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Generic Advertising and Product Differentiation Revisited

John M. Crespi

Abstract

This paper revisits the analysis of generic commodity advertising under product differentiation by Crespi and Marette. Crespi and Marette had shown that a dominant firm producing high-quality goods and facing a competitive fringe of lower quality producers could be harmed by a generic advertising campaign while the fringe was left unaffected. Under this dominant-firm model, a question remained why these producers might support a program for which they were indifferent. In this paper we show that under a duopoly model a high-quality firm may be harmed while its lower-quality rival may be made better off by a generic program, thus helping to explain why some producers might favor a program while others do not. Further, this paper dismisses the claim made by some litigants that increased branded advertising is the result of a deleterious effect of generic advertising.

KEYWORDS: generic advertising, commodity promotion, product differentiation, checkoffs

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1. Introduction

In the first paper to consider the effects of generic commodity advertising when product differentiation might exist, Crespi and Marette (2002), hereafter CM, showed how it was possible for a firm producing high-quality goods to see its demand increase due to generic advertising but nevertheless be harmed by the generic program. The key was whether product differentiation in the market was lessened in consumers' minds because of the generic program.[1] Although CM's article showed that it was possible for a high-quality firm to be harmed by generic advertising, the theoretical model used presented only one possible market structure, namely, that of a dominant firm producing and advertising high-quality products while facing a competitive fringe of lower quality producers.[2] The main contribution of their theoretical model was to show that the dominant firm could be harmed even if generic advertising increased demand for its products. However, as the competitive fringe was neither made worse off nor better off from the generic promotions, CM's results leave open the question of why the producers of the lower-quality goods are necessarily in support of the program. An interesting question is whether the high-quality firm can be harmed while the low-quality firm is helped by generic advertising?

This is the main research question of this current paper. Specifically, I extend CM's dominant-firm/competitive-fringe model to the case of a duopoly where both producers earn economic profits regardless the quality level of the good, with intriguing results. Like CM, the game proceeds in stages whereby a board chooses an amount of generic advertising to spend, the firms choose an

[1] The claim that the generic promotions send a signal that any product in a checkoff program is worthwhile, thus, diluting a branded message by producers of higher quality products, has been made by many opponents of generic advertising. For example, cheese producer Mike Gallo, who sued the California Milk Advisory Board over the Board's "It's the cheese." marketing campaign, said of the generic advertising, "We're trying to differentiate ourselves from other products with quality, and their message is just the opposite. They're saying all cheese is the same, and it's not" (*The Stockton Record*, November 26, 1997, p. F1). Similarly, Dan Gerawan, a tree fruit handler, argued all the way to the U.S. Supreme Court that he undertook branded advertising to convince consumers that his fruit was different from his competitors' yet was being forced to "pay into a fund that advertises that all peaches and plums are the same" (*The Los Angeles Times*, November 29, 1996, p. A26.). As CM summarize, "The idea that *branded* advertising may increase product differentiation seems plausible. After all, advertisements for a specific brand are used to influence consumers' preferences for different brands (e.g., 'Sun Maid raisins are better than other raisins'). What is interesting, however, is whether generic advertising used to raise demand for *all* brands may be sending a signal to consumers that *any* of the brands are worthy (e.g., 'buy any California raisins since all California raisins are good'), thereby lowering the differentiation among competing brands of the same good" (CM, p. 691).

[2] This dominant-firm/competitive-fringe model was apropos to the CM analysis as they examined the market for the dried plum industry, which arguably fits such a model.

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amount of branded advertising to signal consumers of the quality of their goods, and finally the firms compete in prices. I show through both analytical comparative statics and through numerical simulations that over certain ranges of generic advertising assessments, profits can decline for the high-quality producer while increasing for the low-quality producer. I thus provide a model entirely consistent with the claims of certain producers that generic advertising causes harm to some while helping others, a claim heretofore unproven.

Over a billion dollars are spent annually on generic commodity promotion (Kaiser et al., 2005, p. 3) and these programs are arguably among the most heavily scrutinized of farm programs with three cases concerning their constitutionality rising to the U.S. Supreme Court in the last decade alone.[3] As such, understanding why opposition to these programs is so intense is of vital importance. Along the way, I also discuss the effect of generic advertising on firms' branded advertising, an effect unexamined in CM and important because some firms had claimed in court that they spent more on branded advertising to overcome harm from generic advertising.

2. Advertising as a Signal of Quality

Whether advertising can affect the quality differentiation of products is an important question. Nelson (1970, 1974) and Milgrom and Roberts (1986) argue that even so-called uninformative advertising may be informative in that it provides consumers with a signal of firm profitability and, hence, of the quality of a firm's product. Nelson distinguishes between "search" and "experience" characteristics of product quality and argues that producers of high-quality, experience goods will spend more on advertising than those of lower quality goods.[4]

Butters (1977), Schmalensee (1978, 1983) and Bonanno (1986) show how advertising provides firms with some degree of market power and/or entry deterrence. Butters' model examines why consumers may prefer advertised products to unadvertised products even when there is no physical difference among advertised and non-advertised goods (Butters' example is aspirin). Most work, however, simply avoids the question of how advertising influences demand. Dorfman and Steiner (1954) determine the condition under which a monopolist maximizes profits in its simultaneous setting of prices and advertising levels.

[3] See Crespi (2003), Kaiser et al. (2005), and Crespi and McEowen (2006) for a discussion of the legal issues

[4] A search characteristic is one that a consumer can deduce prior to purchasing the product, for example, the ripeness of a banana. Experience characteristics, such as the sweetness of canned pears can only be determined after the product is purchased. Darby and Karni (1973) add a third category called "credence" characteristics if quality is not revealed even after purchasing.

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Here, along with price, advertising simply enters the demand curve, but there is no discussion as to why advertising affects demand. Stahl (1994) looks at the effect of advertising for a homogeneous good where the advertising provides the only source of product information. Relatedly, Grossman and Shapiro (1984) and Meurer and Stahl (1994), look at the same effect when goods are differentiated.

