finds that: 1) a sufficiently low cost of advertising is associated with the existence of advertising in equilibrium.²⁹ 2) The larger the cost differentiation of advertising, the more likely the existence of advertising in equilibrium. 3) In his model, the use of informative advertising improves social welfare since "expected consumer utility is the same independently of whether or not firms advertise, while expected profits are higher with advertising whenever firms choose to advertise, even though there is a cost of advertising".³⁰ Soberman (2002) also finds that informative advertising is beneficial to welfare at any degree of product differentiation even when higher advertising leads to higher prices. This suggests that an increase in the equilibrium price does not necessarily imply over-advertising.³¹

2.3.2 Persuasive advertising and social welfare

The earlier literature suggests that persuasive advertising is wasteful as the only function it performs is to shift consumer tastes. Dixit and Norman (1978) study advertising and welfare in monopoly, oligopoly and monopolistic competition settings, under the assumption of changing tastes and increasing prices and output.³² There are

²⁸ In the model, a firm's cost is private information so that price is uncertain. A firm may use informative price advertising to post new prices after observing its actual costs.

²⁹ The explanation is straightforward. Advertising cost negatively relates with advertising and a low-cost firm has more incentives to advertise.

³⁰ LeBlanc, 1998, p. 65.

³¹ See Section 2.2.2.

³² Dixit and Norman show that advertising is excessive in the three settings and the over-supply is reinforced at each stage. In monopoly, the result largely depends on the assumption that advertising increases prices; while in

pre-advertising and post-advertising taste standards for measuring welfare changes. However, either pre-advertising or post-advertising taste should be used as a standard for a welfare comparison. The net welfare effect is the sum of firms' gains and consumer losses. Dixit and Norman find that advertising is socially excessive under either of the two standards.³³ That is, a monopolist will over-supply price-increasing advertising.

A few recent works obtain ambiguous results. Becker & Murphy (1993) suggest that complementary advertising³⁴ may or may not increase prices. They challenge the assumption of Dixit and Norman (1978) that consumer tastes vary. Not surprisingly, under the assumption of stable preferences, they report the contrasting result that advertising may increase or decrease the equilibrium price. If the price decreases, the monopolist will under-supply advertising as it fails to appropriate consumer gains from advertising. But if the price increases, it is not known whether advertising is over-supplied or not. Besides, in their empirical study of U.S. cigarette advertising, Trembley and Trembley (1995)³⁵ show that both purely persuasive and informative advertising don't significantly affect total surplus whereas they significantly reduce consumer surplus.

3. Advertising and price

The effect of advertising on price can be positive, negative or non-monotonic. A

monopolistic competition, advertising is excessive even if it does not increase price.

³³ For a monopolist choosing the profit-maximizing level of advertising, changes in profit would be zero. Therefore, as long as advertising increase prices, the change in welfare is negative and advertising is excessive. Private profitability is a necessary but not sufficient condition for welfare to increase with advertising.

³⁴ See Section 2.1.

³⁵ See Section 2.1.

general theme of the literature is that informative advertising decreases price whereas persuasive advertising increases price. Part of the empirical literature deals with the effect of price advertising on price, based on case studies before and after the advertising ban in the retail market (Benham 1972; Milyo and Waldfogel 1999). In particular, Kaul and Wittink (1995) offer a clear-cut assessment that (informative) price advertising decreases prices and (persuasive) non-price advertising increases price. Moreover, the recent literature suggests that advertising can increase, leave unchanged, or decrease prices, mainly attributable to the extent of product differentiation (Soberman 2002).³⁶

Kaul and Wittink (1995) empirically study the effects of price advertising and non-price advertising (in parallel to the distinction between informative and persuasive advertising) and find that the effects on price are in opposite directions. They reconcile 18 prior empirical studies about the advertising-price relationship, in which researchers measure the price effects of advertising using different methods such as experimental analysis and econometric modeling, with different data sets and various product types. They report that price advertising leads to higher price sensitivity of buyers since price advertising reminds current buyers of other available brands and prices, attracts price-sensitive new buyers and thus the overall level of price sensitivity level goes up. Accordingly, higher price sensitivity and increased price competition cause prices to fall. On the other hand, non-price advertising reduces price sensitivity of buyers since buyers are not informed about the price but

³⁶ See Section 2.2.1.

rather about the brand itself, and this increases brand differentiation and raises prices.

If buyers are not price sensitive, however, there is little or no effect of non-price advertising on price.

3.1 The informative view

Stigler (1961) set up a well-known search model in which informative advertising decreases prices. Prices charged for homogeneous goods vary across sellers and thus buyers search among sellers to find the most favorable price. Search is costly, however, due to factors such as transportation and time costs. The optimal search condition for a buyer is satisfied when the marginal benefits of search equal the marginal costs of search. Advertising plays a role in reducing search costs and reducing consumers' ignorance of products' characteristics. Stigler (1961) suggests that informative advertising reduces prices by increasing the price sensitivity of consumers, reduces price dispersion and improves competition.

Sharing a similar reasoning with Stigler (1961), Robert and Stahl (1993) study informative price advertising in a model where a consumer sequentially searches for the lowest price if he is not satisfied with the observed price and where search is costly. Robert and Stahl find a unique equilibrium with price dispersion, in which firms "either charge a high price which they do not advertise, or charge a lower price in a connected interval separated from the high price; and they advertise lower prices more intensively".³⁷ If firms don't advertise, they earn high returns by charging high prices and only serve the completely uninformed buyers. On the other hand, if firms

³⁷ Robert and Stahl, 1993, p. 658.

advertise prices, they are better off if they advertise lower prices to expand sales and capture buyers who further search if they are dissatisfied with the observed prices. This is consistent with the hypothesis that informative price advertising reduces price.

