IMPACT OF GENERIC ADVERTISING ON BRAND
ADVERTISING IN FOOD AND AGRICULTURAL
INDUSTRIES

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CHAPTER I

INTRODUCTION

Background

Advertising greatly facilitates the marketing strategies and promotion efforts of producers, firms, and commodity groups in the agricultural products and food industry. The essential purpose of advertising efforts for agricultural products is not only to enhance demand, but also to reduce decreasing consumption (e.g. red meats) for the commodity throughout the marketing channels (Ward, 2006). The function and task of the promotional programs would require different efforts among groups of products available. Promotional programs for differentiated products would focus on their characteristics of brands and individual firms. Other undifferentiated products would get more advantages with some sort of cooperative promotional efforts among producers and suppliers. Therefore, agricultural commodities have typically used cooperative generic advertising and promotional programs. Forker and Ward (1993) define generic advertising as follows:

*Generic advertising is the cooperative effort among producers of a nearly homogeneous product to disseminate information about the underlying attributes of the product to existing and potential consumers for the purpose of strengthening demand for the commodity.*
Brand advertising induces consumers to purchase branded products by promoting some product attributes unique to the brand; therefore, it persuades consumers that the product is a differentiated good among the commodity categories (Chang 1988).

The relative intensities between generic and brand advertising efforts depend on the brand identity and market structures of the commodity. Ward and Ferrara (2005) report that consumers purchase nearly 80% of chicken which is produced from highly vertically integrated markets with brand identity, while about 70% and 50% of beef and pork, respectively, are purchased without brand identity.

Since the federal commodity promotion programs began in 1954 with the passage of the National Wool Act (Armbruster 2001), 18 commodities are currently under congressionally authorized programs. In addition, 35 or more are operating under a federal marketing order (Table. 1). U.S. farmers are assessed over $750 million annually through commodity checkoff to fund various generic commodity promotion programs such as generic advertising, consumer education, and product research. Historically, major commodity groups (e.g., dairy, beef, and pork) have invested majority shares of their checkoff budgets in generic advertising. Many studies in the agricultural economics literature indicate that generic advertising has successfully increased the industry demand for most commodity groups. One of the important assumptions about generic advertising is that each industry produces a homogeneous product. Therefore, the purpose of generic advertising is to increase industry demand while realizing equal benefits for each producer.

In recent years, the circumstances around the agricultural industries have been changing. On the demand side, consumer preferences have been continuously changing.
with rising concerns about food safety, nutrition, and health. On the supply side, as agricultural industries are more concentrated and vertically integrated, agribusiness firms tend to produce differentiated products with various product brands at the firm level in addition to the generic advertising programs at the industry level. Brand advertising intends to increase market share of the product by persuading consumers to choose its own brand over other brands. Through various brand advertising programs, producers try to differentiate their products by emphasizing their unique quality attributes. Obviously, this is not consistent with the objective of generic advertising. Opponents of generic advertising claim that since generic advertising sends a signal that all products are homogeneous, it weakens brand messages of differentiated products.

Despite the potential conflicts between generic and brand advertising programs, the number of commodities participating in this program has been rising, and the funding levels also have been increasing (Beck 2008). An interesting research question might be, why do farmers and producers tend to participate in this collective promotion program? An answer to this question may be attributed to increasing free-rider and advertising cost problems. According to Ward (2006), U.S. commodity checkoff programs were designed to minimize the effect of free-riders and to create sufficient resources to pay for expensive media advertising. Traditionally, since agricultural products cannot easily be differentiated from competitors’ products and convincing consumers to purchase a particular farm product like an egg or a potato is difficult, generic advertising can help to expand total demand for the product. Many commodity programs are authorized with mandatory checkoff programs to minimize or remove free-rider problems and to create sufficient resources to pay for the promotion costs. To the participants in the programs,
the collective checkoffs may contribute to evenly shared benefits and the high cost of advertising, which is generally beyond the means of individual producers matching a perceptible effect on total demand. While globalization and bilateral free trade agreements have producers and providers faced with more competitive environments domestically and globally, those factors encourage them to search for ways of increasing product demands (Ward 2006; Becker 2008).

**Problem Statement**

The success of generic advertising programs depends on product characteristics and market conditions. Forker and Ward (1993) suggest that successful generic advertising requires factors such as homogeneous product, no or little differentiation, well-defined marketing objectives, no monopoly, fair and equitable mechanisms for assessment, and distribution of benefits.

As stated earlier, brand advertising has different objectives from generic advertising. Brand advertising is mainly funded by a single firm that has information about the brand. The primary purpose is to increase the brand’s sales quantities and market share of the products. In contrast, the purpose of generic advertising is to expand the aggregate market demand for a commodity. Therefore, generic advertising encompasses all products within the commodity category, including brands, without promoting specific brands (Forker and Ward, 1988). Another issue is that the suppliers of brand products have control over its quality (parts of brand attributes) and quantity, and thus they can change brand advertising programs accordingly. Generic advertising, however, is designed to promote overall product quality and industry demand.
With the changing market structure and environment, some differentiated goods producers claim that generic advertising gives an unintentional signal to consumers that all generically advertised commodities have the same quality, and therefore their brand advertising messages and efforts may get hurt by generic advertising (Crespi, 2002). Some producers have strongly challenged mandatory checkoff programs. Some producers have even asked USDA to change or abolish the checkoff programs, while some of them have petitioned the department to hold a producer referendum on whether a checkoff program should continue. Their deep dissatisfaction is that they consider the mandatory checkoff assessment “a double taxation.” Three court cases regarding the impact of generic advertising on brand advertising have reached the U.S. Supreme Court: Glickman v. Wileman Brothers and Elliot. Inc, 1997; United States v. United Foods, Inc., 2001; and Johanns v. Livestock Marketing Association, 2005 (see Crespi 2003 for more details about these and other related court cases).

A few questions related to this controversial issue include: What economic rationale are these court cases based on? What methodologies should economists use to analyze the issue? Does generic advertising really hurt brand advertising or does it help all participants?

Several studies have tried to answer these questions in the literature. Lee and Brown (1992) and Ward (1992) find that both generic and brand advertising positively affect industry sales. Both studies also show that brand advertising significantly influences brands’ market share. Carey and Bolton (1996) find that as consumers become well educated about a firm’s product, spillovers from generic advertising become large, and with greater spillovers come greater incentives to collude on generic advertising by
firms. Crespi and Marette (2002) and Crespi (2007) find that generic advertising may help low-quality producers while hurting high-quality producers under a differentiated product environment. Chakravarti and Janiszewski (2004) conduct experiments and find that generic advertising may decrease access to information about differentiating attributes. Zheng, Bar, and Kaiser (2010) also find that benefits of generic advertising are not evenly distributed within firm size, and generic advertising leads to decreased firm profits.

Advertising affects market equilibrium and consequently firms' and the industry's profitability. Generic advertising especially is typically thought to expand total market demand. However, the nature of the changing demand shows varying aspects as the demand become more or less elastic while the curve itself shifts up. Several studies in the literature show that assumptions on demand changes have important implications for investigating advertising effectiveness. The present study assumes two types of demand changes: parallel demand shift and demand rotation (Hamilton, 1999; Chung and Kaiser 2000a; Chung and Kaiser 2000b; Jonson and Myatt 2006; Zheng, Bar, and Kaiser, 2010). The study develops an analytical advertising model that includes generic and brand advertising expenditure variables and attempts to examine the interrelationship between generic and brand advertising. The model is expected to show the impact of generic advertising on brand advertising when three types of demand changes caused by generic advertising are considered: shift up, rotating clockwise, and rotating counterclockwise.
Objectives of the Study

The main objective of this study is to examine the impact of generic advertising on brand advertising. Specific objectives include:

(1) Develop an analytical model of generic and brand advertising

(2) Analyze the impact of generic advertising on brand advertising analytically based on three alternative demand shift scenarios: shift up, rotating clockwise, and rotating counterclockwise

(3) Conduct a numeric simulation and graphically show the impact of generic advertising on brand advertising
CHAPTER II

LITERATURE REVIEW

This chapter includes three sections related to promotions: general classification of commodities and the role of advertising, advertising and demand theory, and generic versus brand advertising. The section on general classification of commodities reviews different product classifications by their natures and characteristics and the role of advertising theoretically. The next section on advertising and demand theory reviews the effects of advertising on demand, which covers the recent demand shifting framework within advertising. The last section of this chapter covers previous studies on the relationship between generic and brand advertising.