Unlike informative advertising, persuasive advertising increases demand by influencing consumers' tastes and preferences. Stigler and Becker (1977) use Lancaster's (1966) characteristics approach to incorporate advertising as an input into the final product; thus when consumers choose a product, they are actually choosing the characteristics (including the advertising). Dixit and Norman (1978) include advertising directly in consumers' utility functions to examine the welfare effects of advertising (the reader is also referred to the subsequent comment on this work by Fisher and McGowan, 1979). The idea that otherwise homogeneous products can be differentiated through the use of persuasive advertising fits with Becker and Murphy's (1993) utility model wherein advertising enters consumers' utility functions as a complement to the advertised product and is purchased along with the product at the point of sale. Von der Fehr and Stevik (1998) model in greater detail how such persuasion might actually work and offer three possible scenarios: advertising may either increase consumers' willingness to pay, change the ideal product variety, or increase perceived product differences. In this paper, advertising is persuasive, adding utility by convincing consumers that the product is of a higher quality than the same product without the advertising.

3. The Duopoly Model

Although altered slightly, the model chosen for this paper follows that of CM, which was based on a model developed by Mussa and Rosen (1978). A continuum of consumers have types identified by a parameter, θ, the marginal willingness to pay for quality, which is uniformly distributed over [0, 1]. For simplicity, there are two integrated grower/handlers, firm 1 and firm 2, who compete in a Bertrand fashion. (One can think of either or both of these firms as cooperatives, for example, where the grower members vote for the marketing board members who then set the generic advertising assessment.) The two firms' products are differentiated such that if both products were offered at the same price, consumers would prefer to buy from firm 1 because its product is of a higher quality. In this game, the firms may not alter the intrinsic quality (e.g., the sugar content, color, texture) of their goods, but they can augment consumers' perceptions of their goods' quality through branded advertising campaigns, generic promotion, or both. As in Bonanno (1986), consumers prefer to buy advertised products to unadvertised products (if prices are the same). Each good's quality level is denoted $k_i = k_i(\kappa_{0i}, B_i, g)$, i=1, 2. For simplicity, a good's

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quality is not a function of a competing good's advertising, though as will be seen below, this does not mean that a firm's branded advertising is neutral in the demand for the other good. Substitution between the two goods is influenced by branded advertising through the price mechanism. Quality is divided into two components: i) intrinsic quality, κ_{0i}, which could be thought of as the good's physical characteristics such as its sugar or fat content, and ii) perceived quality that is influenced by advertising. In this static model, the intrinsic quality of good 1 is greater than that of good 2, perhaps because of some previous competition in research and development or because firm 1 is established in a better growing region. B_i is firm i's level of branded advertising expenditure and g is the per-unit assessment amount gathered from both firms. Multiplying this assessment by the total quantity produced by both firms gives the total amount of generic advertising. Making quality a function of the assessment rate as opposed to a function of the total amount of generic advertising is innocuous since the amount of generic advertising is simply proportional to the assessment rate. The assessment rate is exogenous to the firms' decisions since it is determined by a board (an interesting extension would be to include the political economic question of how the assessment is chosen given that the board is made up in part by the growers it represents), though I discuss the implications of cooperative member voting at the end of the paper. I assume quality is increasing at a decreasing rate with respect to the two types of advertising. In the analysis that follows, we can avoid notational clutter by denoting the quality functions simply by k_1 and k_2.

A consumer of type θ chooses some composite good or bundle of goods outside of the industry and at most one of the two goods in order to maximize $U_i(x, k_i; \theta) = \delta x + \theta k_i$ subject to $P_i(k_i) + x \leq y$. The choice variable, x, is the composite good and prices and income have been normalized by its price. As in Lancaster (1966), when consumers purchase good i, they are choosing the good's quality, k_i, with the price of the good being a function of this quality: $P_i = P_i(k_i)$. y is the consumer's income, and it is assumed for simplicity that all consumers have the same level of income.

Specifying the Lagrangian function for the utility maximization problem as $L = \delta x + \theta k_i - \lambda[P_i + x - y]$, and solving the first-order conditions for this maximization problem gives the indirect utility of a consumer of type θ buying variant i:

$$V_i(P_i, k_i, y, \theta) = \lambda[y - P_i] + \theta k_i \ , \ \ i = 1, 2. \tag{1}$$

By the first-order conditions, δ is equal to λ, and setting $\delta = \lambda = 1$ simplifies equation (1) without loss of generality:

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$$V_i(P_i, k_i, y, \theta) = y - P_i + \theta k_i \,. \tag{1'}$$

Firm i = 1, 2 faces demand $Q_i = Q_i(P_i, P_j, k_i, k_j)$. Each firm has unit costs of production, $c_1 = c_2 = 0$, which do not include the costs of the advertising. If a firm chooses to advertise, it pays B_i. If generic advertising exists, each firm pays the same per-unit assessment rate, g. Allowing branded advertising to enter into the optimization problem as a fixed cost is standard in the literature (see for example, Sutton 1991). Firm profits are given by,

$$\Pi_i(P_i, P_j, k_i, k_j) = (P_i - g) \cdot Q_i(P_i, P_j, k_i, k_j) \; - \; B_i \tag{2}$$

where $k_i = k_i(\kappa_{0i}, B_i, g)$; i, j = 1, 2.

As in CM, consider two scenarios showing how generic advertising may affect product differentiation. The first scenario is based upon a justification for generic promotion programs, that is, that generic advertising creates a "rising tide" that affects all products in the same way. Under scenario 1, generic advertising increases demand while increasing the consumers' perceptions of product quality at the same rate in consumers' utility functions: $\partial k_1 / \partial g = \partial k_2 / \partial g > 0$ and, hence for a given $\theta, \partial V_1 / \partial g = \partial V_2 / \partial g$. In contrast, under a second scenario, the rate of quality increase for good 2 is more than that for good 1: $\partial k_2 / \partial G > \partial k_1 / \partial G > 0$, thus, $\partial V_2 / \partial g > \partial V_1 / \partial g$. It is important to notice that in both scenarios quality increases as generic advertising increases, it is just the rate that differs.