Besides, Bester and Petrakis (1995) study the advertising-price relationship and find that pure price advertising reduces prices. They construct an oligopoly model with spatial product differentiation between two firms. Buyers a priori know product attributes, location and only local prices and need to pay transportation costs to visit one of the two locations. Besides, buyers are uninformed about the price of the remote location unless the remote firm advertises its price. The idea is as follows. Firstly, if there is no advertising, buyers who only know the local price (imperfect information) are captive. In this case, the firm charges high prices to captive buyers without losing sales. Secondly, in the presence of advertising, local buyers are informed about the price of the remote firm. On the one hand, a profit-maximizing firm will advertise a low price in order to attract remote buyers and increase its market share. On the other hand, a cost-minimizing local buyer switches to purchase from a remote firm only if gains from the price reduction outweigh the transportation cost. In other words, it is not optimal for the firm to post a high price to remote buyers since this can neither convince buyers to switch nor recoup the advertising costs. Hence, price advertising promotes price competition and lowers prices. Lastly, in equilibrium, there is a positive probability that each firm posts a lower price to win distant buyers in the presence of price advertising and a remaining probability that each firm charges a high price to local buyers in the absence of advertising.

Empirically, some studies support the informative view of advertising. For instance, Benham (1972) offers an early experimental work to test the effect of price advertising on price in the U.S. eyeglass industry. In the 1960s, some States allowed eyeglass advertising while others didn't. He finds that eyeglass prices in States where advertising is prohibited are significantly higher than prices in States where advertising is allowed. He concludes that price advertising reduces prices. Kaul and Wittink (1995) also report an overview result that price advertising lowers prices, based on prior empirical studies with different data sets and various product types.

3.2 The persuasive view

In contrast to Stigler (1961), Salop and Stiglitz (1977) argue that price advertising of homogeneous goods may not reduce prices and price dispersion in a model of monopolistic competition. The key assumption is that complete information acquisition is costly, and heterogeneous buyers differ in costs of being completely informed about firms' prices. Despite the fact that price advertising reduces the cost to buyers of becoming informed, buyers are differently informed by advertising due to different costs of gathering information. Accordingly, the effect of price advertising on price may vary across firms. Different firms face demand curves with different elasticities and optimally charge different prices in equilibrium, in which some firms may price above the perfectly competitive level to the uninformed buyers. Salop and Stiglitz (1977) conclude that in equilibrium, market prices are set at the monopolistically competitive level or there is persistent price dispersion.³⁸

³⁸ Milyo and Waldfogel, 1999.

Bloch and Manceau (1999) construct a Hotelling model where consumers' tastes differ between two competing goods and a firm may use persuasive advertising to shift the distribution of those tastes. They flexibly offer a multi-product monopoly and oligopoly setting, which depends on whether both products are sold by the same firm or by the two firms. In the former case of monopoly, persuasive advertising increases the price of the advertised good while it reduces the price of the unadvertised good. The explanation is that persuasive advertising shifts the distribution of consumers' tastes toward the advertised good and results in an increase in its market share. "The monopolist benefits from a distribution more biased towards one of the two products, since it allows it to charge a high price on a concentrated segment of the market".³⁹ On the other hand, in the latter case of oligopoly, as both products are sold by the two competing firms, persuasive advertising may lower the price of the advertised good when the price competition effect dominates the market share effect.

In support of the anti-competitive view, empirical evidence from Milyo and Waldfogel (1999) is noteworthy. They compare the price advertising effects on the liquor prices of two States, Rhode Island where advertising was first banned then permitted, and Massachusetts where advertising is legal. Their log-price regression model includes store, product and time effects as explanatory variables and the log price as the dependent variable.

Using longitudinal data for 33 liquor products at 115 stores from 1995 to 1997, they first find no significant overall effects of price advertising on price. Then they

³⁹ Bloch and Manceau, 1999, p. 569.

examine separate effects including advertising and non-advertising stores effects and product effects. They report that effects of price advertising vary across stores: advertising stores markedly reduce prices (around 20%) on the advertised goods, but prices of non-advertised goods of both advertising and non-advertising stores don't change on average. Besides, prices in Rhode Island fall insignificantly after the lifting of the advertising ban. They also examine the relationship between own and rival advertising and find that stores respond differently to rivals' price cuts: advertising stores reduce prices considerably for rivals' advertised goods but non-advertising stores do not. It is shown that there is no price dispersion reduction across stores. Overall, prices fall insignificantly and slowly and there is no decline in price dispersion after one year of lifting the advertising ban in Rhode Island. This result is consistent with the model of Salop and Stiglitz (1977). Milyo and Waldfogel (1999) further suggest that the long run impacts of price advertising on price may coincide with the theory of Stigler (1961) since "consumers are better informed over time".⁴⁰

3.3 A non-monotonic advertising-price relationship

Recent work highlights the key role of product differentiation and its impact on the advertising-price correlation. Soberman (2002)⁴¹ shows that the effect of informative advertising on price depends largely on the degree of horizontal product differentiation and that the advertising-price relationship is non-monotonic. At a high level of horizontal product differentiation, an increase in informative advertising has no effect on prices. With a moderate differentiation, an increase in advertising

⁴⁰ Milyo and Waldfogel, 1999, p. 1096.

⁴¹ See Section 2.2.1.

increases prices and welfare. At a low level of differentiation, an increase in advertising reduces prices and profits.

Overall, the literature suggests that informative price advertising primarily reduces prices while persuasive advertising generally increases prices. In addition, the recent literature emphasizes that product differentiation may result in a non-monotonic advertising-price relationship.

4. Advertising and quality

4.1 The advertising-quality relationship

Part of the literature on advertising predicts that advertising and quality are positively related and that buyers infer quality by observing the level of advertising. Another literature considers that advertising is not correlated with quality if the price alone sufficiently reveals quality, and that advertising is not necessary and is wasteful. Besides, the recent literature highlights that product differentiation may result in a non-monotonic advertising-quality relationship. Moreover, the empirical literature provides mixed support for the relationship between advertising and quality.

Notably, Nelson (1970) distinguishes goods between *search goods* and *experience goods*. The quality of a *search good* (e.g. a T-shirt) can be observed before purchase. In contrast, the quality of an *experience good* (e.g. a car) cannot be inspected before purchase, and can only be judged through consumption. In another pioneering study in 1974, Nelson predicts a positive relationship between advertising expenditures and quality for experience goods. That is, high-quality goods are more

advertised. The key insight is that: buyers are more likely satisfied with high-quality goods than low-quality goods after initial consumption, and the possibility of repeat purchases from satisfied buyers is higher for a high-quality firm. Thus the high-quality firm has more incentives to advertise (signal) high-quality experience goods, in order to create current demand and thus make high future sales.

