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A SIMPLE THEORY OF ADVERTISING AS A GOOD OR BAD*

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Our analysis treats advertisements and the goods advertised as complements in stable metautility functions, and generates new results for advertising by building on and extending the general analysis of complements. By assimilating the theory of advertising into the theory of complements, we avoid the special approaches to advertising found in many studies that place obstacles in the way of understanding the effects of advertising. We also use this approach to evaluate advertising from a welfare perspective. Whether there is excessive or too little advertising depends on several variables: the effects on consumer utility, the degree of competition in the market for advertised goods, the induced changes in prices and outputs of advertised goods, and whether advertising is sold to consumers.

I. INTRODUCTION AND SUMMARY

Most economists and other intellectuals have not liked advertisements that provide little information. Noninformative advertising is claimed to create wants and to change and distort tastes. Although we agree that many ads create wants without producing information, we do not agree that they change tastes. Our approach may at first blush appear strange: we include advertisements as one of the goods that enter the fixed preferences of consumers.

The usual definition of a "good" is something consumers are willing to pay for, and a "bad" is something consumers pay to have removed or must be compensated to accept. Both goods and bads are part of given utility functions. For example, horror movies are "goods" for the many people who pay to be frightened out of their wits, and garbage is a "bad" because people are willing to pay to have it removed.

These straightforward definitions of goods and bads suggest that noninformative advertisements are "goods" in utility functions if people are willing to pay for them—they need not actually pay in equilibrium—and such advertisements are "bads" if people must be paid to accept them. If advertisements are considered

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utility and "taste shifters" rather than goods, why aren't horror movies, cars, opera, and many other things that consumers buy?

To be sure, consumers may respond to the social and psychological pressures generated by advertisements. But they also respond to such pressures when considering dinners at prestige restaurants, ownership of Mercedes cars, and many other goods.

Advertisements "give favorable notice" to other goods, such as Pepsi-Cola or cornflakes, and raise the demand for these goods. In consumer theory, goods that favorably affect the demand for other goods are usually treated as complements to those other goods, not as shifters of utility functions. There is no reason to claim that advertisements change tastes just because they affect the demand for other goods.

Our analysis treats advertisements and the goods advertised as complements in stable metautility functions, and generates new results for advertising by building on and extending the general analysis of complements. By assimilating the theory of advertising into the theory of complements, we avoid the special approaches to advertising found in many studies that place obstacles in the way of understanding the effects of advertising. By removing these obstacles, a clearer picture of these effects emerges.

Clearly, very few advertisements are sold separately and directly to consumers. Ads may be given away, as those in direct mail and billboard advertisements, or they may be sold jointly with programs, newspaper articles, comics, sports pages, etc. The special properties of advertising markets are responsible for important differences between the positive and normative analysis of advertisements and that of many other complements.

Section II sets out the basic model that treats advertisements with the theory of the demand and supply of goods (or bads) that are complements to consumers. We emphasize two cases: either advertisements are given away free and rationed to consumers; or they are sold to consumers, possibly jointly with other ads and goods, and possibly at subsidized, even negative, prices. This section contrasts our approach with the traditional one that treats advertisements as shifting tastes. Ours has the major advantage that it readily incorporates the demand for advertising into the theory of rational consumer choice, and has the usual implications of utility theory concerning symmetry conditions and negatively inclined demand functions.

Section III discusses the relation between advertising and industrial structure. The well-known theorem [Dorfman and

Steiner, 1954] that the incentive to advertise rises as the elasticity of demand for the advertised good falls is shown to be highly misleading, for the incentive to advertise may rise, not fall, as a market becomes more competitive. The reason is that the effect of advertising on the price of the good advertised may rise as the elasticity of demand for this good increased. Section III also demonstrates that advertising tends to raise elasticities of demand for goods advertised by lifting the demands of marginal consumers.

Section IV uses our approach to evaluate advertising from a welfare perspective. Whether there is excessive or too little advertising depends on several variables: the effects on consumer utility, the degree of competition in the market for advertised goods, the induced changes in prices and outputs of advertised goods, and whether advertising is sold to consumers. We show that treating advertising as shifting tastes prejudices a welfare analysis toward the conclusion that advertising is excessive. We avoid that prejudice without implying that firms supply the socially optimal amount.

Section V considers the properties of radio and television, and shows that advertisements attracted to these media tend to lower the utility of viewers. This may also be true of some advertisements that use other media. Advertisers provide utility-raising programs to compensate viewers for exposing themselves to the ads. Even when the programs compensate viewers fully, we reach the strange-sounding conclusion that advertisers would profit from utility-reducing ads that sufficiently raise marginal demands for the goods advertised.

Many implications of a model of advertisements as goods in stable utility functions are similar to the implications of models where advertising provides information or lies about the goods advertised (see, e.g., Grossman and Shapiro [1984]). But there are differences: for example, the information approach to advertising has trouble explaining advertisements that lower consumer utility (see Section V).