General Classification of Commodities

Consumers demand varying and diverse information about commodities such as origin, nutrition facts, price, ingredients, product alternatives, quality differences, and product reliability. Advertising has been one of the most effective ways for advertisers to convey product information to large heterogeneous groups of consumers through mass communication. Even though uncertainties and asymmetric information exist, many consumers may find it easier to make adequate decisions on how, what, and where to buy something they need. One potential role of commodity advertising is to enhance the
understanding of broad general classifications of commodities: search and experience goods. Search goods are generally durable products that consumers can inspect prior to purchase. They usually have high market value and are bought infrequently (e.g., automobiles or food freezers). Experience goods are those that consumers actually have to consume in order to evaluate the positive attributes claimed in the advertisements, and they are relatively inexpensive. Agricultural and food products typically fall into the experience goods category (Forker and Ward, 1993, and Chang, 1988).

Differences in advertising between search and experience goods can be found through direct versus indirect information. Advertising of experience goods is directed toward achieving repeated purchases through enhanced product awareness and perception (Ward, Chang, and Thompson, 1985). In the case of experience goods, advertising is subject to frequent change. Since the messages for the products are intended to encourage experiments, messages may be less factual and more suggestive.

Another commodity classification is cooperative vs. predator goods. First, cooperative goods are classified as products that cannot be differentiated (Friedman, 1983). While the total demand can be increased by advertising, the market share among product suppliers cannot be changed. Among this group, advertising which is either generic or brand advertising or both, identically affects consumer behavior. Brand advertising for cooperative goods would only occur if the benefits accruing to the brand exceeded the costs, even when others also benefited. Predatory goods can be identified as goods that can be differentiated but for which expansion in total consumption of the producer group is difficult to achieve. Advertising among such brands may cause changes in market shares but may not increase total consumption. Generic promotions may still be
effective, however, if there are specific product attributes common to the predatory goods (Forker and Ward, 1993).

The characteristics of most agricultural commodities are located between purely cooperative or predatory goods. Such products can be differentiated within a range but still include many common characteristics. Therefore, generic and brand advertising programs tend to exist jointly for most agricultural commodities.

Advertising and Demand Theory

The primary objective of advertising, as stated earlier, is obviously to enhance demand, particularly for generic advertising programs. Few studies that present the direct effectiveness of advertising on demand consider various variables that affect demand changes. The variables include prices, incomes, policies, market conditions, and so on.

Nerlove and Waugh (1961) develop a theoretical model for cooperative advertising, and then apply the framework to discover the implications of the effects of advertising expenditures on the demand for Florida oranges. The study shows that in the constant supply (short run supply case), increasing one unit (an added dollar) of advertising expenditure would raise the gross returns to orange producers by over 20 units ($20).

Thomson and Eiler (1975) estimate the short-run and long-run effects of generic advertising on New York City Milk sales. The results show that the additional expenditure of generic advertising directly increases milk consumption and producer benefits.
Suzuki et al. (1994) study the effectiveness of the generic milk promotion in Japan using an imperfect competition model. The authors used the Japanese generic milk promotion data to measure the effectiveness of generic milk advertising while incorporating the degree of market competition. An imperfect competition model employing a type of conjectural variations was adopted to determine fluid premiums endogenously, and then compared with a conventional model assuming an exogenous fluid premium. The results show that the fluid milk premium was endogenously explained by the degree of market power, and the estimated marginal rates of return with the exogenous premium model were smaller than those with imperfect competition model. The result shows that analyses with an exogenous premium model likely underestimate the rate of return to milk promotion when imperfect competition is present.

Chung and Kaiser (2002) study the advertising effects on milk consumption in the United States with cross-sectional data. The authors point out the problem that aggregate time series data may provide misleading conclusions since the approach ignores the heterogeneity of individual behavior. They investigate whether the use of aggregate cross-sectional data significantly biases the estimated consumers’ response to advertising programs, and address the question of consistency between household versus macro-level advertising response models. The double-logarithm functional form is adopted using monthly household purchasing data from January 1996 through September 1999. The results show that significant aggregation bias in all three variables estimated: price, income, and advertising. Particularly, the macro estimate of the advertising variable had a different sign from the mean of micro estimates. The results illustrate that the aggregation
bias could potentially mislead the advertising evaluation if one had access only to aggregate data.

Johnson and Myatt (2006) develop a framework to analyze the transformations of demand. That idea is based on the notion that changes in demand are corresponding to changes in the dispersion of the willingness to pay of consumers. The theoretical model shows the results that dispersion leads to a rotation of the demand curve, and depending on the levels of dispersion, a firm should make decisions about a market posture alternate to the mass market or niche market. A niche market position is complemented by high levels of dispersion, and a mass market position by low levels of dispersion. A new taxonomy of advertising is introduced distinguishing between hype, which shifts demand, and real information, which rotates demand.

Zheng, Bar, and Kaiser (2010) develop a framework to examine effects of varying mandatory generic advertising assessment rates. A Cournot oligopoly model developed in this study shows that the distribution of benefits from generic advertising varies with firm size. The model also shows that the assessment rate may change the demand which is shifting and rotating but also increases firms’ costs. The results explain why small firms experience disadvantages from generic advertising.

**Generic and Brand Advertising**

Several studies have investigated the relationship between generic and brand advertising under product differentiation. The papers mostly focus on theoretical development of the effectiveness of advertising programs at firm and industry levels. Crespi and Marette (2002) investigate the effects of generic advertising on the product
differentiation among competing brands. Crespi and Marette’s framework follows Mussa and Rosen (1978) to develop an analytical model under the assumption of vertical product differentiation. The analytical derivation examines how the effectiveness and the optimal level of brand advertising are affected by generic advertising when market demands are derived from consumer utilities with differentiated product qualities. Results of the study show that generic advertising may benefit low quality producers more than high quality producers. The findings bring important implications to agricultural and food industries where products are becoming more differentiated.

Hunnicutt and Israelsen (2003) examine brand vs. generic advertising effects in a differentiated product industry. Considering the monopolistically competitive industry, they develop a conceptual model for generic and brand advertising, which includes the market share and degree of product differentiation. Advertising benefits are clearly examined through the market expansion effects and branding effects through comparative statistic analyses. Chakravarti & Janiszewski (2004) examine the effects of generic advertising on brand preferences through experiments under various scenarios. Results of the experiments suggest that generic advertising may affect the consumers’ choice of brand by changing the consumers’ perceived brand differentiation. They also find that contrary to the objective of generic advertising, generic advertising may increase brand differentiation. Bass et al. (2005) analyze effects of generic and brand advertising in a duopoly market using an optimal control model. In this study, each firm can make decisions on its prices and levels of generic and brand advertising intensities. The study shows that a stronger firm with a higher effectiveness of advertising and gross margin is more likely to invest in generic advertising than a weaker firm, and the market share
mainly depends on the brand advertising. Crespi (2007) and Isariyawongse et al. (2007) extend the Crespi and Marette’s (2002) framework to vertical and horizontal product differentiation models, respectively.

Although these previous studies provide a useful framework for understanding the relationship between generic and brand advertising programs, the relationship has not been clearly identified. Most analytical results from these studies are not able to sign the marginal effects of optimal brand advertising and its effectiveness with respect to generic advertising. In addition, an empirical analysis has rarely been conducted.
CHAPTER III

AN ANALYTICAL MODEL ON GENERIC AND BRAND ADVERTISING

A Cournot Oligopoly Model on Generic and Brand Advertising

We introduce a Cournot oligopoly competition model with generic advertising and brand advertising. Following Quirmbach (1988) and Hamilton (1999), the model considers generic advertising and brand advertising parameters as demand shifters. Unlike the previous models (e.g. Crespi and Marrett 2002; Crespi 2007; Isariyawongse, Kudo, and Tremblay 2007), the model developed in this study considers demand shift and rotations and elasticities of advertising and price. Applying elasticities and alternative patterns of demand shift to the model is expected to provide clearer results of generic advertising impact on brand advertising than previous studies.

Consider a Cournot oligopoly market where exists a fixed number, $n$, of producing firms, and entry is not concerned. We assume some firms, $k$ ($k < n$), in this market produce a branded and nonbranded product and may attempt to create subjective product differentiation through brand advertising. The products are substantially undifferentiated, but the brand products are advertised. Other firms, $n-k$, produce only nonbranded products (Tremblay and Polasky 2002: Zhang, Sexton, and Alston 2002). The firms producing nonbranded products face the same market demands, and compete
in quantity in the homogeneous market. The firms producing brand products that share the brand product's market engage in competition to expand its market share. We assume the total brand advertising may increase market demand.