In addition, Nelson (1974) suggests that advertising information can be direct or indirect. Advertising information for a search good is direct (about the characteristics of a brand). On the other hand, advertising information for an experience good is indirect (about the brand itself).⁴² Intuitively, for experience goods whose quality is unverifiable before purchase, rational consumers may ignore the direct information of advertising but infer the quality from the indirect information (i.e. the level of advertising). Hence, advertising is a signal of quality to the uninformed consumers. This highlights that the effects of advertising depend on the nature of product quality (i.e. search quality or experience quality).

Subsequent studies consistently find that the positive advertising-quality relationship is valid (or strong) in some cases while it is not observed (or weak) in other cases. Kihlstrom and Riordan (1984) and Milgrom and Roberts (1986) formalize the theory of Nelson (1974) by setting up game-theoretic signaling models in monopoly, and find that dissipative advertising⁴³ may be a signal of high quality for newly introduced experience goods.⁴⁴

⁴² A few recent studies allow advertising to play a dual role, being simultaneously a source of direct information and a signal of quality. See Nichols (1998) and Orzach, Overgaard and Tauman (2002).

⁴³ See Section 2.1.

⁴⁴ See Section 4.2 for a detailed discussion.

In a static duopoly model, Hertzendorf and Overgaard (2001)⁴⁵ find that the relationship between dissipative advertising and quality is non-monotonic in the presence of vertical product differentiation. When product differentiation is large or approaches zero, advertising is not used. When the quality difference is intermediate, a positive advertising-quality relationship is the strongest. The high-quality firm signals its quality with dissipative advertising and a lower price (price below the full information level).

Presenting a similar picture in a static oligopoly setting, Fluet and Garella (2002) find that in the presence of price rivalry, advertising may be used to make signaling credible. When quality differences are large, a high price alone signals high quality and there is no need to use advertising. When quality differences are relatively small, the high-quality firm signals its quality with advertising and a lower price, while the low-quality firm lowers its price in the presence of price competition.⁴⁶ They thus support that advertising is pro-competitive, in that the use of advertising causes prices to fall. In consequence, in oligopoly, the relationship between quality differences and advertising may be non-monotonic.

Orzach, Overgaard and Tauman (2002) set up a dynamic monopoly model⁴⁷ to study price and advertising as signals of quality for a newly introduced experience

⁴⁵ See Section 2.2.2 for related discussions.

⁴⁶ Price rivalry is essential in this oligopoly model. This is in contrast with the monopoly case where a low-quality firm stays at its full information optimum, when the high quality firm signals through advertising and a lower price.

⁴⁷ In the model, there are two types of buyers: fastidious buyers are willing to pay more for high-quality goods, while indifferent buyers value high quality goods only marginally more (i.e. they are less sensitive to quality). The high-quality firm serves both types of buyers while the low-quality firm serves the latter type only. Orzach, Overgaard and Tauman (2002) allow advertising to play a joint role as directly informative and indirectly signaling quality. They assume that the ratio of the markups between the high-quality and low-quality firms is not too big or too small, and that the pool of indifferent buyers is significant. They find that modest advertising expenditures signal high quality.

good. The key result is that in the same product category, the high-quality firm may credibly signal its quality by lowering its introductory advertising level under the full-information advertising level of the low-quality firm, whereas the full-information advertising level is higher for the high-quality firm. The modest advertising (expenditures) level is most effective in signaling high quality.

Empirical findings suggest that the relationship between advertising and quality is not uniform across circumstances. Caves and Greene (1996) analyze the relationship between advertising, price and quality rankings in 196 product categories for a cross-section of industries between 1988 and 1990. They find that advertising is generally independent of quality among brands.⁴⁸ A positive advertising-quality relationship may exist for innovative goods or if the quality choice of goods depends on consumers' experience or search. As they explain, this finding is "consistent with advertising as information, if higher quality goods have more features or capabilities (which buyers learn from verifiable advertised information)".⁴⁹ That is, advertising is not a quality signal but directly informs about verifiable product quality. They also find that advertising for convenience goods⁵⁰ is weakly related to quality. Finally, they conclude that on average, advertising and quality is not correlated.

Moreover, Nichols (1998) empirically evaluates intra-industry data of the U.S. automobile market in the period 1985-1990. In particular, he predicts that automobile advertising may directly affect demand and indirectly inform high quality. Firstly,

⁴⁸ The use of both multi-product and cross-section data is criticized by Nichols (1998), because it involves product and/or firm heterogeneity and potential bias may arise in estimation. This may potentially result in a failure to find a positive advertising-quality relationship.

⁴⁹ Caves and Greene, 1996, p. 50.

⁵⁰ Convenience goods are low valued, frequently purchased and easily available in retail outlets, such as toothpastes.

results show that advertising plays a dual role in the car industry: it signals high quality to uninformed / imperfectly informed buyers and directly provides product information (about prior quality). Secondly, when controlling for prior quality and testing quality improvements, he finds that the signaling role of advertising prevails over its informative role. Hence, he suggests that for experience goods, "it is the level of advertising, not necessarily the information content, that provides information to consumers".⁵¹ This is consistent with Nelson's (1974) intuition. Thirdly, the positive advertising-quality relationship is at the peak when the quality improvement from the previous year's model is substantial, where there is little or no prior quality information. Analytically, when the informative effect of advertising is sufficiently small, quality signaling is the primary function of advertising in the U.S. car industry.