Moreover, it is also "obvious" that many ads provide essentially no information. Rather, they entertain, create favorable associations between sexual allure and the products advertised, instill discomfort in people not consuming products popular with athletes, beauties, and other elites, and in other ways induce people to want the products. Table I gives the U. S. companies with the ten largest ratios of advertising expenditures to sales in the first quarter of 1988. Chewing gum, cereal, beer, or cola ads, to take a

TABLE I
TEN COMPANIES WITH LARGEST ADVERTISING TO SALES RATIOS AMONG MAJOR NATIONAL ADVERTISERS

	Advertising sales	Primary business
1. Noxell Corporation	0.18	Toiletries
2. William Wrigley, Jr. Co.	0.17	Food
3. Kellogg Company	0.13	Food
4. Warner-Lambert Company	0.10	Pharmaceuticals
5. Alberto-Culver Company	0.10	Toiletries
6. Adolph Coors Company	0.10	Beer
7. Hasbro, Inc.	0.09	Toys
8. Schering-Plough Corp.	0.09	Pharmaceuticals
9. Coca-Cola Company	0.07	Soft drinks
10. Proctor and Gamble Co.	0.07	Soaps and cleaners

Source. Advertising Age, August 22, 1988
Advertising/sales is for first quarter, 1988.
From set of "100 leading national advertisers."

few of the ads produced by companies on the list, surely usually convey very little information.

Some recent literature agrees that much advertising provides little *direct* information about the goods advertised, but they are said to provide information to consumers *indirectly* by signaling the quality of the goods advertised (Nelson's [1974] study pioneered this approach; also see Kihlstrom and Riordan [1984] and Horstmann and MacDonald [1987]). We do not believe that the intensive advertising for Miller beer, Chevrolet cars, or Marlboro cigarettes, to take a few examples,[15] is signaling exceptionally high product quality. But we shall not try to compare systematically the implications of our model of advertising as a good with a signaling model, beyond pointing out that in the signaling approach, demand can be affected by advertising even when consumers are not exposed to the content of the ads, whereas in our approach demand can be affected only through exposure. Moreover, the pure signaling interpretation implies that companies should advertise how much they spend on advertising, yet almost no companies do that.

Our study builds on important work by others. Dixit and Norman [1978] provide the best formulation of the taste-shifting approach. Telser [1962, 1964] gives a pioneering analysis that includes advertisements as part of given consumer preferences; also see the comment on Dixit and Norman by Fisher and McGowan [1979]. The discussion of advertising in Ehrlich and

Fisher [1982] stresses the importance of advertising in economizing on time. Kaldor [1949–50] has a good early analysis of advertising that discusses both positive and normative economic issues. Comanor and Wilson [1974, Chapter 2] and Barnett [1966] briefly mention that advertisements on radio and television may be "bads." Stigler and Becker [1977] show why perfectly competitive firms may advertise. Analytically, our discussion of the complementarity between advertising and goods advertised is closely related in several respects to Spence's [1976] important analysis of product quality; also see Tirole [1988] and Shapiro [1982].

Although some of our discussion can be found in this earlier literature, apparently no one has worked out the many positive and normative implications of treating advertisements as part of the stable preference structure of consumers. This is the goal of our paper.

II. A Model of Advertising

a. Modeling Considerations

Consider a single-period utility function that depends on goods x and y, and A, advertisements for x:

$$U = U(x,y,A). \tag{1}$$

By definition, advertising gives "favorable notice" to the good advertised, so that an increase in A raises the relative marginal utility of x. We assume that regardless of market structure, consumers can buy all they want of x and y at fixed prices. But this may not be an appropriate assumption for advertisements. Indeed, most discussions of advertising in the economics literature simply assume without much justification that advertisements are given away rather than sold to consumers. They produce revenue indirectly by raising the demand for the good advertised. Therefore, only producers of that good would be willing to pay for the advertisements since they are the only ones who benefit. Producers who give away advertisements want to limit quantities to consumers since they balance the indirect revenue in the market for the good advertised with the cost of supplying additional ads.

Consequently, the dominant model of advertising assumes both that advertisements are given away to consumers, and that quantities are controlled by producers of the goods advertised. This view is so imbedded in thinking about advertising that activities

which violate either of these conditions are simply not considered "advertisements," even when they obviously give "favorable notice" about other goods and services. For example, sports columns in newspapers provide plenty of notice about local professional teams, even though sports sections are not free to readers, and team owners do not pay for the columns. The strike of Pittsburgh's two newspapers in mid-May 1992 was said to have reduced sales to games of the Pittsburgh Pirates baseball team by 3000 to 4000 tickets a game [Klein, 1992].

In this example, sport analysis and description are produced jointly with advertising for teams. In other cases, firms help advertise certain goods because of complementarities between the goods advertised and the goods supplied by these firms. But whatever the reason, there are many examples of advertising that violate one or the other of the two standard assumptions of advertising models.

The assumption that producers choose the quantity of advertising to consumers is intrinsically tied to the approach that assumes advertising shifts tastes. For such an approach has no way of determining how consumers make their choices about advertising. It resolves what otherwise would be a serious dilemma by assuming that producers determine the quantity of advertising available to consumers at a zero price. By contrast, when advertising is part of stable metapreferences, consumer demand for advertising is a straightforward implication of utility maximization (see equation (6)), and it is no longer necessary to assume that advertising is free and that producers control its quantity.

The usual model with a zero price of advertising and quantities controlled by advertisers does apply to direct mail advertisements, although consumers can discard these mailings without looking at what is inside. But it is doubtful how well it explains newspaper ads or those on radio and television.

For example, the quantity of newspaper ads available to consumers is not rationed, and these ads are not necessarily free to readers. The implicit price for these ads is measured by the difference between the actual cost of newspapers to consumers and what it would be if papers did not have the ads.

The implicit price of advertisements in newspapers or on broadcast media may be negative, even if advertisements are part of consumers' stable utility functions. Advertisers could not charge a positive price for ads that yield zero or negative marginal utility, and consumers are usually indirectly paid to listen to radio ads and to watch those on television (see Section V).