CM allowed for the case where consumers could choose not to purchase a good. I consider the case where the market is fully covered, that is, all consumers along the unit interval purchase one of the offered goods (although it is possible that only one good will be offered, in which case, all consumers purchase this good).[5] This is a simplifying assumption that will have some implications on certain results; however, I shall point these out when they arise. After little progress deriving analytical solutions under the framework where consumers can choose not to purchase either good, I decided that this assumption was the least costly of others I had tried.[6] One could think of our model as a case where the

[5] Full coverage in product differentiation models is not as uncommon as it may seem. Hotelling (1929) in his linear city model imposes full coverage through the exogenous placement of the two firms; Salop (1979) in his famous circle model considers full coverage as do Anderson, dePalma and Thisse (1996, p. 307).

[6] For example, analytical solutions are possible if one allows for an uncovered market but asserts generic advertising is a fixed cost and that only the high-quality firm will advertise. These results are very similar to what is presented here, though not as general because of the simplifying assumptions needed. The results are available from the authors.

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product will be purchased regardless of price, but that prices will affect whether a higher or lower quality will be purchased. Milk may fit this example. Demand is very inelastic for milk in general, but prices will change market shares among competing brands. The preference level of the consumer indifferent between purchasing good 1 and good 2, denoted θ_{12}, is found by setting $V_1(P_1, k_1, y, \theta) = V_2(P_2, k_2, y, \theta)$ and solving for θ: $\theta_{12} = (P_1 - P_2)/(k_1 - k_2)$.

Demand for each good is simply the density of consumer preferences in one of the segments along the unit interval multiplied by the total number of consumers in the industry, N. Specifically, the demands for goods 1 and 2 are $Q_1(P_1,P_2, k_1, k_2) = (1 - \theta_{12})N$ and $Q_2(P_1,P_2, k_1, k_2) = (\theta_{12} - 0)N$, respectively.[7] Following Crespi and Marette, $N \equiv N(g)$ is a function of generic advertising and $N'(g) > 0$ and $N''(g) < 0$, consistent with how generic advertising has been modeled in many empirical demand studies (see the various analyses in Kaiser et al., 2005). The assumptions implied here are that generic advertising increases the size of the market, and branded advertising affects consumers' decisions to buy a particular good.

Marketing board and firm behavior is represented as a three-stage game as follows. In the first stage of the game, the generic advertising assessment, g, is set by the marketing board. In the second stage, each firm simultaneously decides how much to spend on its own branded advertising. Then, in the final stage, the firms compete in prices. Note that the firms do not set the generic advertising assessment; hence this is taken as exogenous by the firms. I am most interested in the effect of this advertising on firm-level advertising and price setting and, hence, on profitability.

Solution to the three-stage game requires first solving the final stage of the game: the competition in prices. Differentiating equation (2) with respect to each firm's own price and simultaneously solving the first-order conditions obtains the Nash equilibrium prices: $P_1^* = [2(k_1 - k_2)/3] + g$ and $P_2^* = [(k_1 - k_2)/3] + g$. Not surprisingly, perfect competition arises when consumers no longer perceive any difference between the qualities of goods 1 and 2. The price that arises under product homogeneity is simply the generic advertising assessment (marginal cost to advertising) since the firms' marginal cost of production is zero. Also notice the first implication of the market coverage assumption: because purchases will be made, the generic advertising assessment is simply passed along to the consumers so as g increases, prices increase accordingly.

[7] In the case where the market is not fully covered, to find the preference level of the consumer who is indifferent between buying nothing and buying good 2, θ_{02}, the indirect utility function when only the composite good is purchased is set equal to the indirect utility function when good 2 is purchased to solve $y = V_2(P_2, k_2, y, \theta)$ for θ yielding $\theta_{02} = P_2 / k_2$. In this case, demand for good 1 does not change, but demand for good 2 is given by $Q_2(P_1,P_2, k_1, k_2) = (\theta_{12} - \theta_{02})N$.

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Inserting the equilibrium prices into equation (2) gives the final-stage equilibrium profits:

$$\Pi_1^* = \frac{4(k_1 - k_2)}{9} \cdot N - B_1 \text{ and} \tag{3}$$

$$\Pi_2^* = \frac{k_1 - k_2}{9} \cdot N - B_2 .^{8} \tag{4}$$

The next step is to solve the branded advertising subgame for the equilibrium levels of branded advertising. Before proceeding, I derive the comparative statics for the effect of generic advertising on branded advertising and the effect of generic advertising on firm profits in equilibrium.

3.1 Generic Advertising's Effect on Firms' Branded Advertising and Profit.

In the branded advertising choice, both firms simultaneously choose their optimal levels of branded advertising. Since the generic advertising assessment, g, is not chosen by the firms, it can be taken as an exogenous parameter at this stage of the game, and we can consider the effect of this parameter on firm behavior and profits.

Presuming an optimal level of branded advertising exists, denote $B_1^* \equiv B_1^*(g)$ and $B_2^* \equiv B_2^*(g)$ as the levels of branded advertising chosen by the two firms from simultaneously optimizing equations (3) and (4). Substituting these optimal choices back into the first-order conditions gives the following first-order identities:

$$\frac{\partial \Pi_1^*}{\partial B_1} = \frac{4}{9} \frac{\partial k_1(B_1^*, g)}{\partial B_1} N(g) - 1 \equiv 0 . \tag{5}$$

$$\frac{\partial \Pi_2^*}{\partial B_2} = \left(\frac{-1}{9}\right) \frac{\partial k_2(B_2^*, g)}{\partial B_2} N(g) - 1 \equiv 0 . \tag{6}$$

[8] To see the complexity of the problem when the assumption of market coverage is relaxed, the profit equations allowing for partial market coverage are
$\Pi_1^* = [(2k_1 - g)(2k_1^2 - 2k_1k_2 - g(k_2 - k_1))N] / [(k_2 - 4k_1)^2] - B_1$ and
$\Pi_2^* = [2k_1(k_2 - g)(k_1k_2 - k_2^2 - 2g(k_1 - k_2))N] / [k_2(k_2 - 4k_1)^2] - B_2$. Analytical solutions in the subsequent advertising stages based upon these profit equation were intractable.