Similarly, Thomas, Shane and Weigelt (1998) employ data from the U.S. car industry between 1980 and 1993 to empirically test the advertising signaling hypothesis. Results exhibit a mixture of high price and advertising quality signals and are in support of a positive advertising-quality relationship. Moreover, the results show that the high-quality firm advertises more in order to enjoy greater future sales, and this is consistent with the idea of Milgrom and Roberts (1986).⁵² They also find that the advertising-quality relationship changes in the product life cycle. Specifically, the relationship is significant and positive for cars more than six but less than ten years old (in the expansion stage), while the association is less strong or non-significant for cars less than six or more than ten years old (respectively, in the

⁵¹ Nicolas, 1998, p. 2.

⁵² See Section 4.2.

introductory and mature stages). Broadly speaking, this reflects a non-monotonic advertising-quality relationship.

To summarize, the literature suggests that the relationship between advertising and quality varies across circumstances. Nevertheless, a common thread is that the positive advertising-quality relationship is the strongest when quality differences are intermediate, or when products are mildly close substitutes (neither perfect nor poor substitutes).

4.2 Advertising as a signal of product quality

Advertising may be directly informative and/or indirectly signal quality to the uninformed consumers.⁵³ The question here is: when is advertising used as a quality signal? Theoretically, when a high-quality firm finds it necessary and profitable to distinguish itself from a low-quality firm, advertising may be used as a quality signal to influence consumers' beliefs and discourage mimicry. Besides, separation can be in terms of price and/or advertising distortion compared with the full-information level. Which is the best signal for a high-quality firm depends on the least cost and most efficient device.

The signaling literature on advertising deals mostly with experience goods. The necessary conditions for the existence of advertising in a *separating equilibrium*⁵⁴ are complex, due to factors such as cost differences and repeat purchases (Milgrom and Roberts 1986), the pool of informed consumers (Linnemer 2002), vertical product

⁵³ See footnote 42.

⁵⁴ In a separating equilibrium, a high-quality firm credibly signals its quality by adopting a price-advertising pair to maximize profits and make mimicry too costly for a low-quality firm. Buyers infer quality by observing the price-advertising pairs. In contrast, in a pooling equilibrium, consumers can't distinguish between high and low quality due to the identical price-advertising strategies used by both types of firm.

differentiation (Hertzenford and Overgaard 2001; Fluet and Garella 2002), and imperfect learning (i.e. consumption experience imperfectly reveals quality) (Horstmann and McDonald 1994).

Milgrom and Roberts (1986) formalize Nelson's theory in a two-stage signaling game with repeat purchases,⁵⁵ incorporating price and dissipative advertising as a mix signal of high quality for newly introduced experience goods. The separating equilibrium entails that a high-quality monopolist charges an introductory price from the full information level⁵⁶ and advertises to distinguish its quality, while the low-quality firm stays at its full-information optimum. Whether a joint signal or a price-only signal is used hinges on minimizing the costs of the signal. That is, it depends on "the difference in costs across qualities".⁵⁷ This is an early note that cost differentiation affects the advertising-quality relationship.

The separation mechanism is complex. The product quality is either high (H) or low (L), and marginal cost is either $C(H)$ or $C(L)$. In the polar cases where $C(H)$ is very high or very low, dissipative advertising is not used and price alone sufficiently signals high quality, making mimicry unprofitable.⁵⁸ However, when $C(H) > C(L)$ and the cost difference is not too big (given that the L firm has an incentive to cheat

⁵⁵ Assumptions of the model include: 1) Only first-period buyers will purchase in the second period, and if they are satisfied with the quality after consumption, they will repeat purchase in the second period. 2) Marginal costs may increase or decrease with quality. 3) Initial sales increase with the perceived quality and repeat sales increase with the actual quality. 4) Consumers value high-quality products more. 5) Expected profits increase with perceived quality rather than actual quality. Thus, consumers' beliefs about quality matter.

⁵⁶ The signaling price corresponds to the price of the perceived quality, while the full-information price refers to the price of true quality.

⁵⁷ Milgrom and Robert, 1986, p. 819.

⁵⁸ 1) If $C(H)$ is very high, the H firm charges a high initial price to cover high costs at the expense of losing initial sales, while the L firm doesn't mimic since it enjoys high markups from low costs and expands sales from the sale loss of the H firm. 2) If $C(H)$ is very small, the H firm enjoys its cost advantage and charges a low initial price to create current demand and thus high repeat purchases, while it is unprofitable for the L firm to imitate. In both cases, it is not necessary to use advertising as a signal of quality.

buyers into believing that its quality is high by mimicking the high price), dissipative advertising may emerge together with a high introductory price to signal quality.⁵⁹ The intuition is as follows. The impact of raising the introductory price on profits is different between the H and L firms. There are two considerations. In the first period, the profit loss from a high price signaling of the H firm is less than that of the L firm, since the H firm enjoys a larger production cost saving from demand reductions. However, in the second period with repeat sales, the profit loss from a high price signaling of the H firm may be higher than that of the L firm, since it loses a higher percentage of first-period buyers who are the base of second-period repeat purchasers. If the net impact of the conflicting effects (in the two periods) leads to equalized costs of raising the initial price for both firms, a high initial price alone fails to reveal the high quality and a higher price signal is more expensive for the H firm. Hence, a high-quality firm best signals its quality with dissipative advertising and a high introductory price, since the mix signal is credible and is less costly.⁶⁰ From this perspective, advertising helps the price to efficiently signal high quality. Clearly, in the model, if dissipative advertising occurs for separation (together with a high price signal), it is only used in the introductory period rather than in the repeat purchase period where quality is fully revealed.

Following Milgrom and Roberts (1986), a number of researchers have extended

⁵⁹ Kihlstrom and Riordan (1984) offer a model where a monopolist is a price taker. They find that dissipative advertising may signal high quality for new experience goods if the high-quality product has lower marginal costs. The high-quality firm enjoys high markups from its cost advantage and profitably advertises, while the low-quality firm is unable to cover costs if mimicking. New buyers may thus infer high quality from heavy advertising when price is not a signal of quality.