Of course, the price charged for advertisements would be much more transparent if they were sold separately, the way oranges and fish are. But technological constraints and transactions costs often make it too expensive to sell ads separately. Prior to pay television, ads on radio or television could not be sold directly since there was no way to charge the audience for what they heard or watched. Ads in print could technically be sold on small pieces of paper, but transaction costs are greatly reduced by selling printed ads together in newspapers, along with information and entertainment.

A special problem arises when consumers are paid to take ads. It might not be profitable to allow them to take all they want at a fixed (negative) price per unit. For they might "buy" a large number and ignore as many as possible, as when remote controls are used to switch off ads on television. The difficulties of monitoring these consumers have led advertisers to control the supply as well as the prices of ads with negative prices.

Therefore, transactions costs and technological constraints in some, but far from all, cases support the usual assumption that advertisers rather than consumers determine the amount of advertising. Our discussion in this and the next section treats two polar situations: either advertisements are given away and the quantity is controlled by producers, or they are sold at a fixed (implicit) price per unit to consumers who can buy all they want. Section V considers the case where consumers must be paid to accept certain advertisements.

The production of advertisements is generally a very competitive industry, where advertisers hire agencies to prepare copy for them. Competition implies that the marginal cost to advertisers of a unit of advertising would equal the marginal cost of preparing it (c_a).

We start the systematic discussion with the conventional case, where advertisements are given away, with the quantity controlled by producers. A firm that determines x and A to maximize net profits $p_x(A)x - c_x x - c_a A = p_x x(A) - c_x x(A) - c_a A$ must satisfy

$$p_x(1 - 1/\epsilon_x) = c_x, \tag{2}$$

and

$$\frac{\partial p_x}{\partial A} x = \frac{\partial x}{\partial A}(p_x - c_x) = c_a, \tag{3}$$

where c_x is the unit cost of x, ϵ_x is the elasticity of demand for x,

$\partial p_x/\partial A$ holds x constant as p_x changes, and $\partial x/\partial A$ holds p_x as x changes. Equation (3) assumes that consumers are willing to accept the quantity of A given away by producers because the marginal utility of A is not negative (see equation (6)).

The first condition is the usual one when firms produce a single product (x). Since A is given away, the choice of x does not depend on the price of A, but, of course, it does depend on the quantity of A. The second condition shows that the entire value of A that is given away comes from its effect on the price and quantity of x. Although A's market price is zero, it has a shadow price to each consumer that equals the money value of the marginal utility of an additional advertisement (see equation (6)).

If instead of giving advertisements away, firms allow consumers to buy all they want at a fixed price p_a, the first-order conditions for x and A become

$$p_x\left(1-\frac{1}{\epsilon_x}\right)+\frac{\partial p_a}{\partial x}A=c_x \tag{4}$$

$$p_a\left(1-\frac{1}{\epsilon_a}\right)+\frac{\partial p_x}{\partial A}x=c_a, \tag{5}$$

where $\partial p_a/\partial x$ holds A constant, $\partial p_x/\partial A$ holds x constant, and ϵ_a is the elasticity of demand for A. See the relation between $\partial p_x/\partial A x$ and $\partial x/\partial A\ (p_x - c_x)$ in equation (3). If A raises the demand for x, the marginal revenue from an increase in A is partly due to an induced increase in p_x at a given x. Equation (5) shows that if $\partial p_x/\partial A$ is large, then the optimal value of A could be sufficiently large to lower p_a below c_a. Advertising would be sold below cost, even when it could be sold at a profit, if its complementary with the good advertised is sufficiently strong. The complementary is obvious with beer advertising on television during football games since many people drink beer as they watch a televised game.

A utility-maximizing consumer satisfies the following inequality both when advertising is sold and when it is not:

$$U_A \geq p_a, \tag{6}$$

where U_A is the marginal utility of advertising. If advertising is rationed, then $>$ holds; if it is also given away, $p_a = 0$, and $U_A > 0$. If consumers can buy all the ads they would at fixed prices, then equality holds.

When A is sold at a fixed price, nothing formally distinguishes advertising from an analysis of multiproduct firms, where the products are complements in consumption. For example, x and A

could also refer to cars and repair services or personal computers and software.

Since in our formulation advertising enters the consumer's utility function along with other goods, rational choice implies that advertising satisfies the symmetry conditions and other implications of utility theory. Therefore, this analysis implies that if advertisements are complements to goods advertised, those goods are complements to the advertisements. That is, greater consumption of advertised goods would raise the marginal utility from, and the demand for, advertising. This is a crucial implication of our approach, although some readers may be dubious about its validity.

We know of little evidence on this implication, but a study by several psychologists did find that people who have recently purchased a new car were more likely to read ads for the same type of car than for other types (see Ehrlich, Guttman, Schönbach, and Mills [1957]). The authors interpret these findings as evidence of cognitive dissonance, but our treatment of advertisements as complements to the goods advertised can explain them, perhaps including the finding that people who owned their cars for a while did not show more interest in ads for their type.

The positive implications of our approach differ in substance and not only in language from a more traditional approach that treats advertising as shifting tastes. Firm behavior is the same, once firms know the demand for advertising and how advertising affects demand for the goods advertised. But since the taste-shifting approach has no theory of consumer choice, it does not imply the various implications of consumer theory, and cannot explain how consumers choose among different ads that require time, money, or other scarce resources. In particular, this approach lacks the equivalent of equation (6), which is a first-order condition for consumers that determines their demand for advertising. It does not seem possible even conceptually for the taste-shifting approach to incorporate advertising into the theory of rational consumer choices.