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Differentiating these identities with respect to g reveals the following comparative static conditions:

$$\frac{\partial B_1^*}{\partial g} = \frac{-\dfrac{\partial^2 k_1}{\partial B_1 \partial g}}{\dfrac{\partial^2 k_1}{\partial B_1^2}} - \frac{\dfrac{\partial k_1}{\partial B_1}\dfrac{\partial N}{\partial g}}{\dfrac{\partial^2 k_1}{\partial B_1^2} N}, \text{ and} \tag{7}$$

$$\frac{\partial B_2^*}{\partial g} = \frac{-\dfrac{\partial^2 k_2}{\partial B_2 \partial g}}{\dfrac{\partial^2 k_2}{\partial B_2^2}} - \frac{\dfrac{\partial k_2}{\partial B_2}\dfrac{\partial N}{\partial g}}{\dfrac{\partial^2 k_2}{\partial B_2^2} N}. \tag{8}$$

Both of these are indeterminate in sign because I have no priors on the effect of generic advertising on the *rate* of quality increase from branded advertising ($\partial^2 k_i / \partial B_i \partial g$). However, noting that $\partial k_i / \partial B_i > 0$ and $\partial^2 k_i / \partial B_i^2 < 0$ by the previous assertion that quality increases at a diminishing rate with respect to any advertising, we can say that if generic advertising has either a positive effect or no effect on branded advertising's effect on quality (i.e. $\partial^2 k_i / \partial B_i \partial g \geq 0$), then generic advertising will increase both firms' level of branded advertising. Interestingly, in such a case, this positive relationship occurs *regardless the scenario*.

In the oral arguments of the Supreme Court case concerning the generic advertising of tree fruit, one objection to the marketing order was that after the generic advertisement is aired, a high-quality producer has to "spend a lot of [money] trying to change the minds of the consumer" that their fruits are different from those of other growers (Glickman, 1997). The analysis here shows that *an increase in branded advertising – in and of itself– is not evidence that generic advertising is lowering product differentiation* as the branded advertisers may very well increase their own advertising regardless of whether there is any effect on consumers' perceptions.

Similarly, we can determine the effect of the generic advertising assessment on firms' equilibrium profits by differentiating the second-stage, optimal profit functions

$$\Pi_1^{**} = \frac{4(k_1(B_1^*(g), g) - k_2(B_2^*(g), g))}{9} \cdot N(g) - B_1^*(g) \text{ and} \tag{9}$$

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$$\Pi_2^{**} = \frac{k_1(B_1^*(g),g) - k_2(B_2^*(g),g)}{9} \cdot N(g) - B_2^*(g), \tag{10}$$

with respect to g. Using Caputo's (1996) first theorem for the envelope condition under Nash equilibrium and denoting quality as a function of the optimal branded advertising (i.e., $k_i^* \equiv k_i(B_i^*(g),g)$) the following comparative static relations are found:

$$\frac{\partial \Pi_1^{**}(B_1^*, B_2^*, g)}{\partial g} = \frac{4}{9}\left[(k_1^* - k_2^*)\frac{\partial N}{\partial g} + \left(\frac{\partial k_1^*}{\partial g} - \frac{\partial k_2^*}{\partial g} - \frac{\partial k_2^*}{\partial B_2}\frac{\partial B_2^*}{\partial g}\right)N(g)\right], \text{ and} \tag{11}$$

$$\frac{\partial \Pi_2^{**}(B_1^*, B_2^*, g)}{\partial g} = \frac{1}{9}\left[(k_1^* - k_2^*)\frac{\partial N}{\partial g} + \left(\frac{\partial k_1^*}{\partial g} - \frac{\partial k_2^*}{\partial g} + \frac{\partial k_1^*}{\partial B_1}\frac{\partial B_1^*}{\partial g}\right)N(g)\right]. \tag{12}$$

These differ from CM's equation (2), which showed the effect of generic advertising on the dominant, high-quality firm. The difference is in the inclusion of the $(\partial k_i^* / \partial B_i)(\partial B_i^* / \partial g)$ terms. Since these terms are indeterminate in sign (because of the indeterminacy of generic advertising's effect on branded advertising), it is not as clear as in the dominant-firm case how generic advertising affects profits under scenario 2. However, some intriguing results appear.

If generic advertising has no effect on branded advertising, both firms are made better off by generic advertising under scenario 1. Under scenario 2, as g increases, profits could increase for both firms and then begin to decrease. Importantly, though, is the observation that under scenario 2, as g increases firm 1 would become worse off faster than firm 2.

If generic advertising has a positive effect on both firms' branded advertising, however, an interesting result is that generic advertising will make firm 2 better off under scenario 1 with an indeterminate effect under scenario 2. On the other hand, the effect on firm 1 will be indeterminate under either scenario 1 or scenario 2, but its profits begin to decline much faster under scenario 2 than they would under scenario 1. Further, equilibrium profit for firm 1 will begin to decline at lower levels of g for firm 1 than will profit for firm 2. One very interesting result is that if generic advertising causes the two firms to increase their branded advertising, firm 2 is helped by firm 1's branded advertising, whereas, firm 1 is harmed by firm 2's branded advertising. This result is invariant to the scenario.

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If generic advertising decreases the amount spent on branded advertising by both firms, then generic advertising always helps firm 1 under scenario 1 but is indeterminate for firm 2. Under scenario 2, the results are indeterminate for both firms.

Finally, if the effect of generic advertising on branded advertising is positive for one firm but negative for another, the results are indeterminate. Nonetheless, equations (11) and (12) show that presuming that generic advertising's effects on firm profits is innocuous is questionable if generic advertising is affecting consumers' perceptions of quality. For any of the cases, to say more than what is implied by equations (11) and (12), we must turn to numerical simulations.