⁶⁰ On the other hand, if the net effect differs between H and L, a high introductory price credibly signals quality and advertising is not used.

the signaling model in different ways. Hertzendorf (1993) considers a monopoly model where there is no mix signal in separating equilibrium, departing from the model of Milgrom and Roberts (1986) in which price and advertising may be simultaneously used to signal quality. Hertzendorf suggests that advertising is used only if price is independent (uninformative) of quality, while advertising is unnecessary if price alone fully reveals quality. This implies that in separating equilibrium, either price or advertising signals quality. Besides, in the model, there is an advertising signal loss in which a buyer cannot perfectly observe advertising, and thus the observed level of advertising is lower than the actual exposure level. Since a buyer cannot distinguish between his failure to observe advertising and no advertising at all, he may not correctly identify quality from his observation. This allows the low-quality firm to imitate the high-quality firm simply by price matching. Then the high-quality firm may have to advertise continuously to reduce the advertising signal loss and deter mimicry. He suggests that advertising noise may explain the realistic observations of persistent advertising campaigns.

Horstmann and McDonald (1994) develop a two-stage model where consumers imperfectly learn about quality through consumption, and marginal costs are independent of quality in monopoly. The main feature is that the quality of an experience good cannot be perfectly inferred by consumers upon use. This means that consumption experience is imperfectly informative about quality, and consumer beliefs about quality remain uncertain after consumption. Accordingly, although buyers are more likely to be satisfied with high-quality products, they do not have

persistent quality satisfaction. This is in contrast to the perfect learning model of Milgrom and Roberts (1986) in which a buyer's first-period consumption fully reveals quality. The idea is as follows: when the product is newly introduced, there is no separating equilibrium such that neither price nor advertising is used as a signal to reveal quality; when the product is established and buyers have consumption experiences, the expected number of satisfied buyers is larger for the high-quality firm. In equilibrium, the high-quality firm finds it profitable to signal its quality by advertising and charging a high price to satisfied buyers. Put together, Horstmann and McDonald provide a different prediction in terms of learning that advertising signaling is not used in the introductory stage but in the established stage (together with a high price signal).⁶¹

More recently, Linnemer (2002) sets up a static model with durable (one time purchase) experience goods, in which dissipative advertising may be jointly used with a high price to signal quality. It is assumed that some consumers are informed (about quality) while others are not. The static model is different from Milgrom and Roberts' (1986) two-stage model with non-durable (repeat purchase) experience goods. As Linnemer suggests, however, the pool of informed buyers in his setting corresponds to the second-period repeat purchasers in the Milgrom and Roberts (1986) model. The induced incentive for a high-quality monopolist to use an advertising signal is generally the same in the two models. Linnemer (2002) finds that without repeat purchase, dissipative advertising can be a signal of quality if the fraction of informed

⁶¹ Horstmann and McDonald (1994) indicate that in the imperfect learning model, if advertising is used, it is an imperfect signal of quality for established goods.

buyers is modest. However, dissipative advertising is not used if the group of informed buyers is too small or too large.

The intuition is as follows. 1) If the pool of the uninformed is very large, the cost of advertising is high if a firm advertises. The best signal for the high-quality firm is a high introductory price and no advertising. 2) If the pool of the uninformed is modest and more buyers know about the true quality, the high-quality firm signals with dissipative advertising and a lower price (but still above the full information level). Put differently, the use of dissipative advertising shares the signaling costs with price, causing prices to slightly fall and sales to increase.⁶² 3) If the pool of the uninformed is very small, the signaling price is slightly above the full information level and advertising becomes unnecessary, since advertising fails to further affect consumers' perception of quality when a significant pool of informed buyers already know the true quality. It is shown that high signaling prices declines over time.

Linnemer (2002) shows that without repeat purchases, dissipative advertising is used as a quality signal when the pool of informed buyers is modest. On the other hand, in the presence of repeat purchases, as in the model of Milgrom and Roberts (1986), introductory advertising is used as a signal of quality to influence quality perceptions of the uninformed and create initial and future sales. The latter view may explain the real-world observations of advertising campaigns for newly introduced products. Nevertheless, in both cases, dissipative advertising is jointly used with price, contributing to price signaling for a credible and least cost separation.

⁶² When the pool of informed buyers is intermediate, raising the price to signal quality is more costly for a high-quality firm, since the potential profit loss from losing an informed buyer due to the price hike is greater for a high-quality firm than a low-quality firm. Thus, dissipative advertising is necessary for separation.

To summarize, the existence of advertising signaling in a separating equilibrium largely relies on the specific assumptions of the model. Nevertheless, in a market with quality uncertainty, if a high-quality firm is to separate its quality, it always chooses a quality signal (price, advertising or both) at minimal cost and thus achieves the highest pay-off.

5. Advertising and entry

“The idea that advertising investment can act as a barrier to entry is almost as old as the study of industrial organization itself”.⁶³ One literature predicts that advertising creates product differentiation and brand loyalty, reduces demand elasticity, and constitutes an entry barrier. By contrast, another literature claims that entrants can use advertising to convey product information and increase demand elasticity, and that in consequence advertising is an effective way to promote the entry of new products and facilitate entry. Empirical evidence on the effects of advertising on entry is mixed.

5.1 Theoretical studies

In his seminal work of 1956, Bain indicates that incumbents may block, deter or accommodate entry in the face of an entry threat.⁶⁴ He also specifies that four important factors serve as entry barriers: economies of scale, absolute cost advantages, product differentiation, and capital requirements. Holding the above advantages over potential entrants, the established firms may profitably charge prices above the

⁶³ Church and Ware, 1999, p. 564

⁶⁴ Entry is blocked if entry is not profitable, in which case the incumbent behaves as if there were no threat of entry. Entry is deterred if the incumbent adopts strategic actions (distorts his behavior) and makes entry unprofitable. Entry is accommodated if the incumbent finds it too costly to deter entry and thus allows entry. See Tirole, 1988.

competitive level without inducing entry. He considers that advertising, as an important source of product differentiation, may act as a barrier to entry.