The output of a representative firm $i$ is denoted by $q_i$ and the market output, $Q$, is represented as: $Q = \sum q_i$. A marketing board of commodity controls the level of generic advertising expenditures funded by checkoff assessment. The mandatory checkoffs are levied to participants in the programs by a unit assessment rate, $t$. When the marketing board allocates the entire checkoff fee to the spending of generic advertising, the feasible generic advertising expenditures, $G$, is represented as: $G = tQ$. In the market exist brands, $B_N$, less than or equal to the number of firms (products), i.e., $B_N \leq n$. Some producers invest their brand advertising for consumers to convince the qualities and attributes of the goods for subjective differentiation. The brand advertising expenditure for firm $i$ may be denoted $B_i$, and it is a function of the expenditures of generic advertising, $B_i(t)$. In previous studies, the effectiveness of generic advertising is only concerned expanding total market demand, and so the market demand curve would shift up rightward. In this study, we assume that the generic advertising affects in three ways: (1) shift the demand parallel, (2) rotate the demand clockwise, (3) rotate the demand counterclockwise. This study focuses on the effect of generic advertising on brand advertising effectiveness.

The market demand is given by the inverse demand function $P = P(Q, t, B(t))$. We assume that the inverse demand is twice continuously differentiable, and let the subscripts indicate partial differentiation, $P_Q < 0$ for all $Q$. That is, the slope of the market demand is downward regardless of the effects of demand shifters. The demand curve is
concave in generic advertising assessment rates and brand advertising expenditures, that is, \( P_t > 0, P_B > 0, \) and \( P_u < 0, P_{BB} < 0. \)

Based on these assumptions, we consider three scenarios. The scenarios start with advertising which leads parallel shifts demand, then considers elastic and inelastic rotation of the demand curve. The three scenarios related to shift and rotation of demand curves include:

i) \( P_{Qt} = 0 \) indicating parallel shift.

ii) \( P_{Qt} < 0, P_{QB} < 0 \) indicating inelastic rotation (clockwise rotation).

iii) \( P_{Qt} > 0, P_{QB} > 0 \) indicating elastic rotation (counterclockwise rotation).

\( P_{Qt} = \frac{\partial P}{\partial t} \) denotes the change in the slope of demand curve \( (P_Q) \) with respect to the generic advertising assessment rate \( (t) \). The first scenario, therefore, \( P_t > 0 \) and \( P_{Qt} = 0 \) is a parallel increase in demand, which is a demand shift typically applied in the advertising literatures. However, a case may occur when the brand advertising does not affect demand shift, but changes the slope of it. The second scenario, in addition to the concave conditions, \( P_{Qt} \) or \( P_{QB} < 0 \), means that both generic and brand advertising decrease the variation of consumers’ valuation, and then make the demand curve steeper, consequently the more advertising, the less elastic the demand. The third scenario is the opposite case of the second one. The more advertising, the more elastic the demand.

The firm \( i \)'s cost function is given by \( C_i = C(q_i, B_i(t)) \). We assume that while the marginal cost of production \( (c_{q_i}) \) is constant for any output level \( q_i \), the marginal cost of brand advertising is increasing \( (c_{B_i} > 0) \) at a decreasing rate \( (c_{BB_i} < 0) \). Each firm has an equivalent marginal cost of production and brand advertising expenditures.

Then, the firm \( i \)'s profit function may be written as:
Differentiating $\pi_i$ with respect to $q_i$ yields the first-order condition as:

$$\pi_{q_i} = P(Q,t,B_i(t)) - t + q_i P_Q - c_{q_i} = 0.$$ 

Then, the second order condition of firm $i$ would be:

$$\pi_{q_i q_i} = 2P_Q(Q,t,B_i(t)) + q_i P_{QQ} - c_{q_i q_i} < 0.$$ 

Rewriting equation (1) using firm $i$'s market share leads to:

$$\pi_{q_i} = P(Q,t,B_i(t)) - t + s_i Q P_Q - c_{q_i} = 0,$$

where $s_i = q_i / Q$ represents market share of firm $i$.

Following Dixit (1986), Seade (1980), and Vives (1999), conditions for existence and stability of oligopoly equilibrium are:

$$1 - \frac{c_{q_i}}{P_Q} > 0,$$

$$P_Q + q_i P_{QQ} < 0,$$

where the second term of the right hand side of equation (6) is the summation of the output response of all other firms except firm $i$. Equation (6) is a necessary condition for a maximum, and requires (Hamilton 1999b; Seade 1980).

To address the optimal brand advertising expenditure at the firm level, its expenditure $B_i^*$ is treated as a continuous variable following Seade (1980), Besley (1989), and Hamilton (1999). After the checkoff fee is set to maximize the industrial total profit by the marketing board, a representative firm’s optimal brand advertising, $B_i^*(t)$, is derived from the following indirect profit function:
\[
\pi^*_i = \left[ P(Q^*, t^*, B_i(t^*)) - t^* \right] H_i - C_i(q^*_i, B_i(t^*)) \geq 0 ,
\]
where the superscript, \( ^* \), denotes optimal levels of checkoff assessment rates and output levels at firm and market.

**Impacts of Generic Advertising on Firm-level Output, Optimal Brand Advertising Expenditures, and Effectiveness of Brand Advertising**

To find the effects of generic advertising on firm-level output and the optimal brand advertising expenditure, total differentiation is imposed on FOC of equations (3) and (7). Combining equations, the result is

\[
\left[ \begin{array}{c}
\lambda \\
\pi^*_{q_{-i}} \\
\pi^*_{B_i} \\
\end{array} \right] \begin{bmatrix}
\frac{dq_i}{dt} \\
\frac{dB_i}{dt}
\end{bmatrix} = - \begin{bmatrix}
P_T - 1 + s_i Q P_{QT} \\
(P_T - 1)q_i - c_{B_i}
\end{bmatrix} dt ,
\]
where \( P_T = P_i + P_{B_i} \) and \( P_{QT} = P_{Q_t} + P_{Q_{B_i}} \). Suppose the coefficient matrix in equation (8) is denoted as \( \Phi \). Then the determinant of the matrix \( \Phi \) is:

\[
Det(\Phi) = \left( 2P_Q + s_i Q P_{QQ} \right) \left( q_i P_{B_i} - c_{B_i} \right) - \left( 1 - s_i \right) \left( P_Q + s_i Q P_{QQ} \right) c_{B_i} .
\]
Rewriting equation (9) with elasticity terms gives:

\[
(9)' \quad Det(\Phi) = P_Q \left[ (2 - s_i)E (q_i P_{B_i} - c_B) - (1 - s_i) (1 - s_i) E c_B \right] ,
\]
where \( E = -Q P_{QQ} / P_Q \) denotes the elasticity of the slope of the inverse demand. A direction of \( E \) implies curvature of the demand curve: \( E > 0 \), \( E < 0 \), and \( E = 0 \) implies convex, concave, and linear, respectively (Zheng, Bar, and Kaiser 2010). Implying the two stability conditions, two terms in the bracket, \( (2 - s_i)E \) and \( (1 - s_i)E \), are positive. The first term, \( (2 - s_i)E \), measures firm \( i \)'s response to rival's output (Hamilton 1999b; Zheng, Bar, and Kaiser 2010). Collecting terms and rewriting equation (9)' yields:
\[
\text{Det}(\Phi) = P_Q \left\{ (2-s_i E \cdot q_i, P_h - c_h \left[ (2-s_i E) + (1-s_i) (1-s_i E) \right] \right\}.
\]

The first part of the brace in braces measures the slope of firm \(i\)'s marginal revenue changed by its own brand advertising (denoted by \(MR_{QR_g}^i\)), and the second part of the brace denotes the summation of the slope changes of the marginal revenue due to increasing marginal costs of brand advertising in the entire market (denoted by \(MR_{QC_b}^M\)).

Then, the determinant can be rewritten as:

\[
\text{Det}(\Phi) = P_Q \left( MR_{QR_g}^i - MR_{QC_b}^M \right) = P_Q \Omega,
\]

where \(\Omega = MR_{QR_g}^i - MR_{QC_b}^M\). Three cases exist in determining the sign of the determinant, which shows the relative impacts of slope changes of marginal revenue to individual firm and entire market:

i) \(\Omega < 0\), ii) \(\Omega > 0\), and iii) \(\Omega = 0\).