3.2 Solutions to the Subgames and Numerical Examples

Solving for the specific, optimal levels of branded advertising requires specifying functional forms for the perceived quality variables and *N*. For this stage, I chose two functional forms for the sake of demonstration. First, I consider "square-root" forms $k_i = \kappa_{0i} + \kappa_{bi}\sqrt{B_i} + \kappa_{gi}\sqrt{g}$ (i = 1, 2) and $N = \rho_0 + \rho_g\sqrt{g}$, where in all three equations, the parameters are non-negative. Second, I consider "constant-elasticity" forms $k_i = \kappa_{0i}B_i^{\kappa_{bi}}g^{\kappa_{gi}}$ (i = 1, 2) and $N = \rho_0 g^{\rho_g}$, where I restrict the exponents to be between zero and one. Both forms ensure diminishing returns to advertising.

Some remarks should be made concerning the quality specifications. In both quality functions, the first term in k_i represents the intrinsic quality of the goods such that κ_{01} is greater than κ_{02}. If the coefficients in the square-root models or the exponents in the constant-elasticity models on the advertising variables are zero, then consumers do not believe that advertising adds anything to the quality of the goods and perceived quality is equal to intrinsic quality. Under scenario 1, if generic advertising causes the perceived quality of both goods to increase at the same rate, then κ_{g1} is equal to κ_{g2}; whereas, κ_{g1} is less than κ_{g2} if generic advertising increases the perceived quality of good 2 more than good 1 as would occur under scenario 2.

To solve the models, the quality and market-size functions were put into equations (3) and (4) and the optimal levels of branded advertising were found. Equations (13) and (14) present the optimal branded advertising levels (as a function of *g*) under the square-root model and equations (15) and (16) present the optimal branded advertising levels under the constant-elasticity form.

[Optimal advertising under the square-root form.]

$$B_1^*(g) = \frac{16\kappa_{b1}^2}{81}\left[\rho_0 + 2\rho_g\sqrt{g}\right]^2, \tag{13}$$

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$$B_2^*(g) = \frac{\kappa_{b2}^2}{81}\left[\rho_0 + 2\rho_g\sqrt{g}\right]^2, \tag{14}$$

[Optimal advertising under the constant-elasticity form.]

$$B_1^*(g) = \exp\left\{\frac{\ln\left[\left(9/(4\kappa_{01}\kappa_{b1}\rho_0)\right)g^{-(\kappa_{g1}+\rho g)}\right]}{(\kappa_{b1}-1)}\right\}, \text{ and} \tag{15}$$

$$B_2^*(g) = \exp\left\{\frac{\ln\left[\left(-9/(4\kappa_{01}\kappa_{b1}\rho_0)\right)g^{-(\kappa_{g2}+\rho_g)}\right]}{(\kappa_{b2}-1)}\right\}. \tag{16}$$

These branded advertising values are used in the profit equations (9) and (10). One could then solve for the optimal levels of generic advertising from each firm's perspective (e.g. how much g would firm i prefer under each scenario) and from the perspective of the marketing board who would seek to maximize aggregate industry profit. However, such derivatives are analytically unwieldy (especially for the constant-elasticity forms which require conversion to polar coordinates because of a complex value that appears in one of the first-order conditions). Nevertheless, numerical solutions are tractable for specifications of the parameters, and I turn to these next.

For the numerical derivations, *MathCad* version 12 was used. For both model types, I use the same parameter specifications for simplicity. The intrinsic qualities of the goods were chosen so that in the absence of advertising, good 1 would be preferred to good 2: $\kappa_{01} = 1$, $\kappa_{02} = ½$. The other parameters were chosen as follows: $\kappa_{b1} = ½$, $\kappa_{b2} = ½$, $\rho_0 = 1$, and $\rho_g = ½$. These values remain the same in both scenarios. The coefficient values that change in the two scenarios are κ_{g1} and κ_{g2}. Under scenario 1, κ_{g1} and κ_{g2} both equal ½. Under scenario 2, κ_{g1} is lowered to ¼, and κ_{g2} remains at ½.

The parameter values chosen for the simulations mean very little in themselves, other than conforming to our assumptions of quality and market size increasing at decreasing rates, and were chosen simply to demonstrate what might happen if, under scenario 1, generic advertising increased the quality of the two goods in the same manner, and, under scenario 2, if product differentiation began to decline. The four figures 1 through 4 provide interesting insights into a potential problem with generic advertising when product differentiation exists.

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These give the firm profits as well as the aggregate, industry profit for various levels of generic advertising under the above parameterization. Figures 1 and 2 give the results when generic advertising affects both qualities in the same way and under each of the two quality specifications. Figures 3 and 4 give the results when generic advertising lowers product differentiation.

Profit is everywhere increasing in figures 1 and 2 because of the assumption of market coverage. As the model constrains consumers to purchase the good regardless the cost of the generic advertising assessments, then the cost of the generic advertising is simply passed along by the firms. That caveat taken, there are two important messages that come from figures 1 and 2. The first is that if generic advertising has a neutral effect on product differentiation then as generic advertising increases, firm 1's profit is always above firm 2's profit. The second is that if generic advertising does not affect product differentiation, then both firms prefer more generic advertising to less.

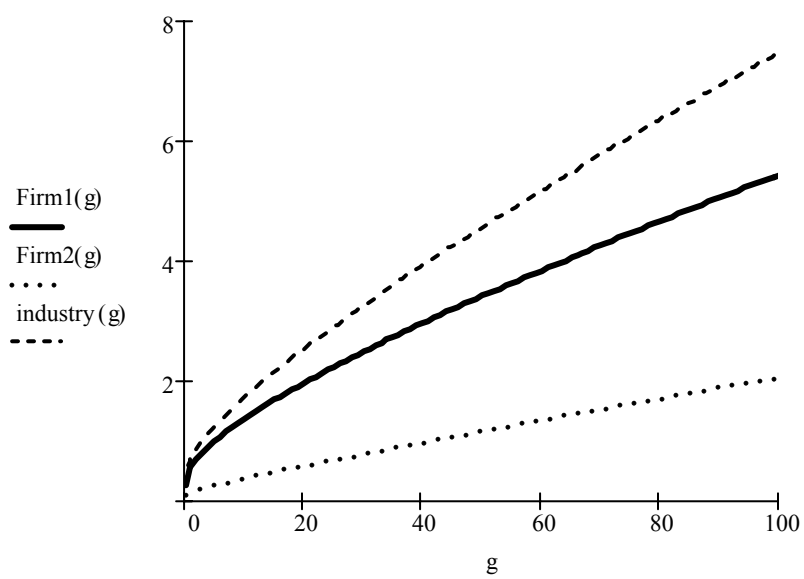

Figure 1: Profits when Generic Advertising Affects Both Goods in the Same Manner, Square-Root Quality Specification.