By contrast, when advertisements are treated as part of given metatastes, consumer demand for advertising is subject to the same rules of behavior as their demand for other goods. These rules include consistent choices over time, symmetry between cross price effects, results about the effects of rationing on the demand for substitutes and complements, and so forth. Section IV makes clear that because the theories about behavior are so different, the welfare implications of the taste-shifting and stable tastes approaches to advertising are also very different.

b. Advertising and Consumer Surplus

A firm that rations the ads it gives away (so $p_a = 0$ and $\geq$ holds in equation (6)) can collect the marginal value of A to consumers only through the effect of the ads on the demand for x. Therefore, if the firm also charges for advertising, it might collect *more* than the value of A to consumers because the direct revenue from selling A (p_aA) is added to the indirect revenue in the market for x. Indeed, if the firm is setting market prices that clear the market for both x and A, it can collect twice for a small increase in A: once directly in the market for A and once in the market for x.

The source of the paradox is the effects of advertising on the ability of firms to extract consumer surplus in the market for the advertised goods. If greater advertising raises the demand for x by a constant amount, the entire increase in consumer surplus from the higher A accrues to the firm through the higher price for x, assuming that the quantity of x is held fixed (see Figure I). Additional revenue from the direct sale of A takes away some of the initial surplus. This conclusion about consumer surplus is not unique to advertising and applies to any complements produced by a firm (such as computers and their software) as long as increased quantities of one of them raises by a constant amount the negatively sloped downward curve for the other.

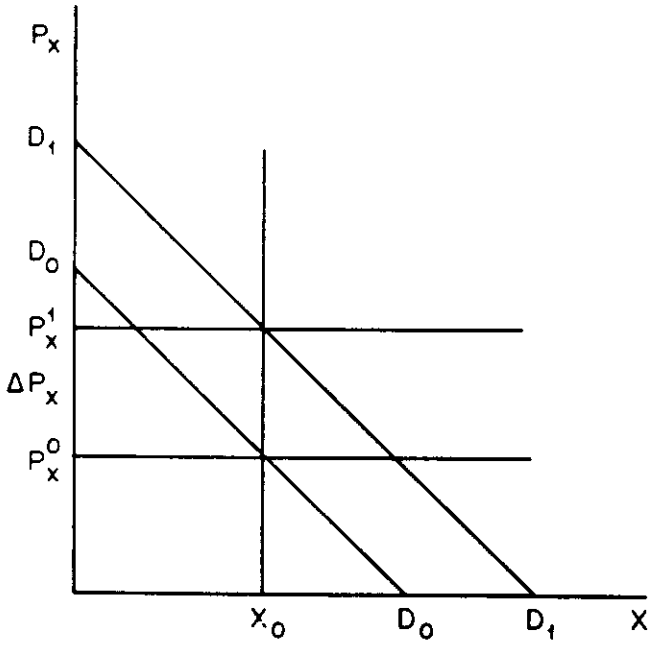

FIGURE I

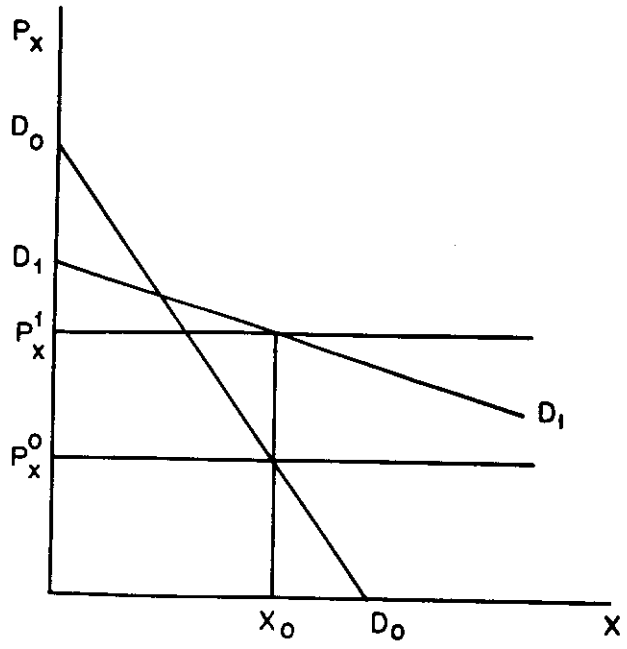

FIGURE II

If the effect of higher A on the marginal utility of x is not constant but is larger when x is bigger (compare D_1 and D_0 in Figure II), the greater revenue in the x market from an increase in A exceeds the increase in consumer surplus. Direct revenue from the sale of A only adds to the surplus extracted from consumers. This case shows that what counts to producers is the effect of advertising on the utility from *marginal* units of x. The effect on marginal units determines the effect on profits through its effect on the price and quantity of x.

Therefore, a firm that is unable to price discriminate in a market where it has monopoly power may be able to use a complementary product to extract additional consumer surplus. Even if the complement must be sold below its average cost of production—perhaps because its marginal value to consumers is less than the average cost—the complement may increase the firm's profits by sufficiently raising the demand for the monopolized good.

Since the analysis of advertising has much in common with an analysis of product quality, it is not surprising that the same emphasis on marginal units and marginal consumers is found in the literature on product quality (see Spence [1976], Shapiro [1982], and Tirole [1988]) and retail price maintenance (see Klein

and Murphy [1988] and Comanor [1985]). For example, the presale services sometimes encouraged by price maintenance may well be valued most by marginal consumers because they know less about the product.