We assume that \(MR_{QR_g}^i < MR_{QC_b}^M\), therefore, \(\Omega < 0\), and then \(\text{Det}(\Phi) > 0\).

**Impact of Generic Advertising on Individual Firm's Output**

We consider first the effect of generic advertising on the individual firm's output. Since the unit checkoff assessment rate has a similar nature to the production checkoff, the firm-level output is expected to decrease with the assessment rate. The impact of generic advertising on the individual firm's output, therefore, is generally expected to be negative:

\[
\frac{dq_i}{dt} < 0.
\]

From equation (8), the impact of change of generic advertising (represented by the checkoff assessment rate) on the output of a representative firm is derived:
\[
\frac{dq_i}{dt} = \frac{c_B \left( P_i + s_i Q_{Qi} - 1 \right) - q_i s_i Q_{Qi} - q_i s_i Q_{Qi} \} \right),
\]

and is rewritten with elasticity terms as:

\[
(10)^{'} \quad \frac{dq_i}{dt} = P_c \frac{c_B \left( 1 + s_i \Psi_i - P_i^{-1} \right) - P_q q_i s_i \Psi_B}{P \left( 2 - s_i E \right) \left( q_i P_q - c_B \right) - (1 - s_i)(1 - s_i E) \right)},
\]

where \( \Psi_i = \frac{Q_{Qi}}{P_i}, \Psi_B = \frac{Q_{Qi}}{P_B} \), which represent the output elasticities of generic advertising assessment rates and brand advertising expenditures, respectively (Hamilton 1999; Cowan 2004).

To determine sign of \((10)^{'}\), we should consider the three cases of demand changes influenced by generic advertising, which are shift up, elastic, or inelastic rotation of the demand curve. Each of the cases is also dependent on the influences of brand advertising effects, which are no change slope, elastic, or inelastic rotation of the demand curve.

Table 2 shows the results of signs of \(dq_i/dt\) for each case of demand changes. Generally, when generic advertising attempts to expand total market demand \(P_{Qi} = 0\) shift up) and leads to elastic demand \(P_{Qi} > 0\) rotates counterclockwise), most of the signs denote positive except that the case of brand advertising leads to elastic demand. According to the results, when brand advertising makes the demand inelastic or does not change the slope of the demand curve, most of the cases are positive or conditionally positive except the case when generic advertising makes the demand inelastic, that is, rotates the demand curve clockwise.

In the opposite case, when brand advertising leads elastic demand, most of the cases are negative or ambiguous. While generic advertising leads to increase market demand \(P_{Qi} = 0\) and rotate clockwise \(P_{Qi} < 0\), inelastic demand), if brand advertising
makes demand elastic, then the signs show negative or ambiguous. In the case of generic advertising generating the market demand curve to rotate clockwise (inelastic demand), most of the effectiveness show negative or ambiguous except when $P_T > 1$ and brand advertising make elastic demand or do not change the slope of the demand curve, the impacts of generic advertising on firm-level output are conditionally positive.

**Impact of Generic Advertising on Firm’s Optimal Brand Advertising Expenditure**

Opponents of generic advertising argue that it may lessen consumers’ subjective perceptions about the brand’s differentiated attributes that have been increased by brand advertising (Glickman 1997). If a firm spends more money for brand advertising to recover a brand’s reputation that was impacted by generic advertising, the sign of (11) would be positive, $\frac{dB^*}{dt} > 0$.

The impact of generic advertising (represented by the checkoff assessment rate) on the optimal brand advertising expenditures of a representative firm is derived:

(11) $\frac{dB^*}{dt} = \frac{c_B(1-s_i)(P_Q + s_iQP_{QQ}) - (2P_Q + s_iQP_{QQ})(P_T-1)q_I - c_B)}{(2P_Q + s_iQP_{QQ})q_B + (1-s_i)(P_Q + s_iQP_{QQ})F_B}$,

and rewriting with the elasticity terms yields:

(11) $\frac{dB^*}{dt} = \frac{c_B[(1-s_i)(1-s_i)E + (2-s_i)E] - (2-s_i)E(P_T-1)q_I)}{(2-s_i)E(q_B - c_B) - (1-s_i)(1-s_i)E)C_B}$.

The sign of equation (11) is determined by the direction of the numerator. At first, we determine directions of the second part of the numerator. Since the sign of the first term, $(2-s_i)E$ is already known as positive, the unknown sign of the second part is the second term, $(P_T-1)$. Therefore, the sign depends on whether $P_T=1$, $P_T>1$, or $P_T<0$. 

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Since $P_T$ is the summation of $Pt$ and $P_B$, the results are dependent on the sign of $P_B$. We assume $P_T$ and $P_I$, which has scenarios with the values of it, are always positive, and then we can determine the sign of $P_B$, with respect to the scenarios of $P_I$. Table 3.A shows the signs of all of the terms with respect to each scenario. Depending on the sign of $c_B$, the second differentiation of marginal cost of brand advertising with respect to the generic advertising, the sign of all the cases are represented in table 3.B.

When the total effect of generic advertising on the inverse demand (market price) is greater than or equal to one, $P_T \geq 1$, and the effect of generic advertising on the marginal brand advertising cost is negative or equal to zero, $c_B \leq 0$, the signs of these cases are positive except that there may be no impact when $P_T = 1$ and $c_B = 0$. This result means that the firm would spend more brand advertising expenditures as generic advertising increases. Since the effect of generic advertising on the marginal brand advertising cost is less than zero in these cases, the marginal brand advertising expenditures increase with diminishing rate with respect to the checkoff fee. In other cases when the generic advertising assessment rate causes an increase, the marginal cost of brand advertising with increasing rate or at least no impact on it, $c_B \geq 0$, and when the total effectiveness of generic advertising on market price is less than or equal to one ($P_T \leq 1$), the signs of these cases are negative. In this case, generic advertising decreases the optimal brand advertising expenditures.

Chakravarti and Janiszewski (2004) conducted two experiments. First, when generic advertising emphasizes a differentiated attribute, people prefer the premium brand and the premium brand share increases. In a second experiment, when generic advertising emphasizes a nondifferentiating attribute, while decreasing access to
information about the differentiating attribute, the generic advertising results in an increased price responsiveness.

**Impact of Generic Advertising on the Marginal Effectiveness of Brand Advertising**

In this section, we try to determine the sign of impact of generic advertising on the marginal effectiveness of brand advertising. Signing the impact is rarely found in the previous studies, since not only some scenarios and assumptions but also the model are not eligible to determine it.

Totally differentiating firm \( i \)'s profit using equation (1), the total changes of profit can be expressed in terms of output and demand shifters as:

\[
(12) \quad d\pi_i = q_i P \left( dQ - dq_i \right) + \left[ q_i (P_T - 1) - c_B \right] dt + \left( q_i P_B - c_B \right) dB_i,
\]

and rearranging equation (12) for the marginal effectiveness of brand advertising on firm \( i \)'s profit produces:

\[
(13) \quad \frac{d\pi_i}{dB_i} = q_i P \left( \frac{dQ - dq_i}{dB_i} \right) + \left[ q_i (P_T - 1) - c_B \right] \frac{dt}{dB_i} + \left( q_i P_B - c_B \right),
\]

where \( dq_{-i} \) denotes changes of all individual firms’ output except the firm \( i \). In the right hand side of equation (13), since we know \( P \leq 0 \) and \( \frac{dq_{-i}}{dB_i} \) should be non positive, i.e.,

\[
\frac{dq_{-i}}{dB_i(t)} \leq 0 ,
\]

The second term would be zero, because the generic advertising assessment rate is not dependent on brand advertising expenditures, that is, the sign of \( \frac{dt}{dB_i} \) is zero.
The signs of two terms, therefore, have the same direction, and then the sign of the second term is positive. For the last term, \( (q_i P_{B_i} - c_{B_i}) \), we assume that the sign of the term is nonnegative, that is, the term, \( q_i P_{B_i} \), the marginal effect of brand advertising on the inverse demand times farm-level output should be greater than or equal to the marginal cost of brand advertising. According to these signs and assumptions, the marginal profit of brand advertising, \( \frac{d\pi_i}{dB_i} \), should be positive or at least nonnegative.