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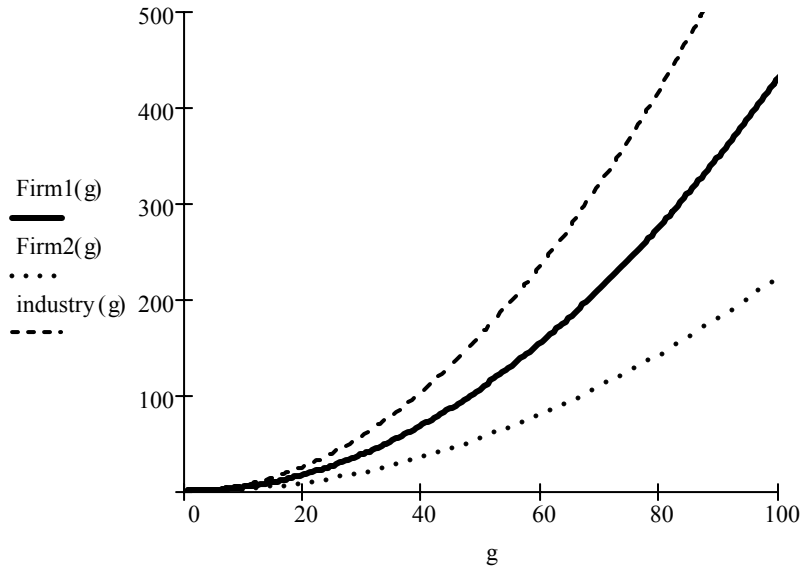

Figure 2: Profits when Generic Advertising Affects Both Goods in the Same Manner, Constant-Elasticity Quality Specification.

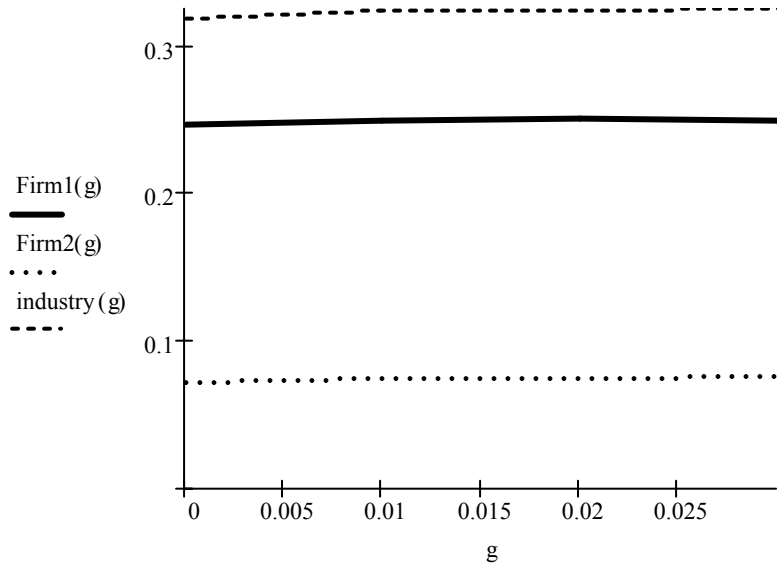

Figure 3: Profits when Generic Advertising Decreases Product Differentiation, Square-Root Quality Specification.

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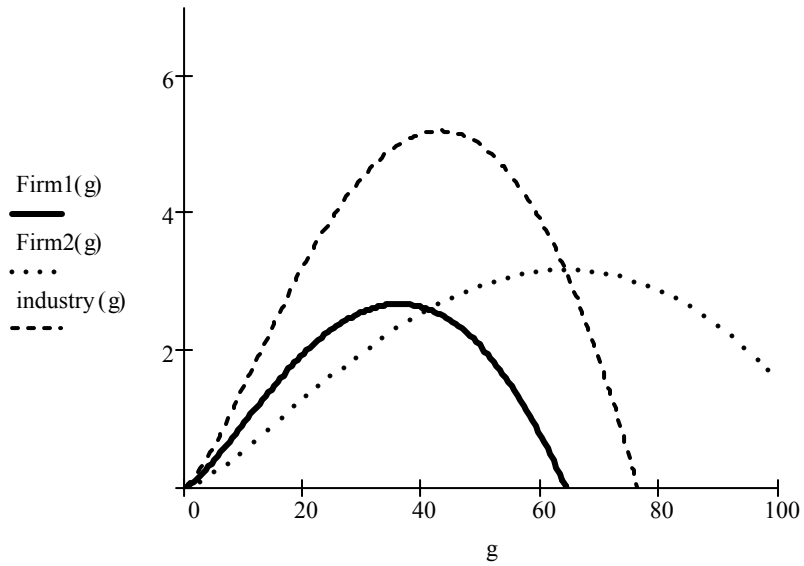

Figure 4: Profits when Generic Advertising Decreases Product Differentiation, Constant-Elasticity Quality Specification.