III. Advertising, Competition, and the Elasticity of Demand

a. Advertising and Competition

Seventy-three years ago, Pigou [1920] already argued that competitive firms do not advertise because they can more or less sell all they want at a given price even without advertising. This conclusion is repeated often (see, e.g., Kaldor [1949–50], or Scherer [1980, p. 387]).

That firms with elastic demand curves do not want to provide free advertising appears to be supported by the first-order profit-maximizing conditions in equations (2) and (3). The middle term in equation (3) seems to indicate that marginal revenue from advertising is low for competitive producers of x since $p_x - c_x$ is close to zero for these producers. If equation (2) is substituted into this middle term, one gets an expression that relates the marginal revenue from advertising directly to the elasticity of demand for x:

$$MR_A = \frac{p_x}{\epsilon_x}\frac{dx}{dA}. \tag{7}$$

Therefore, *if the price of the product (p_x) and the increase in demand due to advertising (dx/dA) are held fixed,* the marginal revenue from advertising declines as the elasticity of demand for x (ϵ_x) increases. This is the famous theorem of Dorfman and Steiner [1954] that less competitive firms have more incentive to advertise.

Despite the continued reliance on their result,[1] we claim that it is highly misleading. For one thing, the theorem proves too much, for it applies not only to advertising, but to all complements produced by the same firm. If x is quantity of output and A measures quality, the theorem says that producers with more monopoly power have a greater incentive to upgrade their quality. Hence the unreasonable conclusion from the theorem that monopolistic producers make better quality products than competitive producers.

1. Among the numerous favorable references, see Hurwitz and Caves's recent discussion of advertising by pharmaceutical companies [1988] and Tirole's [1988, p. 103] excellent book on modern industrial organization theory.

The proof of this theorem crucially depends on the assumption that dx/dA does not change as ϵ_x increases. What happens to dx/dA depends on why ϵ_x changes, and often it would increase as ϵ_x did. For example, the elasticity of demand for the soap industry is much smaller than that for individual soap companies. And the effect of advertising on the quantity demanded at a given price is presumably also much greater when one company alone advertises than when all companies (the industry) do, since advertising by one company attracts customers from competitors. In this example, therefore, the effect of advertising on the quantity demanded of the advertised good is positively related to, not independent of, the elasticity of demand for the product advertised.

It is far more reasonable to assume that dp_x/dA is approximately constant for a given x as ϵ_x changes than that dx/dA is constant for a given p_x. The difference between these assumptions may seem minor, but actually they have very different implications. In particular, if dp_x/dA is held constant, there is no presumption that the incentive to advertise falls as ϵ_x increases. For the left-hand side of equation (3) indicates that the marginal revenue from advertising can be written not only as in equation (7) but also as

$$MR_A = x\frac{\partial p_x}{\partial A}. \tag{8}$$

Given the output of the product advertised (x), the marginal revenue from advertising is greater when the increase in price is greater. A change in the elasticity of demand for the product advertised *has no effect whatsoever* on the marginal revenue from advertising when x and $\partial p_x/\partial A$ are held constant.

It is easy to reconcile the different implications of equations (7) and (8). When the effect of A on x is held fixed as ϵ_x increases, the effect of A on p_x falls,[2] which explains why the marginal revenue of

2. If

$$x = a(A)p_x^{-\epsilon_x}, \frac{d\log x}{dA} = \frac{a'}{a} \text{ (for a given } p_x\text{)}.$$

Since

$$\frac{d\log p_x}{dA} = \frac{1}{\epsilon_x}\frac{a'}{a} \text{ (for a given } x\text{)},$$

an increase in ϵ_x reduces the effect of A on p_x when a'/a (and thus $(d\log x)/da$) is held fixed.

advertising then also falls. Similarly, when the effect of A on p_x is held fixed as ϵ_x increases, the effect of A on x rises.

The value of highlighting the effect of advertising on the price of the good advertised is that the marginal revenue from advertising is then directly related to the higher marginal utility from consuming a given amount of the advertised good, as in equation (6). By contrast, the effect of advertising on the quantity demanded at a given price has no ready interpretation in terms of marginal utilities. If the effect of advertising on the marginal utility from consuming a given quantity of the good advertised is unrelated to its elasticity of demand, the effect on price and the incentive to advertise would also be unrelated to this elasticity.

For example, it is plausible to assume that the effects of advertising by one soap company on the price and marginal utility of its soap is similar to the effects of advertising by the industry on the average price of all soap. For the effect of advertising on price depends on the sensitivity of marginal demand. This sensitivity may not be very different when one soap company attracts consumers from competing companies through its advertising than when the industry attracts consumers from competing products.

The presumption that oligopolistic industries usually advertise more than monopolistic industries is based on the assumption that demand for an oligopolistic firm's product is more elastic, *and hence more sensitive to advertising*, than is demand for a monopoly's product. Such reasoning contradicts that behind the Dorfman-Steiner result, although it is fully consistent with our approach.

A different argument for why competitive firms have no incentive to advertise is that many close competitors could free ride on the advertising (see, e.g., Comanor and Wilson [1974, p. 20]). Advertising by a wheat farmer may raise slightly the demand for all wheat, but it is unlikely to raise much the demand for this farmer's wheat relative to that of others.