The impact of generic advertising on the marginal profit effectiveness of brand advertising can be obtained from the second total derivatives of equation (13), and the terms arranged as:

\[
\frac{d^2\pi_i}{dB_i dt} = \left( P_{Q_i} \frac{dq_i}{dt} + q_i P_{QQ_i} \frac{dQ_i}{dt} \right) \left( \frac{dQ_i - dq_i}{dB_i} \right) \\
+ \left[ \left( P_T - q_i P_{QT} - 1 \right) dq_i + 2 q_i P_{Q_T} dQ_i + \left( q_i P_{TT} - c_{B_i} \right) \right] \frac{1}{dB_i} \\
+ \left[ \left( P_{R_i} - q_i P_{Ri} \right) dq_i + 2 q_i P_{Ri} dQ_i + \left( q_i P_{RR_i} - c_{B_i} \right) \right] \frac{1}{dt} \\
+ \left[ 2 q_i P_{TB_i} - \left( c_{B_i} + c_{B_R_i} \right) \right] 
\]

We assume that the second differentiation of marginal cost of brand advertising, \( c_{BB_i} \), is constant, the third differentiation, \( P_{BB_i} \), is constant, and \( P_{TQ} = P_{QT} \). After rewriting equation (14) with elasticity forms, we can now sign equation (14):
\[
\frac{d^2 \pi_i}{dB_i dt} = P\left[ \frac{dq_i}{dt} - s_i \frac{dQ}{dt} \right] dq_i + P_q \left[ \left(1 - s_i \psi_T - P_q^{-1}\right) dq_i + 2 s_i \psi_T dQ + q_i P_{TT}^{-1} dt \right] \frac{1}{dB_i} \\
+ P_B \left[ \left(1 - s_i \psi_{B_t} - P_B^{-1}\right) dq_i + 2 s_i \psi_{B_t} dQ + q_i P_{Bt,B_i}^{-1} dB_i \right] \frac{1}{dt} \\
+ [2q_i P_{B_i} - c_{B_i}]
\]

Equation (14) has not been able to be signed previous studies. However, after rewriting equation (14) with elasticity forms, we can now sign equation (14). We previously assumed that \( P_B < 0, P_T \) and \( P_{B_t} > 0, P_{TT} \) and \( P_{B_t,B_i} < 0 \). The marginal effect of brand advertising on the competitors’ products is nonpositive as assumed in equation (13), \( \frac{dq_i}{dB_i} \leq 0 \), and the marginal effect of generic advertising on the total market output is nonnegative, \( \frac{dq}{dt} \geq 0 \). The marginal effect of brand advertising on the total market demand assumes to be nonnegative, \( \frac{dq}{dB_i} \geq 0 \), and the marginal effect of brand advertising on its own products is assumed at least non negative, \( \frac{dq_i}{dB_i} \geq 0 \). We have a condition for the two output elasticities of generic advertising and brand advertising: those are less than one, \( \psi_T \) and \( \psi_B < 1 \) based on the previous studies.

With the assumptions and conditions, the sign of the equation (14)' is dependent on the terms of \( \frac{dq_i}{dt} \) and \( \frac{dB_i}{dt} \). At first considering the first line of the equation, the sign of the term is dependent on the direction of the term, \( \frac{dq_i}{dt} \). It is mostly positive when generic advertising generates market demand to shift up or elastic, \( P_Q \geq 0 \), and brand advertising leads it to be inelastic or does not change the slope, \( P_{B,t} \leq 0 \). In this case, applying the assumptions, \( P_Q < 0, dQ/dt \geq 0, \frac{dq_i}{dB_i} \leq 0 \), the first part is positive or
at least nonnegative. For the second line, when \( P_T \leq 1, c_{B_{i,t}} \geq 0 \), and generic advertising generate market demand shift up or inelastic, then \( dq_i/dB_i > 0 \), and \( dt/dB_i < 0 \). In this case, the second line is positive.

With the first and second lines of equation (14)', and \( P_T > 0 \) and \( \psi_B < 1 \), the third part is positive. Considering the fourth line, when \( P_T \leq 1, P_{B_{i,t}} \leq 0 \), and \( c_{B_{i,t}} \geq 0 \), then the sign of the fourth line is negative. Combining the signs of all lines the sign of equation (14)' is dependent on the relative size between the sum of the first to the third lines and the fourth line. If the assumptions stated above are reversed, then signing this equation become more complex, and in some cases, indeterminant.

**Summary of Analytical Results**

An analytical model is developed in this chapter to examine the impacts of generic advertising on brand advertising. To explain the relationship, we applied the theory of demand changes; shift-up, clockwise, and counterclockwise rotation. Through comparative statistics using elasticities of demand and advertising, we were able to sign three equations: the effect of generic advertising on an individual’s product \( dq_i/dt \), the impact of generic advertising on brand advertising expenditures \( dB_i/dt \), and the impact of generic advertising on the marginal profit of brand advertising effectiveness \( d^2 \pi_i/dB_i dt \).

When generic advertising expands the total market demand (shift-up) and makes demand inelastic (clockwise rotation) and brand advertising also induces inelastic demand, generic advertising positively affects an individual firm’s output and the
marginal profit effectiveness of brand advertising. When generic advertising influences brand advertising to make less elastic demand, the individual firm can reduce brand advertising expenditures. Chakravarti and Janiszewski (2004) provide useful experiment results to support our findings. According to their experiment, generic advertising shows a differentiating (nondifferentiating) attribute decreases access to information about the nondifferentiating (differentiating) attribute, which results in an increase in the importance of the differentiating (nondifferentiating) attribute and decreased price response. In that case, generic advertising potentially redistributes market shares among brands. This implies that when generic advertising gives messages about subjective differentiating attributes such as taste, colors, figures, rather than objective information, generic advertising may help to change the consumer’s preferences to the brand product. Referring to the analytical results of this study, when generic advertising induces market demand inelastic (rotating clockwise), generic advertising helps brand advertising.

Zhang and Sexton (2002), however, suggest that inelastic demand of agricultural products would lead to a harmful effect for producers. The study shows that “in the processor/retailer oligopoly power, if advertising makes retail demand less elastic, it will exacerbate the oligopoly distortion in the market, an outcome harmful to producers that causes reduced farm sales.”
CHAPTER IV

SIMULATION

Simulation Model

A simulation model is developed in this chapter to further investigate how the impact of generic advertising on brand advertising changes while changing the degree of market competitiveness and demand elasticities. To conduct simulations, a parameterized model is developed. A linear model is widely used in applied studies for economic simulation because of its simplicity, and therefore a liner model is adopted for our simulation model in this study. For simulations, the marketing and individual firms are represented in two stage games. In the first stage, the marketing board determines the generic advertising assessment rate, $t$, to maximize the market profit. In the next stage, each firm simultaneously makes a decision on the size of brand advertising expenditures to maximize its own profit.

Market equilibrium without advertising

We start a competitive market without advertising. In this competitive market, we can find an equilibrium point, and normalize the point to one. In the competitive market, total demand, $Q$, and inverse supply function, $Z$, are given as follows:

\begin{equation}
Q = a - \alpha P
\end{equation}
(16) \[ Z = b + \beta Q - c. \]

We solve the two equations for the competitive equilibrium quantity and price denoting \( P^c \) and \( Q^c \), and we assume the equilibrium point is normalized to one, that is, \( (P^c, Q^c) = (1,1) \). Solving the two equations for the equilibrium, the optimal price and quantity are specified following equations;

(17) \[ P^c = \frac{a\beta + b + c}{a\beta + 1} = 1 \]

(18) \[ Q^c = \frac{a - a(b + c)}{a\beta + 1} = 1. \]

The relations among the parameters are \( a = 1 + \alpha, b = 1 - c - \beta \). In addition, the demand and supply slope parameters, \( \alpha \) and \( \beta \), can be expressed in terms of the demand elasticity and supply elasticity, both evaluated at the competitive equilibrium:

(19) \[ \eta_P = \frac{\partial Q}{\partial P} = \alpha \]

(20) \[ \varepsilon = \frac{\partial Q}{\partial Z} = \frac{1}{\beta} (1 - c) \]

**The First Stage Solution**

The total market demand is represented as follows:

(21) \[ Q = a + \gamma \sqrt{tQ} + \kappa \sqrt{k B_i} - \alpha P, \]

where \( t \) is checkoff rate, \( tQ \) is the total expenditures for generic advertising, \( \gamma \) is the parameter of generic advertising expenditures and denotes the effectiveness of the generic advertising, \( B_i \) is the individual firm's brand advertising expenditures, \( k \) is the number of firms, \( \kappa \) is parameter of brand advertising expenditures and denotes the effectiveness of it, and therefore \( k B_i \) is the total brand advertising expenditures in the market. This demand equation indicates that generic advertising shifts the market demand.
curve parallel. Another assumption imposed to the model is that the agricultural supply chains and manufacturing have constant returns to scale technology with fixed proportions: \( Q' = Q' = Q \), where total market demand at retail and farm levels, respectively.