The early limit-pricing literature predicts that an incumbent can deter entry by committing to a low pre-entry price such that an entrant would find it unprofitable to enter. The game-theoretic literature incorporates signaling into the limit-pricing model with incomplete information, in which price and advertising are the two most important strategic tools for signaling and deterring entry. The basic idea is that a low-cost incumbent may use pre-entry pricing and/or advertising to signal its private information (low costs or insufficient demand) to a potential entrant, in order to influence the entrant's belief about post-entry profits. Consequently, an entrant observes signals, infers the demand as well as cost conditions and the incumbent's potential reaction to entry (fight or accommodate), and thereby makes its entry decision based on its expected post-entry payoff.

Under imperfect information with cost uncertainty, the incumbent may deter entry by either using a low price to signal its low costs of production and a low profitability from entry (Milgrom and Roberts 1982), or by distorting both advertising upward and price downward to signal its low costs and unprofitable entry (Bagwell and Ramey 1988). In the model of Bagwell and Ramey (1988), the entrant infers the incumbent's cost type, stays out if the incumbent has high costs, and enters only if the incumbent has low costs. In order to reveal that its costs are low and that entry is unprofitable, the low-cost incumbent chooses a combination of low price and high advertising that would maximize profits as if its marginal cost was reduced. This reflects that limit

pricing and incurring greater advertising by the incumbent may deter entry.

In an important work, Sutton (1991) predicts that sunk costs (in the form of advertising) affect the relationship between concentration and market size. Sutton distinguishes between two types of industries. The former type of industries is associated with homogenous or horizontal differentiated goods, in which sunk costs are exogenous setup costs. For instance, a minimum level of advertising is required for entering into such industries. By contrast, the latter type of industries is associated with vertically differentiated goods, in which endogenous sunk expenditures are choice variables such as advertising and R&D. For example, as the market expands, a firm may decide to invest in advertising in order to differentiate its product quality, increase consumers' willingness to pay and capture subsequent demands.

When sunk costs are exogenous, as in the traditional view, the relationship between concentration and market size is negative. That is, as market size increases, profits increase and this attracts entry, firm numbers rise, and concentration falls monotonically then finally converges to zero (i.e. a fragmented structure).

By contrast, when sunk advertising costs are endogenously determined, Sutton (1991) predicts that the negative concentration-market size relationship no longer stands. Instead, the equilibrium concentration doesn't converge to zero, but to above zero. As market size increases, the incentive to sink advertising costs to gain market shares increases, but the number of firms does not rise since the expanding demands are captured by incumbents who leave no room for profitable entry.⁶⁵ In consequence,

⁶⁵ As Sutton states (1991, p. 47), "If it is possible to enhance consumers' willingness-to-pay for a given product to some minimal degree by way of a proportionate increase in *fixed cost* (with either no increase or only a small

as the market becomes large, the market structure does not fragment compared with the case of exogenous sunk costs. Sutton (1991) also empirically analyzes his predictions of the concentration-market size relationship by employing data from homogenous goods and advertising-intensive industries in the food and drink sector, and finds evidence supports his predictions. In brief, Sutton (1991) highlights that the concentration-market size relationship is no longer monotonic with endogenous (advertising) sunk costs, and he offers some empirical support for the hypothesis that as market size increases, the escalation in endogenous advertising may constitute a barrier to entry.

However, there is another literature considering that informative advertising is not a barrier to entry. Modifying the model of Schmalensee (1983), Ishigaki (2000) employs a Bertrand model in the post-advertising stage to allow firms to compete in price after sequentially advertising. This is a three-stage game in a homogenous-good market. In the pre-entry stage, the incumbent advertises. In the second stage, the potential entrant decides whether to sink advertising costs to enter. If the entrant enters, it advertises. In the post-entry (oligopoly) stage, firms simultaneously set prices. Ishigaki finds that informative advertising is unable to strategically deter entry, rather, it blocks or accommodates entry. This is in contrast to the Cournot entry-deterrence model of Schmalensee (1983), in which firms compete in quantity in the post-advertising stage, the incumbent strategically under-invests in pre-entry

increase in unit variable costs), then the industry will not converge to a fragmented structure, however large the market becomes". This may be interpreted that advertising sunk costs have two effects: they raise fixed costs of entry, increase consumers' willingness to buy for the advertised goods by influencing their perception about product quality and enable incumbents to expand subsequent market shares. In this sense, the escalation of endogenous advertising makes entry difficult. See also Church and Ware, 1999.

advertising to deter entry, and informative advertising has entry-deterrence effects. Thus, Ishigaki suggests “an incumbent’s ability to deter entry through informative advertising in a homogenous-product market is sensitive to whether firms compete in prices or quantities”.⁶⁶

5.2 Empirical results

Part of the empirical literature examines whether advertising constitutes a structural barrier to entry. A few recent empirical studies focus on incumbents’ strategic reactions in advertising in the event of entry.

5.2.1 Advertising with no entry-deterring effect

Following the key insights of Bain (1956), some empirical studies directly analyze whether advertising affects entry. In contrast to Bain’s work, empirical findings suggest that advertising is not a significant entry barrier.

Eckard (1991) empirically analyzes the effect of the 1970 U.S. ban on TV advertising for cigarettes. Eckard predicts that entry is more difficult after the ban if advertising promotes competition, and that entry would be easier after the ban if advertising increases market power. During the sample period of 1960-1980, the six leading producers accounted for at least 99.5% of domestic cigarette sales, there is no firm entry and thus he examines new brand introductions. Using data on twenty-four brands sold by six leading cigarette firms, Eckard finds that “new brand entry ceased during the first four years after the ban, resuming only in conjunction with a substantial increase in advertising intensity”.⁶⁷ Clearly, the results coincide with the

⁶⁶ Ishigaki, 2000, p. 342.

⁶⁷ Eckard, 1991, p. 132.

pro-competitive view that advertising is not a barrier to entry. Eckard (1991) also finds that the markups of the U.S. cigarette industry increase after the 1970 ban on TV advertising. He reports that both brand and firm market shares are more stable after the ban. In addition, shares of the leading-brand fall before the ban and become stable after the ban.