Of course, firms do not advertise when they cannot differentiate their products from many competing products. Yet the fact is that companies in highly competitive situations often do a lot of advertising. Perdue chickens closely compete with other chickens, Chiquita bananas with other bananas, and Jaffa oranges with other oranges. Yet all these brands have been extensively adver-

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The discussion in Tirole [1988, pp. 100–03] is revealing. Immediately after a good analysis of product quality that uses the effect of quality on the price consumers are willing to pay for a given quantity, he analyzes advertising through its effect on the quantity demanded at a given price.

tised because say Perdue advertisements convince consumers that a pound of its chickens is worth more than a pound of other chickens. Whether advertising succeeds in differentiating further the product advertised from that of substitutes may be related empirically to the number and closeness of substitutes, but there is no strict analytical connection.

b. Advertising and Prices of Advertised Goods

That advertising raises the price of the good advertised for a *given* quantity does not in general imply that it raises the *equilibrium* price. Equations (2) and (4) show that advertising tends to raise or lower the equilibrium price as it lowers or raises the elasticity of demand for the advertised good. Advertising is often said to lower this elasticity because firms expand their monopoly power by differentiating further their products from others. However, we have shown that advertising is profitable not because it lowers the elasticity of demand for the advertised good, but because it raises the level of demand.

We believe that the presumption in fact goes the other way, that advertising tends to *raise* the elasticity of demand at the initial equilibrium quantity of the advertised good. The reason is that firms try to tailor their advertising to bring up the demands of marginal consumers since these drag down the equilibrium price paid by inframarginal consumers: again the analysis is related to discussions of product quality by Spence [1976] and others. In lieu of explicit price discrimination, advertising may help price a good *effectively* lower to marginal consumers.

Assume two classes of consumers, C and D, where each C is willing to pay \$10, and each D is willing to pay only \$5, for a single unit of x that costs \$2 to produce. Suppose that \$10 is the profit-maximizing price without price discrimination and advertising, so that only C buys x at this price. Introduce an advertising campaign aimed at D, the marginal consumers, and assume it costs \$7 to raise each D's reservation price for x to \$10. Although the advertising costs more than the increase in D's reservation price, advertising is profitable because it enables the firm to collect also the initial reservation price (\$5) of the D consumers.

This example illustrates why advertising tends to increase the market elasticity of demand for the goods advertised in the vicinity of the initial equilibrium quantity. In the example, advertising is a way to price discriminate that is inferior to free explicit discrimination but may be superior to feasible alternatives.

The early ads for low calorie beer were targeted to women because their weak demand for beer lowered the equilibrium price of beer. Such advertising could pay even if it reduced demand by inframarginal males. Similarly, a political candidate's promises are often targeted to undecided voters even when that lowers the backing of his strong supporters, because he is likely to get their votes, and he needs undecided votes to win.

The claim that advertising raises prices of the goods advertised is often supported by evidence that advertised goods are more expensive than "similar" unadvertised goods (see the review of this evidence in Scherer [1980, pp. 381–88]). But advertised goods may have good qualities that are not observed by econometricians, as implied by the signaling literature.

Better evidence comes from the consequences of advertising regulations. Several studies find that states which permit advertising for particular goods have lower prices than states which ban the advertising (see Benham's [1972] well-known study of eyeglasses and Bond's [1980] discussion of advertising in the professions). These studies may be exceptional cases; however, perhaps they only illustrate that advertising raises elasticities of demand for advertised goods.

IV. Advertising and Welfare

Economists have long been opposed to advertising (see, e.g., Pigou [1920, p. 199]; or Galbraith [1958, pp. 155–56]), yet they have been unable to use standard welfare analysis to show that advertising is excessive because of the peculiar attitude toward how advertising affects consumers. A major analytical advantage of our approach that treats advertising as part of given preferences rather than as shifting tastes is that the standard welfare analysis becomes directly applicable. Indeed, the following discussion is similar to the welfare analysis of product quality by Spence [1976]; also see Tirole [1988]. Some differences between the analysis of advertising and quality are considered at the end.

We use the sum of consumer and producer surplus (S) to evaluate the welfare effects of advertising by a firm:

$$V(A,p_x,T) + \Pi(A,p_x,T) = S, \tag{9}$$

where V is the money value of the consumer's utility, Π is the surplus to the firm producing the advertising (A) and the product advertised (x), p_x is the price of x, and T is any revenue from the sale

of A. Whether advertising is socially optimal after including induced changes in the output of the good advertised is found by totally differentiating equation (9) with respect to A:

$$(10)\quad \frac{dS}{dA} = V_A + V_{p_x}\frac{dp_x}{dA} + V_T\frac{dT}{dA} + \frac{d\Pi}{dA}\left(= \Pi_A + \Pi_{p_x}\frac{dp_x}{dA} + \Pi_T\frac{dT}{dA}\right).$$

It is clear that

$$(11)\quad V_T = -1, \quad V_{p_x} = -x, \quad \Pi_{p_x} = x, \quad \Pi_T = 1,$$

$$\text{and } \Pi_A \ (p_x - c_x)\frac{dx}{dA} - c_a,$$

where c_a and c_x are the marginal costs of A and x, respectively. Note that dp_x/dA and dx/dA are the equilibrium changes in p_x and x after taking account of changes in all variables, whereas $\partial p_x/\partial A$ and $\partial x/\partial A$ in the profit-maximizing first-order condition in equation (3) are partial changes, holding x or p_x constant. The term V_A gives the marginal utility to consumers from advertisements for x, net of any reduction induced by these ads in the utility from other goods.

By substituting (11) into (10), we see that advertising is excessive, optimal, or underproduced:

$$(12)\quad \frac{dS}{dA} \gtreqless 0 \quad \text{as } V_A + (p_x - c_x)\frac{dx}{dA} \gtreqless c_a.$$

Since a firm maximizes producer surplus, $d\pi/dA = 0$, and equation (10) also simplifies to

$$(13)\quad \frac{dS}{dA} \gtreqless 0 \quad \text{as } V_A - x\frac{dp_x}{dA} - \frac{dT}{dA} \gtreqless 0.$$

When consumers voluntarily expose themselves to advertisements, V_A has to be ≥ 0 unless consumers are compensated for any loss in utility from the ads. That is, unless dT/dA is sufficiently ≤ 0.