The market profit function of the commodity marketing board can be expressed as:

\[
(22) \quad \Pi = (P - t)Q - C,
\]

where \( P \) represents the indirect demand, and \( C \) denotes the market cost function. The market cost function is defined as \( C = b + \beta Q \). The first order condition for maximizing the market profit with respect to output is follows:

\[
\frac{\partial \Pi}{\partial Q} = P - t + \frac{Q}{\alpha} \left( \frac{\gamma\sqrt{t}}{2\sqrt{Q}} - 1 \right) - \beta = 0.
\]

Solving the equation for \( Q \), we can obtain the optimal level of market output;

\[
(23) \quad Q^* = \frac{1}{32} \left[ 16(a - t\alpha - \alpha\beta) + 9t\gamma^2 + 3\sqrt{t\gamma^2}(32(a - t\alpha - \alpha\beta) + 9t\gamma^2) \right].
\]

To find the optimal checkoff rate, \( t \), differentiating \( Q^* \) with respect to \( t \) and setting it as zero, then we obtain:

\[
(24) \quad t^* = \frac{9(\alpha\gamma^2 - a\beta\gamma^2)}{a(32\alpha - 9\gamma^2)}.
\]

**The Second Stage Solution**

The individual firm’s demand function with brand advertising can be expressed as

\[
(25) \quad q_i = \left( a + \gamma\sqrt{t^*Q^* + \kappa\sqrt{kB_i} - \alpha P} \right) S(B_i),
\]

where \( t^*Q^* \) represents the total generic advertising expenditures determined by the marketing board, \( n \) is number of firms investing brand advertising. Therefore, \( n \) times \( B_i \) is to be the total market brand advertising expenditure, \( \gamma \) and \( \kappa \) are the parameters and represent the effectiveness of advertising, respectively, and \( S(B_i) \) denotes brand
advertising share in this market, and in this case it is represented \( \delta \sqrt{B_i} \). The individual firms’ cost function can be denoted as follows:

\[
C_i = b + \beta q_i + \theta \sqrt{B_i}.
\]

The profit function for this firm represents:

\[
\pi_i = (P - t)q_i - C_i.
\]

Taking the first order condition for maximizing the profit with \( q_i \), and solving the equation for \( B_i \), we can obtain the optimal level of brand advertising expenditures:

\[
B_i^* = \left[ \frac{(a + \gamma \sqrt{Q} - at - \alpha \beta)}{2\sqrt{B}} \right]^2.
\]

To find the effects of generic advertising on the brand advertising expenditures, differentiating the optimal level of brand advertising with respect to the checkoff rate, \( t \).

\[
\frac{\partial B_i^*}{\partial t} = \frac{(\gamma \sqrt{Q} - \alpha)(a + \gamma \sqrt{Q} - at - \alpha \beta)}{2k^2}.
\]

The next step is to find the impact of generic advertising on the brand advertising effectiveness of the firm’s profitability. Differentiating the profit function, equation (27), with respect to \( B_i \), and then taking derivate, the result with respect to the checkoff assessment rate, \( t \), gives:

\[
\frac{\partial \pi_i}{\partial B_i} = \frac{1}{8 \sqrt{B_i} \alpha \sqrt{G}} \left[ \delta (a \sqrt{B} (Q\gamma - 2a \sqrt{G}) + 2a^2 \beta \sqrt{B} \sqrt{G} + t \alpha \sqrt{B} (2a \sqrt{G} - 3Q\gamma) - 4B \lambda \sqrt{G} + Q \gamma ^2 \sqrt{B} \sqrt{G} - Q \alpha \beta \gamma \sqrt{B} + 2B Q \gamma \kappa) \right],
\]

where \( B \) denotes total brand advertising expenditures in the market, \( B_i \) is individual firm’s brand advertising expenditures, and \( G \) represents generic advertising expenditures.
The simulation model formed with the linear function is characterized by five parameters: the price elasticities of demand ($\eta_P$) and supply ($\varepsilon$), generic advertising effectiveness ($\gamma$) and brand advertising effectiveness ($\kappa$), and market share parameter ($\delta$).

The essential objective for the simulation is to show and examine the changes of optimal and marginal values in this industry when the generic advertising assessment rate is changed. To set up the starting values for the base simulation, the price elasticities of demand and supply are set to unitary at the competitive equilibrium: $\eta_P = \varepsilon = 1.0$. The generic advertising effectiveness parameter, $\gamma$, is fixed based upon its relation to the generic advertising elasticity of demand ($\eta_G$). From the given market demand function, equation (21), the formulation for the generic advertising elasticity can be expressed as follows:

\[
\eta_G = \frac{\gamma \sqrt{Q^*}}{2Q^*} = \frac{\gamma \sqrt{t^*Q^*}}{2Q^*} = \frac{\gamma \sqrt{t^*}}{2\sqrt{Q^*}}.
\]

Equation (31) indicates that the parameter representing generic advertising effectiveness, $\gamma$, can be obtained from values of $\eta_G$, $t^*$, and $Q^*$. Solving the entire expression in equation (31) for $\gamma$ as a function of the other market parameters and $\eta_G$, it obtains $\gamma=f(\eta_P, \eta_G, \varepsilon, f)$. We chose two levels of the generic advertising elasticities based on the values from previous studies. The lowest value is $\eta_G = 0.03$ (following Kinnucan, Hsia, and Jackson 1997), and the highest value is $\eta_G = 0.15$ (following Carman and Green 1993). The brand advertising effectiveness parameter, $\kappa$, can be obtained through a similar procedure. From the given individual firm’s demand function, equation (25), the formulation for that can be expressed as:

\[
\eta_G = \frac{\gamma \sqrt{Q^*}}{2Q^*} = \frac{\gamma \sqrt{t^*Q^*}}{2Q^*} = \frac{\gamma \sqrt{t^*}}{2\sqrt{Q^*}}.
\]
Equation (32) represents that the parameter representing brand advertising effectiveness, $\kappa$, can be obtained from values of $\eta_B$, $\epsilon$, $Q^*$, $P^*$, $q_i^*$, and $B_i^*$. Solving the entire expression in equation (32) for $\kappa$ as a function of the other market parameters and $\eta_B$, it obtains $\kappa = f(\eta_P, \eta_B, \epsilon, f, k, \delta)$. We chose the level of the brand advertising elasticities based on the values from previous studies and the value is $\eta_B = 0.01$.

The checkoff rate is imposed to the unit assessment rate, and its range is from $.01 to $1.50. In the case of beef promotion, the Cattlemen’s Beef Promotion and Research Board imposes a $1 per head checkoff on all sales or importation of cattle. And in the fluid milk case, producers and processors cooperate to increase fluid milk demand at the retail level, and the contribution is $0.15/cwt for producers and $0.20/cwt for processors.

We consider the market competition condition as duopoly ($k=2$), and oligopoly competition ($k=3$, 5, and 10). Therefore, the market shares are to be 50%, 33%, 20% and 10%, respectively.

**Simulation Results**

Figure 1.1-4 graphically show the impact of changing the generic checkoff rate on optimal brand advertising expenditures of the representative firm, $B_i^*$. Optimal brand advertising expenditures decline as the generic advertising assessment rate increases. The result is consistent throughout the scenarios. After the declining curvature passes a minimum point, it turns to be continuously increasing. The shape of these figures,
parabola, indicates quadratic functional form with respect to \( t \), and it is a sort of typical cost function figure. The trends show little differences even if parameter values representing demand elasticities, advertising elasticities, and market competitive conditions change.