Figures 3 and 4 show what happens if–as generic advertising increases–the goods become less heterogeneous. Both graphs (though it is easier to see in figure 4) demonstrate the parabola shapes implied by equations (11) and (12). The maxima were solved for these cases. In the case of figure 3, firm 1 achieves a profit maximum at $g = 0.016$, firm 2 achieves a maximum at $g = 0.148$ and the industry maximum is at $g = 0.029$. In the case of figure 4, firm 1 achieves a maximum at $g = 36$, firm 2 achieves a maximum at $g = 64$ and the industry maximum is at roughly $g = 43$. Thus under both models we see that if generic advertising affects product differentiation, firm 2 will prefer the marketing board to spend more money on generic advertising than firm 1 would like the board to spend. Figure 4 shows that profits for firm 1 may even turn negative while remaining positive for firm 2. Further, the industry level of expenditure (the marketing board's optimum) occurs on the region of firm 2's profit that is increasing whereas it occurs on the region of firm 1's profit that is decreasing.

Although these simulations represent just one outcome, they show that it is possible for generic advertising to be detrimental to high-quality firms while being profitable to firms producing lower qualities if generic advertising indeed

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lowers product differentiation. Empirical tests for such an effect are thus crucial for any marketing board to judge how its advertisements affect all producers.[9]

4. Why would the high-quality firm go along with generic advertising under Scenario 2?

A reviewer asked why, under scenario 2, would the high-quality firm ever consent to a generic advertising program? The simple answer is that if it actually had a choice, it probably would not. But, we must remember that once approved by the Secretary of Agriculture, a generic advertising program is compelled upon all producers. The farm vote that precedes that decision needs either two-thirds of producers to vote for the marketing order or producers representing two-thirds of product volume. Once established the marketing order is binding on all participants. One could easily imagine a case where a marketing order was established under scenario 1, but then something affected the advertising or consumers' perceptions so that scenario 1 evolved into scenario 2. For example, what if a marketing order was begun at a time when the affected industry mostly sold bulk commodities but later through the introduction of proprietary varieties or through the establishment of a brand image via firm-level advertising, product differentiation grew? Generic advertising may not work as uniformly when brands exist. In such a case, firms become harmed because the market has changed. Perhaps, the harmed firm or firms simply do not have the ability to get rid of the order through the referenda process. Why might that be?

Suppose that firm 2 was a large cooperative and firm 1 was a smaller co-op or a single entity. In such a case either through sheer numbers of growers or sheer volume of product, the referendum could easily be in favor of establishing or maintaining a generic advertising program despite firm 1's opposition. Furthermore, once established, the marketing board overseeing the advertising is made up in part by grower members elected by producers. One could imagine a situation where the board is dominated by those who share the interest of a large cooperative. As such, a board might choose an industry-optimal amount of generic advertising that benefits firm 2 more than firm 1. Or, the board may innocently make a decision without recognizing the potential for harm, believing the industry is operating under scenario 1.

As it happens, very large cooperatives exist in several industries under the jurisdiction of marketing orders. Examples include the cooperatives Blue Diamond Almonds, Sunsweet Prunes, and Sun Maid Raisins. Moreover, some

[9] Empirical tests for such an effect can be found in CM for dried plums and Chakravarti and Janiszewski (2004) for a variety of generically advertised products. Importantly, both of these studies show correlations between increases in generic advertising and decreases in product differentiation.

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marketing orders allow what is called "bloc voting." Bloc voting allows a cooperative to vote for board members or in referenda on behalf of the cooperative's members. Thus, either through voting by growers who are members of a cooperative or through bloc voting, it is possible for a generic advertising program to institute assessment rates or other marketing decisions that may or may not be beneficial to a particular firm or small cooperative.[10] The harmed firm would contribute to the generic advertising because its only other choice under the compelled funding is to leave the industry (or sue to overturn the marketing order, as several firms have tried). As Crespi, (2003, 2005) describes, the cases involving the Almond Board of California hinged on just this issue. Namely, Blue Diamond Almonds was accused of influencing the Almond Board so as to set generic advertising assessments in a manner that benefited Blue Diamond and harmed smaller, independent producers.[11]

The converse may also occur. If the harmed firm is a large cooperative in terms of number of grower members or volume of sales, then we would expect to see this firm halt or change a board's advertising activities. A majority of raisin growers voted in 1994 to get rid of their industry's generic advertising after a number of packing houses had expressed opposition of the program (Merlo, 2001). Approximately thirty percent of growers were members of the Sun Maid raisin cooperative, the largest packer. Could this be evidence that Sun Maid and other packers were protecting their brand images from the homogenizing effects of generic advertising?[12] I am aware of no research that has looked at this specific question in either raisins, almonds or other products, but the influence of cooperatives on marketing boards would make for an interesting study of the political economy of generic advertising.

5. Conclusion

This paper adds to the understanding of generic advertising when product differentiation exists. Specifically, it helps better explain why some producers

[10] See the discussion in Crespi and Sexton (2003, English translation, p. 15): "In fact, the [Agricultural Marketing Agreement Act] envisioned cooperatives and marketing orders working hand in hand to improve producer welfare because it includes a provision to allow qualifying cooperatives to discharge their members' votes as a bloc, meaning that a cooperative that controls sufficient volume in the market can also control decision making in the marketing order."

[11] See especially the quote from Judge Brunetti on p. 302 of Crespi, 2003. In the opinion striking down the generic advertising in almonds Judge Brunetti wrote that the Almond Board had set assessment provisions for generic advertising in a manner "designed to benefit Blue Diamond, who overwhelmingly dominates the retail almond market, at the expense of smaller handlers…"

[12] Sun Maid even went on to file an *amici curiae* brief in the Glickman v. Wileman Bros. tree fruit case asking the U.S. Supreme Court to uphold a 1995 appellate court's ruling that generic advertising was unconstitutional.

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would favor generic advertising while others would be opposed to it, an explanation that is necessary to shed light on why so many lawsuits have emerged in recent years. Although a previous study by Crespi and Marette had shown that generic advertising could have deleterious effects on the profitability of high-quality producers, their study showed that producers of lower-quality were made neither worse off nor better off by the advertising. Also, their paper did not consider the effect of generic advertising on firms' branded advertising.