Advertising has been said to be excessive when its price is less than marginal cost (see Kaldor [1949–50, p. 3] and Comanor and Wilson [1974, p. 20]). But if producers ration advertisements to consumers, the relevant price is not the price charged, but the shadow price to consumers which is measured by V_A. Equation (12) shows that the difference between the shadow price and marginal cost of advertising (c_a) does help determine whether or not advertising is socially excessive.

If the advertised good is perfectly competitive, with price equal to marginal cost ($p_x = c_x$), equation (12) gives the usual first-best

criterion for welfare maximization; that is, the marginal cost of producing advertisements equals its shadow price to consumers. If x is imperfectly competitive ($p_x > c_x$), advertising also has a "second-best" aspect, for it may change the distortion in the market for the advertised good by raising or lowering output. A second-best incentive to subsidize advertising would appear to exist if advertising stimulates the demand for x, for then $(p_x - c_x)$ $dx/dA > 0$. But firms do take this effect into account when they choose their advertising since profits depend on $(p_x - c_x)dx/dA$ (see equation (3)). Whether firms produce too much or too little advertising from a social perspective depends on the effect of advertising on demand for the advertised good.

Equation (6) indicates that $V_a \geq p_a$; hence, $dT/dA \leq p_a \leq V_a$ because marginal revenue is not above price. Substitution of this inequality into equation (13) gives that $dS/dA \geq 0$ if $dp_x/dA \leq 0$. Therefore, no matter how advertising changes demand, equation (13) and the consumer first-order condition to maximize utility imply that the amount of advertising is insufficient if the equilibrium price of the advertised product falls. For if it falls, producers fail to include the higher amount consumers are willing to pay for the product advertised in their estimate of the gain from additional advertising.

Whether advertising lowers price of the product advertised is a remarkably simple test that can be applied in practice to determine whether there is too little advertising. And this criterion follows from the usual welfare analysis and consumer utility maximization without special assumptions about how advertising affects either demand for the product or consumer utility. In particular, it applies to the case where advertising is rationed and given away as well as when it is sold at a fixed price in whatever quantities consumers want; the case where advertising has negative marginal utility as well as when it has positive utility; and to advertising by competitive firms as well as by monopolists. This is a major implication of our approach that treats advertising as part of given metatastes, but it cannot be derived from a model where advertising shifts tastes.

Most discussions of advertising assume that it is given away to consumers ($dT/dA = 0$), and that advertisements do not directly provide utility ($V_A = 0$). Equation (13) then implies that advertising is excessive, optimal, or insufficient as it raises, does not change, or lowers the equilibrium price of the advertised good. This explains why Dixit and Norman [1978] conclude that advertising is

generally excessive, for they essentially assume that $V_A = 0$, that advertising is not sold, and that advertising usually raises the price of advertised goods.

These assumptions are dubious, for advertising does affect the utility of consumers, and it is often sold—sometimes at a negative price. Therefore, with reasonable assumptions an increase in the equilibrium price does not necessarily imply that advertising is excessive. Our criterion, that advertising is insufficient if the equilibrium price *falls* does not require any special assumptions about the advertising market or the effect of advertising on consumer utility.

The surplus criterion can be generalized beyond the effects of advertising on the product advertised by including induced changes in the consumers' and producers' surplus in other markets. Equation (12) becomes

$$(14) \qquad \frac{d\left(\sum_{j=1}^{m} S_j\right)}{dA_1} \gtreqless 0 \quad \text{as } V_{A_1} + (p_1 - c_1)\frac{dx_1}{dA_1} + \sum_{i=2}^{m} (p_i - c_i)\frac{dx_i}{dA_1} \gtreqless c_{a_1},$$

where S_j is the total surplus in the jth market, x_1 is the good advertised, x_i, $i = 2, \ldots, m$ are the other products affected by advertising for x_1, p_j, and c_j are the price and marginal cost of x_j, and dx_i/dA_1 is the equilibrium change in x_i induced by an increase in A_1. If the other products affected are perfectly competitive ($p_i = c_i$), equation (14) reduces to equation (12), and the previous discussion is fully applicable.

However, if the good advertised expands partly through substitution for a monopolized good, x_2, where $p_2 > c_2$ and $dx_2 < 0$, the advantage of expanding x_1 is partly negated by the disadvantage of contracting a monopolized substitute. A full analysis of the social optimality of advertising includes induced changes in the outputs of substitutes and complements as well as changes in the output of the advertised good.

One interesting application is to competitive advertising of brands, where advertising expands output of a brand partly or wholly at the expense of competing brands. From early discussions to more recent treatments (see, e.g., Pigou [1920, pp. 197–99], Solow [1967, p. 165], and Scherer [1980, p. 389]), economists have generally agreed that brand advertising is largely worthless to society if it does not increase aggregate consumption of the brands.

But our analysis shows that even this seemingly plausible conclusion does not necessarily follow from a consumer surplus analysis.

If $p_i - c_i = p_1 - c_1$, $i = 2, \ldots, m$, equation (14) differs from equation (12) simply by substituting the total change in outputs of all brands (dX) for the change in the good advertised. If the total change $dX = 0$, then the criterion for excessive or insufficient advertising reduces simply to whether $V_{A_1} \lessgtr c_{a_1}$; i.e., whether the marginal value to consumers of the advertising exceeds or is less than its marginal cost. The relation between these marginal values and cost depends on whether advertising is sold, and how it shifts demand for the brand advertised.