Figure 2.1-4 demonstrate the marginal effect of generic advertising on the optimal brand advertising expenditures, \( \frac{\partial B_t'}{\partial t} \). The generic advertising elasticities vary shapes of the marginal changes of brand advertising expenditures with respect to changing checkoff rates. When \( \eta_G = 0.03 \), that is, low responses to generic advertising relatively, the marginal effects are almost linearly increasing continuously through the varying demand elasticities and market competitiveness. When it \( \eta_G = 0.15 \), which is a relatively high effectiveness of generic advertising, the figures depict parabola shapes except the inelastic demand case (\( \eta_P = 0.5 \)). The case shows exponential functional form through the \( t \) ranges, that is, at first the slope rapidly declines and then very slowly declines after passing a specific \( t \) level. This implies that when the market has inelastic demand or brand advertising generates it with relatively helpful generic advertising messages, then the individual firms may decline the cost of brand advertising expenditures. This result is consistent with the analytical results of this study and Chakravarti and Janiszewski’s study (2004).

The next simulation results illustrated in Figure 3.1-4, and Figure 4.1-4 show the impacts of generic advertising on the marginal profits of brand advertising, \( \frac{\partial \pi_{t'}'}{\partial B_t'} \), and its marginal impacts, \( \frac{\partial^2 \pi_{t'}'}{\partial B_t' \partial t} \). The third and fifth figures of the all figures give the results, and the trends are common in all scenarios. The marginal profits of brand advertising with respect to the increasing effects of the generic advertising assessment rate are linearly
decreasing, which is consistent with the arguments of opponents of generic advertising
(*United Foods* legal case). When generic advertising emphasizes a nondifferentiated
attribute, the highly differentiated brands, or premium brands are perceived as more
similar to the nonpremium brands and the choice share of a premium brand declines. This
result is the case where generic advertising generates market demand more elastic or
rotating counterclockwise. The analytical results of this paper also show that when
generic advertising made the market demand more elastic, the impact of generic
advertising on the individual firm’s output \( \frac{\partial q_t}{\partial t} \) is negative, and occasionally the
effectiveness of brand advertising on its own output \( \frac{\partial q_t}{\partial B_t} \) is affected negatively.
CHAPTER V

SUMMARY AND CONCLUSIONS

Generic advertising programs managed by several agricultural commodity groups are a collective economic action to promote agricultural products. Several previous studies have shown the effectiveness of generic advertising in increasing producer benefits both empirically and analytically. While some producers favor generic advertising, others claim that generic advertising hinders effective brand advertising efforts.

This study investigates the relationship between generic and brand advertising programs. A few previous studies indicate that generic advertising could harm highly differentiated brand producers (Crespi and Marette 2002; Crespi 2003; Insariyaongse et al. 2007; Zhang et al. 2002; etc.). Although these studies provide a useful framework for understanding the relationship between generic and brand advertising programs, the relationship has not been clearly identified. Most analytical results from these studies are not able to sign the marginal effects of optimal brand advertising and its effectiveness with respect to generic advertising, and the empirical analysis has been rarely conducted.

In this study, an analytical model is developed to examine the impact of generic advertising on brand advertising with alternative assumptions on demand changes (shift-up and rotation) and elasticities of prices and advertising. The newly developed model allows us to determine the relationship between generic and brand advertising, which has
not been clearly shown in previous studies. Numeric simulations are also conducted to further examine the relationship empirically.

Analytical results show that the sign of impact of generic advertising on an individual firm’s output would be positive when the brand advertising leads to an inelastic demand while generic advertising with elastic demand increases market demand. Under the same environment, the study finds the impact of generic advertising on optimal brand advertising expenditures would be negative. The marginal effectiveness of generic advertising on the marginal profit of brand advertising also verifies the signs based on the assumptions and scenarios.

Simulation results show that when generic advertising leads to inelastic demand, generic advertising helps brand advertising and could decrease the optimal brand advertising expenditures. However, when generic advertising leads to elastic demand, it negatively affects the profitability of brand advertising and also the marginal effectiveness of brand advertising. These results are consistent with findings from Chakravarti and Janiszewski (2004). Although the current study provides excellent insights on the relationship between generic and brand advertising, further studies are needed for more generalized results with more functional forms and more realistic empirical analysis with real data. First, the simulation model needs to build on more forms to accommodate to varying reality for the differentiated products. Second, the demand model can be updated to fit the combination effects of shift up and rotation. Third, with the real data, the more sophisticated empirical studies are needed.
REFERENCES


Participating Firms.” *American Journal of Agricultural Economics* 82:659–64.


<table>
<thead>
<tr>
<th>Item</th>
<th>Start Year</th>
<th>Funds(^a) ($ million)</th>
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</tr>
<tr>
<td>Blueberries</td>
<td>2000</td>
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<td>1976</td>
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<tr>
<td>Fluid Milk</td>
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</tr>
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<td>Hass Avocados</td>
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</tr>
<tr>
<td>Honey</td>
<td>1987</td>
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<tr>
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<tr>
<td>Mangos</td>
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</tr>
<tr>
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<td>$2.6</td>
</tr>
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</tr>
<tr>
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</tr>
<tr>
<td>Pork</td>
<td>1986</td>
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<tr>
<td>Potatoes</td>
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</tr>
<tr>
<td>Sorghum</td>
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<tr>
<td>Soybeans</td>
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</tr>
<tr>
<td>Watermelons</td>
<td>1990</td>
<td>$1.6</td>
</tr>
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</table>

\(^a\)The most recent year reported.  
Table 2: Impact of Generic Advertising on Firm-level Output, $dq_t/dt$

| Case 1: Generic advertising does not change the slope of demand curve, $P_{Qtr} = 0$ |
|---|---|---|
| $P_t = 1$ | 0 | - | + |
| $P_t > 1$ | + | ? | + |
| $P_t < 1$ | - | - | ? |

| Case 2: Generic advertising rotates counterclockwise the demand curve (elastic demands), $P_{Qtr} > 0$ |
|---|---|---|
| $P_t = 1$ | + | ? | + |
| $P_t > 1$ | + | ? | + |
| $P_t < 1$ | + if $s_t \Psi_t > |P_t - 1|$ | - if $s_t \Psi_t \leq |P_t - 1|$ | + if $s_t \Psi_t \geq |P_t - 1|$ |

| Case 3: Generic advertising rotates clockwise the demand curve (inelastic demands), $P_{Qtr} < 0$ |
|---|---|---|
| $P_t = 1$ | - | - | ? |
| $P_t > 1$ | + if $s_t \Psi_t > |P_t - 1|$ | - if $s_t \Psi_t \geq |P_t - 1|$ | + if $s_t \Psi_t \leq |P_t - 1|$ |
| $P_t < 1$ | - | - | ? |
Table 3.1. Impact of Generic Advertising on the Optimal Brand Advertising Expenditures of Representative Firm; Scenarios

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Table 3.2. Impact of Generic Advertising on the Optimal Brand Advertising Expenditures; $dBt/dt$

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Table 4. Impact of Own Brand Advertising on the Firm-level Output; \( dq_i / dB_i \)

### Table 4.1. No Effect of Generic Advertising on Marginal Cost of Brand Advertising; \( c_{bi} = 0 \)

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<td>?</td>
<td>+</td>
</tr>
<tr>
<td>( P_i &lt; 1 )</td>
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<td>-</td>
<td>?</td>
</tr>
<tr>
<td><strong>Case 2:</strong> Generic advertising rotates counterclockwise the demand curve (elastic demands); ( P_{Qt} &gt; 0 )</td>
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</tr>
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<td>( P_t &gt; 1 )</td>
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<td>?</td>
</tr>
<tr>
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<td>+</td>
<td>?</td>
<td>+</td>
</tr>
<tr>
<td>( P_i &lt; 1 )</td>
<td>+ if ( s_i \Psi &gt;</td>
<td>P_i - 1</td>
<td>)</td>
</tr>
<tr>
<td><strong>Case 3:</strong> Generic advertising rotates clockwise the demand curve (inelastic demands); ( P_{Qt} &lt; 0 )</td>
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<tr>
<td>( P_t &gt; 1 )</td>
<td>( P_i = 1 )</td>
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<td>( P_i &gt; 1 )</td>
<td>+ if ( s_i \Psi &lt;</td>
<td>P_i - 1</td>
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Table 4.2. Generic Advertising Increases Marginal Cost of Brand Advertising; \( c_{bt} > 0 \);  
Table 4.2.1. Generic Advertising Does Not Change the Slope of Demand Curve; \( P_{Qt} = 0 \)