In an extended entry model that incorporates both limit-pricing and stochastic-replacement views of entry, Baldwin and Rafiquzzaman (1995) empirically examine the existence of entry barriers as well as the extent to which barriers affect entry, and find that the entry-deterrence effect of advertising is not significant. They propose a stochastic-replacement view that entry is a dynamic concept and that entry and replacement always take place, assuming that entry occurs even when industry profits are zero. In their endogenous entry model, explanatory variables consist of two sets of variables: choice variables, which capture the traditional concept of limit-pricing, that include anticipated profits, market risks and barriers to entry (i.e. economies of scale, concentration, advertising intensity and research and development intensity); and appended stochastic-replacement variables that include market size and industry growth. In principle, market size, industry growth, and anticipated profits are expected to stimulate entry, while entry barriers and market risks are expected to deter entry.

Using data at the four-digit SIC level for the Canadian manufacturing industry in the period 1970-1979, Baldwin and Rafiquzzaman measure the rate of entry and the average size of entrants. They find that the effect of advertising on entry is

insignificant, and that the effect of research and development on entry is positive in the short and long run but is significant only in the short run. They also find that concentration and scale economies negatively affect entry. However, the evidence also shows that in concentrated industries, the scale of entry is not small and the success rate of entrants is high. Put together, this suggests that concentration may lower the entry rate but it does not negatively affect the size of entrants. Additionally, the scale of economies as an entry barrier matters only in small-firm industries (no more than 30 firms). Hence, they conclude that structural barriers exist but “they impeded entry only for industries in which there was a relatively small number of firms”.⁶⁸

Scott Morton (2000) empirically examines whether brand advertising is a barrier to the entry of generic firms in the U.S. pharmaceutical industry. In that industry, established firms might be given a long period of legal monopoly power in the form of patent rights, which makes entry possible only after the patent expiration. As Bain (1956) indicates, patents are one of the sources for product differentiation advantages of incumbents over entrants.⁶⁹ Using data on 98 branded drugs that lost patent protection between 1986 and 1991, she estimates the effect of pre-entry (before patent expiration) advertising with two different predictions. One is exogenous advertising as other studies would predict, and the other is endogenous advertising. When advertising is an explanatory variable to the entry decision, she reports that pre-entry advertising has a very small effect on entry. As she argues, however, advertising is

⁶⁸ Baldwin and Rafiqzaman, 1995, p. 378.

⁶⁹ Martin, 2002.

not exogenous since expected profits affect the level of advertising and largely determine the rate of generic entry. Accordingly, she assumes that advertising is endogenous, instruments for incumbent's pre-entry advertising in an equation that estimates entry and reports that the coefficient of advertising is insignificant. That is, incumbents' pre-entry advertising has no entry-deterrence effect on generic firms. She concludes that advertising does not constitute an entry barrier in the U.S. pharmaceutical industry.

5.2.2 Advertising as a strategic response to entry

A few recent empirical works tend to study how incumbents respond to entry, suggesting that advertising is an important strategic tool⁷⁰ and that incumbents may use advertising as well as pricing strategies in response to entry.

Kadiyali (1996) empirically examines entry, its deterrence and its accommodation in the U.S. photographic film industry between 1970 and 1980. Using the NEIO approach, she sets up and estimates a structural specification of demand and constant marginal costs. Her findings are as follows. 1) In the pre-entry period (1970-1980), Kodak acts as a monopolist, enjoys high markups, and deters entry by adopting a low price and high advertising strategies in the face of Fuji's entry threat. Indeed, pre-entry advertising makes entry harder. A potential explanation for this finding is that the incumbent distorts its price downward and advertising upward in order to signal its low costs and deter entry.⁷¹ 2) The entry of Fuji occurs in 1980.

⁷⁰ The strategic behavior literature suggests that an incumbent may decide to make entry-detering investments facing the threat of entry. Strategic tools used to deter entry include limit pricing, advertising, research and development, and excess capacity. See Martin, 2002.

⁷¹ Bagwell and Ramey, 1998. See Section 5.1.

Kodak is compelled to accommodate Fuji, the efficient entrant who has demand advantages (as characterized by a low price and advertising elasticity) and absolute cost advantages over Kodak.⁷² 3) In the post-entry period (1980-1990), Fuji and Kodak jointly adopt limit pricing (but above Nash levels) and high advertising strategies to deter further entry. The two firms behave collusively in price as well as advertising and they are better off in jointly maximizing profits. Clearly, incumbents over-invest in advertising to deter further entry. Moreover, Kadiyali finds that both price and advertising are strategic complements. That is, an increase in a firm's price or advertising increases its rival's profits. This supports the beneficial market-expanding effect of advertising.

Thomas (1999) empirically analyzes how incumbents react to entry in the U.S. ready-to-eat cereal industry. In this industry, branding and advertising play key roles in influencing consumers' brand choices, and new product introductions are frequent. He uses the data of 112 cereals introduced between 1971 and 1989, out of a total of 129 cereals. First, he predicts that an incumbent often reduces the scale of entry or deters entry by using lower prices to build a reputation of fighting entry, by sinking great advertising costs to raise fixed costs of entry and expand its demand,⁷³ or by launching its new products to limit or deter the entry of the rival's new products. Next, he sets up equations of price, advertising and market shares for estimation, taking entry as given and the rival's price as well as advertising as given. Following

⁷² As Kadiyali (1996) explains, she examines both product differentiation and absolute cost advantages as causes of entry and accommodation. In her model, entry and accommodation are functions of demand and costs. She rules out economies of scale by assuming that marginal costs are constant, and rules out capital requirements by not explicitly modeling fixed costs.

⁷³ This prediction is in line with Sutton's (1991) theory.

Dorfman and Steiner (1954),⁷⁴ Thomas specifies that endogenous advertising is a function of price, marginal cost, quantity, and the rival's advertising.

Thomas' findings suggest several results. (1) Prices are strategic complements, and incumbents accommodate on price while rival incumbents are more accommodated than new entrants. Considering that the price accommodation may be specific for the cereal industry, however, he does not rule out the possibility of aggressive price responses from incumbents, especially in the presence of large-scale entry. (2) Incumbents aggressively respond by increasing advertising to restrict the scale of entry. (3) Advertising outlays are strategic substitutes. In addition, advertising has a mildly predatory effect. That is, as a firm's advertising increases, its market shares modestly increases by stealing business from its rival.⁷⁵ It is clear that an incumbent increases its advertising expenditures as a strategy of responding to entry.