If the total output of all brands is unaffected, equation (14) implies that advertising is excessive if the marginal utility of advertising is negative. For then, $V_{A_1} < 0 < c_{a_1}$. If the direct marginal revenue from advertising equals the marginal utility of the advertising (if $dT_1/dA_1 = V_{A_1}$), advertising by a firm is excessive under the frequently realized condition that the increased quantity demanded for its product exceed the increased demand for all brands. For then $V_{A_1} + dX/dA_1(p_x - c_x) < c_{a_1}$ (see equations (14) and (5) and the first two terms on the left-hand side of equation (3)). However, with the usual assumption that advertising is rationed and is given away, the amount of advertising is insufficient when total brand output is unchanged as long as $V_{A_1} > x_1 \partial p_1/\partial A_1 = c_{a_1}$ (see equation (3)); that is, if the increased utility from advertising by a firm exceeds the *marginal* increase in the demand for its product.

Our welfare analysis of advertising applies also to government efforts to persuade consumers to change behavior. Suppose that the government wants consumers to bring used bottles and cans to recycling centers. It produces advertisements that are complements in consumer utility functions with a more favorable attitude toward recycling. Even if these ads directly lower utility, and hence consumers must be compensated to accept them, they would indirectly raise utility if the externalities from throwing away bottles and cans are sufficiently strong. In equation (12), x refers to proper disposal ($dx/dA > 0$), $p_x - c_x > 0$ because the cost to consumers of proper disposal is less than the social gain (measured by p_x), and V could be <0. If $p_x - c_x$ is sufficiently positive, government efforts at persuasion could raise utility even when $V_A < 0$, and c_a is not negligible.

As we indicated, the welfare analysis of advertising is similar to the welfare analysis of product quality and other complements,

but there are some differences. Since advertisements are physically distinct from the products advertised, while quality is embodied in products, firms can more easily charge separately for advertisements than for quality, although the charge for ads is usually implicit in the cost of a package that includes other goods. For the same reason, advertisements are not likely to affect the marginal cost of the good advertised, whereas improvements in the quality of a product usually do raise the marginal cost of a larger quantity.

Although these and similar differences between advertising and quality are important, they do not explain the hostility to advertising. We believe the explanation is that economists are willing to abandon the principle of consumer sovereignty when evaluating advertising but not when discussing quality, although a few studies have criticized changes in quality (see, e.g., the well-known paper by Fisher, Griliches, and Kaysen [1962]. The taste-change interpretation of advertising abandons consumer sovereignty by ignoring the utility from advertising when evaluating its welfare effects. We have shown that respect for consumer sovereignty does not imply that the amount of advertising by profit-maximizing firms is necessarily welfare-maximizing, but it does cast doubt on most discussions of the welfare effects.

V. Negative Utility from Advertising on Radio and Television

"Free" radio and television do not charge audiences either for advertisements or programs. Advertisers usually pay for both the cost of preparing and using their ads, and for programming costs. Since radio and television could provide advertisements without programming, why do advertisers go to the expense of including costly programs?

There are several possible reasons, but we believe the main one is that utility from programs compensates the audience for tuning in and becoming exposed to the ads. Since consumers do not have to be compensated for utility-raising services, the inference must be that most ads on radio and television lower the utility of marginal viewers, after netting out the value of the time spent watching and listening. As it were, advertisers throw in free programming to generate the audience for utility-reducing ads. One can say either that advertising pays for the programming—the usual interpretation—or that programming compensates for the advertising, which is our preferred interpretation.

Advertisements that lower utility are less likely to be placed in newspapers, magazines, and other print media because readers can more easily ignore advertisements than can listeners or viewers. Therefore, the presumption is that the print media have a larger fraction of utility-raising ads, including those providing information, than do radio and television.

Although plausible, it is not true that advertisements must raise consumer utility if they increase demand for the goods advertised. For the effect of advertising on demand depends on the cross derivative in the utility function between advertising and advertised goods, while the effect on utility depends on the first derivative with respect to advertising.

Still, it may seem unlikely that most radio and television ads reduce utility since these ads constitute an important fraction of all advertising expenditures. But utility is necessarily reduced only to marginal viewers, and only after netting out the value of time spent viewing ads. And just as death, divorce, unemployment, and similar utility-reducing events often induce greater drinking, smoking, overeating, and similar changes in consumption, we believe so too do many advertisements lower utility and yet raise demand for the advertised goods. These ads produce anxiety and depression, stir up envious feelings toward the success and happiness of others, or arouse guilt toward parents or children (see Marchand [1985]).

Indeed, in some ways the assumption that many ads lower utility is easier to reconcile with consumer behavior than is the assumption that they raise utility. For consumers often do not appear to look forward to consuming advertisements, and rational consumers would not seek out even free advertising if it lowers their utility.

It may seem strange that firms can profit from advertisements that lower utility even when they have to fully compensate consumers for their loss, perhaps by including utility-raising programs along with the advertising. But suppose that advertising raises the marginal utility of the advertised good at the initial equilibrium quantity, reduces the marginal utility of the advertised good at some lower quantities, and possibly also lowers utility independently of consumption of that good. Such advertising may reduce utility overall, but the reduction could be small compared with the revenue from the higher price for the good due to the increase in marginal utilities. Essentially, such advertising would be profitable because it allows a firm to collect more of the

consumer surplus from the advertised good (see the example in Becker and Murphy [1990, p. 37]).

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