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Table 4.2. 2. Case 2) Generic Advertising Rotates Counterclockwise the Demand Curve (Elastic Demands); $P_{Qt} > 0$

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<td>$P_t &lt; 1$</td>
<td>+ if $s_i \Psi_t &lt;</td>
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<tr>
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Table 4.2.3. Generic Advertising Rotates Clockwise the Demand Curve (Inelastic Demands); $P_{Qt} < 0$

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Table 4.3.1. Generic Advertising Does Not Change the Slope of Demand Curve; \( P_{Qt} = 0 \)

\[
\begin{array}{cccc}
\text{ } & P_{QB} = 0 & P_{QB} > 0 & P_{QB} < 0 \\
\hline
P_t = 1 & P_t = 1 & 0 & - & + \\
& P_t > 1 & + & ? & + \\
& P_t < 1 & - & - & ? \\
P_t > 1 & P_t = 1 & 0 & - & + \\
& P_t > 1 & + & ? & + \\
& P_t < 1 & - & - & ? \\
P_t < 1 & P_t = 1 & 0 & - & + \\
& P_t > 1 & + & ? & + \\
& P_t < 1 & - & - & ? \\
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\]
Table 4.3.2. Generic Advertising Rotates Counterclockwise the Demand Curve (Elastic Demands); $P_{Qt} > 0$

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Table 4.3.3. Generic Advertising Rotates Clockwise the Demand Curve (Inelastic Demands); $P_{Q_i} < 0$

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i. Unit elasticity of Demand ($\eta_d = 1$) 

ii. Inelastic Demand ($\eta_d = 0.5$) 

iii. Elastic Demand ($\eta_d = 1.5$) 

Figure 1.1 Impact of Generic Advertising on the Optimal Brand Advertising Expenditures ($B^*_i$), $k=2$, $\eta_G = .003$
i. Unit elasticity of Demand ($\eta_d = 1$)

ii. Inelastic Demand ($\eta_d = 0.5$)

iii. Elastic Demand ($\eta_d = 1.5$)

Figure 1. 2. Impact of Generic Advertising on the Optimal Brand Advertising Expenditures ($B^*_i$) $k=10$, $\eta_g = 0.003$
i. Unit elasticity of Demand ($\eta_d = 1$)

ii. Inelastic Demand ($\eta_d = 0.5$)

iii. Elastic Demand ($\eta_d = 1.5$)

Figure 1. 3. Impact of Generic Advertising on the Optimal Brand Advertising Expenditures ($B_i^*$) $k=2$, $\eta_G = .15$
i. Unit elasticity of Demand ($\eta_d = 1$)

ii. Inelastic Demand ($\eta_d = 0.5$)

iii. Elastic Demand ($\eta_d = 1.5$)

Figure 1.4. Impact of Generic Advertising on the Optimal Brand Advertising Expenditures ($B_i^*$) $k=10$, $\eta_g = 15$
i. Unit elasticity of Demand ($\eta_d = 1$)

ii. Inelastic Demand ($\eta_d = 0.5$)

iii. Elastic Demand ($\eta_d = 1.5$)

Figure 2.1. Marginal Impact of Generic Advertising on the Optimal Brand Advertising Expenditures $k=2, \eta_G = .003$
Figure 2. Marginal Impact of Generic Advertising on the Optimal Brand Advertising Expenditures

- **i. Unit elasticity of Demand ($\eta_d = 1$)**
- **ii. Inelastic Demand ($\eta_d = 0.5$)**
- **iii. Elastic Demand ($\eta_d = 1.5$)**

**Equation:**

\[
\frac{dB_i}{dt} = k - \eta_d G_i
\]
Figure 2.3. Marginal Impact of Generic Advertising on the Optimal Brand Advertising Expenditures $k=2, \eta_G = .15$
i. Unit elasticity of Demand ($\eta_d = 1$)

ii. Inelastic Demand ($\eta_d = 0.5$)

iii. Elastic Demand ($\eta_d = 1.5$)

Figure 2.4. Marginal Impact of Generic Advertising on the Optimal Brand Advertising Expenditures, $k=10, \eta_G = .15$
Figure 3.1. Impact of Generic Advertising on the Brand Advertising Effectiveness $k=2, \eta_G = 0.03$
i. Unit elasticity of Demand ($\eta_d = 1$)

ii. Inelastic Demand ($\eta_d = 0.5$)

iii. Elastic Demand ($\eta_d = 1.5$)

Figure 3.2. Impact of Generic Advertising on the Brand Advertising Effectiveness $k=10, \eta_g = .003$
i. Unit elasticity of Demand ($\eta_d = 1$)

\[
\frac{d\pi_i}{dB_i}
\]

ii. Inelastic Demand ($\eta_d = 0.5$)

\[
\frac{d\pi_i}{dB_i}
\]

iii. Elastic Demand ($\eta_d = 1.5$)

\[
\frac{d\pi_i}{dB_i}
\]

Figure 3.3. Impact of Generic Advertising on the Brand Advertising Effectiveness $k=2, \eta_G = .15$
i. Unit elasticity of Demand ($\eta_d = 1$)

ii. Inelastic Demand ($\eta_d = 0.5$)

iii. Elastic Demand ($\eta_d = 1.5$)

Figure 3.4. Impact of Generic Advertising on the Brand Advertising Effectiveness ($B_i^*$) $k=10$, $\eta_G = .15$
Figure 4.1. Impact of Generic Advertising on the Marginal Effectiveness of Brand Advertising on Profits $k=2$, $\eta_G = 0.003$
Figure 4.2. Impact of Generic Advertising on the Marginal Effectiveness of Brand Advertising on Profits $k=10$, $\eta_{GA} = .003$
Figure 4.3. Impact of Generic Advertising on the Marginal Effectiveness of Brand Advertising on Profits $k=2$, $\eta_{GA} = .15$
i. Unit elasticity of Demand ($\eta_d = 1$)

ii. Inelastic Demand ($\eta_d = 0.5$)

iii. Elastic Demand ($\eta_d = 1.5$)

Figure 4.4. Impact of Generic Advertising on the Marginal Effectiveness of Brand Advertising on the Profits, $k=10$, $\eta_{GA} = .15$
VITA

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Doctor of Philosophy

Dissertation: IMPACT OF GENERIC ADVERTISING ON BRAND ADVERTISING IN FOOD AND AGRICULTURAL INDUSTRIES

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Biographical:

Personal Data: Born in Hanam, Gyeonggi, Republic of Korea, on January 1, 1969, the son of Jeongchul Suh and Kyungsook Hong, married with Intaek Lim, and two sons, Hyungwon and Hyungphil.

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Experience: Employed as a Graduate Assistant at KonKuk University, Department of Agricultural Economics, March 1994 – June 1996; Employed as a Research Associate in Korea Rural Economic Institute since August 1996.
Scope, Method of Study, and Findings: Generic advertising programs managed by several agricultural commodity groups are collective economic actions to promote agricultural products. Several previous studies have shown the effectiveness of generic advertising in increasing producer benefits both empirically and analytically. While some producers favor generic advertising, others claim that generic advertising hinders effective brand advertising efforts.

This study investigates the relationship between generic and brand advertising programs. A few previous studies indicate that generic advertising could harm highly differentiated brand producers. Although these studies provide a useful framework for understanding the relationship between generic and brand advertising programs, the relationship has not been clearly identified. Most analytical results from these studies are not able to sign the marginal effects of optimal brand advertising and its effectiveness with respect to generic advertising, and the empirical analysis has rarely been conducted.

In this study, an analytical model is developed to examine the impact of generic advertising on brand advertising with alternative assumptions on demand changes (shift-up and rotation) and elasticities of prices and advertising. The newly developed model allows us to determine the relationship between generic and brand advertising, which is not clearly shown in previous studies. Numeric simulations are also conducted to further examine the relationship empirically. Analytical results show that the sign of impact of generic advertising on individual firm’s output is positive when the brand advertising leads to an inelastic demand, while generic advertising with elastic demand increases market demand. Under the same environment, this study finds the impact of generic advertising on optimal brand advertising expenditures to be negative. The marginal effectiveness of generic advertising on the marginal profit of brand advertising also verifies the signs based on the assumptions and scenarios.

Simulation results show that when generic advertising leads to inelastic demand, generic advertising helps brand advertising and could decrease the optimal brand advertising expenditures. However, when generic advertising leads to elastic demand, it negatively affects the profitability of brand advertising and also the marginal effectiveness of brand advertising.