Since empirical work offers mixed support, it appears that the debate over the entry effects of advertising is not resolved.

6. Conclusions

This paper reviewed the main theoretical studies of the economic effects of advertising as well as the main empirical results.

⁷⁴ Dorfman and Steiner (1954) analyze the optimal level of advertising of a profit-maximizing firm and establish a well-known optimal condition: the advertising-sales ratio equals the ratio of the advertising demand elasticity to the product demand elasticity, or the product of the advertising demand elasticity and the price cost margin. In other words, the causation is from profits to advertising, in that the greater the profits, the higher the advertising-sales ratio and advertising expenditures.

⁷⁵ The result (3) of Thomas (1999) is similar to that of Slade (1995), who empirically studies product rivalry in the saltine cracker market in Williamsport, Pennsylvania. In her dynamic model, there is interaction between the price and advertising strategy. She finds that prices are strategic complements while advertisements are strategic substitutes. Facing the possibility of entry, incumbents respond aggressively in advertising but accommodate on prices and this softens price competition. Moreover, advertising is modestly predatory and it also has a positive effect on market size.

The literature distinguishes between informative and persuasive advertising, taking into account the conflicting effects of advertising on price, product differentiation and welfare. In general, informative advertising is pro-competitive, reduces product differentiation, lowers prices and improves social welfare. By contrast, persuasive advertising is anti-competitive, increases perceived product differentiation, raises prices and induces a social loss. Regarding the welfare implications of advertising, disagreements persist since it is often difficult to infer the net impact of the conflicting effects.

The theoretical literature has increasingly suggested that product differentiation plays an important role in determining the effects of advertising. The degree of horizontal product differentiation may affect the correlation between advertising and price, while the degree of vertical product differentiation may impact the association between advertising and quality.

As to the effects of advertising on prices, a main thread of the theoretical and empirical literature is that informative advertising decreases prices while persuasive advertising increases them. The recent literature suggests that horizontal product differentiation may lead to a non-monotonic advertising-price relationship.

Advertising can directly inform about quality and/or indirectly signal it. The relationship between advertising and quality varies across circumstances. The recent literature indicates that vertical product differentiation may result in a non-monotonic relationship between advertising and quality.

Advertising signaling (about quality, cost or demand) is rooted in imperfect

information. Under imperfect information with uncertainty about product quality, a high-quality firm may use price and/or advertising to signal its high quality to consumers and discourage the mimicry of a low-quality firm. Rational consumers infer the unobservable quality by observing price and/or advertising signals and make purchase decisions. Nevertheless, the conditions under which advertising is used as a quality signal are complex, critically depending on the assumptions of the signaling model.

Similarly, under imperfect information with cost uncertainty about an established firm, a low-cost incumbent may have an incentive to adopt pre-entry limit pricing and/or high advertising strategies to signal its low costs, in order to limit or deter entry. A rational entrant then interprets the cost and demand conditions from signals, evaluates its post-entry profits and makes its entry decision.

There are two conflicting views of the relationship between advertising and entry. One is the anti-competitive view that advertising acts as an entry barrier. The other is the pro-competitive view that advertising does not deter entry. The theoretical and empirical findings are mixed. Nevertheless, a few recent empirical studies suggest that advertising is an important strategic tool and that an incumbent may increase its advertising investments as a strategic reaction to potential entry.

Overall, the effects of advertising are complex and mixed. There is no dominant view of the effects of advertising, valid in all markets and all circumstances.

This paper focused on the key economic effects of advertising. However, there are important gaps in the literature. Two areas seem particularly promising for future

research: targeted advertising and cooperative advertising.

The recent literature has addressed targeted advertising, which is intentionally distributed to reach a specific group of consumers. Since heterogeneous buyers have different valuations over brands, a profit-maximizing firm targets to attract the higher potential buyers through advertising. Shy (1995) proposes a simple model in which two firms (producing two differentiated brands) choose the best advertising method between informative and persuasive advertising, in order to capture a maximum number of either experienced or inexperienced buyers.⁷⁶ Soberman (2002) considers that a firm can target informative advertising to consumers who locate differently (closely to the firm or far from it) in a spatial market.⁷⁷ Esteban, Gil and Hernandez (2001) offer a monopoly model in which the use of targeted informative advertising may raise prices, lower the level of advertising, and the resulting social loss from the higher monopoly power may exceed the social gain from the increase of advertising efficiency. Many issues related to targeted advertising remain to be explored, like strategic segmentation of a market through targeted advertising (Roy 2000) and the choice of advertising strategies (mass advertising, targeted advertising and customer directed advertising) and their relevant market outcome (Esteban, Hernandez and Moraga-Gonzalez 2003).

Another topic worthy of further exploration is the cooperative effect of advertising.

⁷⁶ Shy (1995) finds that which advertising method will be adopted hinges on the relative size of experienced and inexperienced buyers, and their preferences. For instance, if the number of new buyers is larger than that of old buyers, both firms target new buyers by investing in persuasive advertising. Alternatively, if the pool of old buyers is large enough, both firms target old buyers through informative advertising. And if experienced consumers favor the brand of one firm, that firm will focus on informative advertising.

⁷⁷ Soberman (2002) finds that when product differentiation is modest and the firm targets remote buyers, prices decline with targeted advertising. While if the firm targets close buyers, prices increase with targeted advertising. However, when product differentiation is small, the results are reversed. This is in line with the key idea of his work that horizontal product differentiation is an important factor influencing the effect of advertising on prices.

In contrast to predatory advertising that induces a business-stealing effect, cooperative advertising increases market size, has the property of being a public good and will be under-invested in by firms in equilibrium.⁷⁸ The social planner may have a role to play in promoting cooperative advertising.

⁷⁸ An example of predatory advertising is the U. S. ready-to-eat cereal industry (Thomas, 1999), while an example of cooperative advertising is the U.S. photographic film industry (Kadiyali, 1996). See Section 5.2.

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