In this paper, I first show that an increase in branded advertising by either producer in the face of increased generic advertising is not a sufficient condition to claim that generic advertising is harmful. This is important because litigants had argued that generic advertising forced them to spend more on branded advertising to counter the generic ads. The model here shows that branded advertising may very likely go up as generic advertising increases, regardless generic advertising's effect on product differentiation.

Secondly, through analytical and numerical examples, I show that if generic advertising increases consumers' perception of quality, increases the size of the market, and does not affect product differentiation, then both firms can be made better off by generic advertising. On the other hand, if generic advertising diminishes product differentiation while it increases perceptions of quality and increases the size of the market then it is possible for a high-quality firm to be harmed and for a lower quality firm to be helped by generic advertising, up to a point.

What our paper and that by Crespi and Marette urge is that examinations of the benefits and costs of generic advertising must include empirical tests on whether and how generic campaigns affect both quality and branded advertising and should begin to consider the political economy question of how an industry chooses or manages a generic program in the face of product differentiation.

5. References

Anderson, S.P., A. de Palma, and J-F Thisse. *Discrete Choice Theory of Product Differentiation*. The MIT Press, Cambridge, Massachusetts, 1996.

Becker, G.S. and K.M. Murphy, "A Simple Theory of Advertising as a Good or Bad." *Quarterly Journal of Economics* 108 (1993):941-964.

Bonanno, G., "Advertising, Perceived Quality and Strategic Entry Deterrence and Accommodation." *Metroeconomica* 38(1986):257-280.

Butters, G, "Equilibrium Distribution of Sales and Advertising Prices." *Review of Economic Studies* 44(1977):465-491.

Caputo, M.R. "The Envelope Theorem and Comparative Statics of Nash Equilibria." *Games and Economic Behavior* 13(1996):201-224.

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Download Date | 1/11/17 5:48 PM

Chakravarti, A. and C. Janiszewski. "The Influence of Generic Advertising on Brand Preferences." *Journal of Consumer Research* 30(2004):487-502.

Crespi, J.M. "The Generic Advertising Controversy: How Did We Get Here and Where Are We Going?" *Review of Agricultural Economics* 25(2003):294-315.

Crespi, J.M. and S. Marette. "Generic Advertising and Product Differentiation." *American Journal of Agricultural Economics* 84(2002):151-161.

Crespi, J.M. and R.A. McEowen. "The Constitutionality of Generic Advertising Checkoff Programs." *Choices* 21(2006):61-65.

Crespi, J.M. and R.J. Sexton. "Concurrence, Coopératives de Producteurs et Marketing Orders aux États-Unis." *Economie Rurale* No. 277-278(2003):135-151.

Darby, M.R. and E. Karni. "Free Competition and The Optimal Amount of Fraud." *Journal of Law and Economics* 16(1973):67-88.

Dixit, A. and V. Norman. "Advertising and Welfare." *The Bell Journal of Economics* 9(1978):1-17.

Dorfman, R., and P. Steiner. "Optimal Advertising and Optimal Quality." *American Economic Review* 44(1954):826-836.

Fisher, F.M. and J.J. McGowan. "Advertising and Welfare: Comment." *Bell Journal of Economics* 10(1979):726-27.

Gabszewicz, J. Jaskold and J-F. Thisse. "Price Competition and Income Disparities." *Journal of Economic Theory* 20(1979):340-359.

Glickman v. Wileman Brothers & Elliott, Inc. 117 S.Ct. 2130, 138 L.Ed.2d 585 no. 95-1184 (1997).

Grossman, G.M., and C. Shapiro. "Informative Advertising with Differentiated Products." *Review of Economic Studies* 51(1984):63-81.

Hotelling, H. "Stability in Competition." *The Economic Journal* 39(1929):41-57.

Kaiser, H.M., J.M. Alston, J.M. Crespi, and R.J. Sexton, eds. *Commodity Promotion Programs in California: Economic Evaluation and Legal Issues*. Peter Lang Publishing, New York, 2005.

Lancaster, K.J. "A New Approach to Consumer Theory." *Journal of Political Economy* 74 (1966):132-57.

Los Angeles Times. Savage, D.G. and M. Groves. "Fruit Growers Sour on Ads, Go to Court.", November 29, 1996:A1.

Merlo, C. "Season of Turmoil: A Price Dispute Between California's Raisin Growers and Packers Divides Financially Troubled Industry." *USDA Rural Cooperatives* 68 (2001): 14-19.

Meurer, M. and D.O. Stahl, II. "Informative Advertising and Product Match." *International Journal of Industrial Organization* 12(1994):1-19.

Milgrom, P. and J. Roberts. "Price and Advertising Signals of Product Quality." *Journal of Political Economy* 94(1986):796-821.

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Download Date | 1/11/17 5:48 PM

Mussa, M. and S. Rosen. "Monopoly and Product Quality." *Journal of Economic Theory* 18 (1978):301-317.

Nelson, P.. "Advertising as Information." *Journal of Political Economy* 81(1974):729-754.

Nelson, P. "Information and Consumer Behavior." *Journal of Political Economy* 78(1970):311-329.

Salop, S.C. "Monopolistic Competition with Outside Goods." *Bell Journal of Economics* 10 (1979):141-156.

Schmalensee, R. "A Model of Advertising and Product Quality." *Journal of Political Economy* 86(1978):796-821.

Schmalensee, R. "Advertising and Entry Deterrence: An Exploratory Model." *Journal of Political Economy* 91(1983):636-653.

Stigler, G. J. and G. S. Becker. "De Gustibus Non Est Disputandum." *American Economic Review* 67(1977):76-90.

Sutton, J. *Sunk Costs and Market Structure: Price Competition, Advertising, and the Evolution of Concentration*. MIT Press, Cambridge, MA, 1991.

Stahl II, D.O. "Oligopolistic Pricing and Advertising." *Journal of Economic Theory* 64(1994): 162-177.

Stockton Record, The. Hood, J. "S-moo-th Sailing for Milk-Marketing Program." November 26, 1997: F1.

Von der Fehr, N. H. M. and K. Stevik. "Persuasive Advertising and Product Differentiation." *Southern Economic Journal* 65(1998):113-26.

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