Economic Evaluation of Commodity Promotion Programs in the Current Legal and Political Environment

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Relationship Between Price and Advertising in Two-Stage Demand Models

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Two-stage demand models, motivated by Strotz's utility tree hypothesis, are increasingly being used to evaluate the economic impacts of advertising (Duffy; Green, Carman, and McManus; Rickertsen, Chalfant, and Steen; Kinnucan, Xiao, and Hsia). One reason for their popularity is that two-stage models permit simultaneous testing of the market share and market expansion effects of advertising (Goddard and Amuah; Richards, et al.), an issue of importance to generic advertising programs that seek to enlarge demand industrywide (Forker and Ward). The models also provide insight into the relative effectiveness of generic versus specific (e.g., branded) advertising appeals, an issue of particular importance in the context of differentiated goods (Goddard and Conboy).

Despite the growing use of two-stage demand models for advertising evaluation, the scholarly literature is virtually devoid of studies that elucidate the price impacts of advertising implied by these models in any systematic fashion. Goddard and Conboy investigate the price-advertising relationship using a synthetic two-stage demand model, but the simulations are based on particular functional forms and parameter values, so the results are difficult to generalize. The analysis, moreover, assumes fixed supply. In their study of the price effects of beef advertising, Kinnucan, Xiao, and Hsia take into account supply response, but implicitly assume that group expenditure is exogenous, which is tantamount to assuming that advertising has no effect on total meat expenditures.

The purpose of the research reported in this paper is to determine the relationship between price and advertising in two-stage demand models when supply is upward-sloping, group expenditure is endogenous, and advertising is either generic or specific. The price effects of advertising are important because they govern the extent to which advertising affects producer and consumer welfare (e.g., Alston, Carman, and Chalfant). As a by-product of the analysis, I draw a distinction between generic advertising that is neutral with respect to market share and generic advertising that is nonneutral. This distinction is useful because it highlights the importance of testing for advertising effects at *both* stages of the two-stage model, and not just at the second stage, as is common in the literature.

The analysis proceeds by specifying the two-stage model in an equilibrium-displacement form (e.g., Piggott, Piggott, and Wright) with supply initially held fixed. For clarity, the model consists of two goods, only one of which is advertised in the case of specific advertising. After determining the price effects of advertising with fixed supply, the effects of relaxing this assumption are considered. The paper concludes with an analysis of the relative effectiveness of generic versus specific advertising.

Neutral Generic Advertising

The case where advertising is generic in nature, affects total expenditure, but leaves market shares unaffected is analyzed with the following structural model:

(1) $d\ln X = N\, d\ln P + B\, d\ln A_G$

(2) $d\ln P = R_1\, d\ln P_1 + R_2\, d\ln P_2$

(3) $d\ln Q_1 = - N_{11}\, d\ln P_1 + N_{12}\, d\ln P_2 + M_1\, d\ln X$

(4) $d\ln Q_2 = N_{21}\, d\ln P_1 - N_{22}\, d\ln P_2 + M_2\, d\ln X$

where $d\ln Z = dZ/Z$ represents the relative change in variable Z; X is total (group) expenditure, i.e., $X = P_1 Q_1 + P_2 Q_2$ where Q_i and P_i refer to quantities and prices of the two goods; P is a price index defined as $P = k_1 P_1 + k_2 P_2$ where k_i is the ith good's quantity share, i.e., $k_i = Q_i/(Q_1 + Q_2)$); and R_i is the ith good's expenditure share, i.e., $R_i = (P_i Q_i)/X$.

The coefficient N represents the percentage change in group expenditure associated with a 1 percent change in the price index, hereafter called the "revenue elasticity." The N_{11} and N_{22} are second-stage own-price elasticities; N_{12} and N_{21} are the corresponding cross-price elasticities; and M_1 and M_2 are the corresponding expenditure elasticities. The B parameter is the advertising elasticity for generic advertising, which is assumed to affect first-stage demand only. In this system, all parameters except the revenue elasticity are defined to be positive. That is, the second stage goods are normal, have downward-sloping demand curves, and are substitutes. Generic advertising, the exogenous variable in the system, is assumed to have a positive effect on group expenditures, i.e., $B > 0$. The revenue elasticity, N, can be negative, zero, or positive depending on whether first-stage demand is elastic, unitary elastic, or inelastic. For the purposes of this analysis, it will be assumed that $N < 1$.[1]

The theoretical relationship between price and advertising in the above system is determined by setting $d\ln Q_1 = d\ln Q_2 = 0$ (supply is fixed) and solving (1) - (4) simultaneously for $d\ln P_1$ and $d\ln P_2$, which yields

(5a) $d\ln P_1 = [(B\ \alpha_1) / D]\ d\ln A_G$

(5b) $d\ln P_2 = [(B\ \alpha_2) / D]\ d\ln A_G$

where $\alpha_1 = (M_1 N_{22} + M_2 N_{12})$, $\alpha_2 = (M_2 N_{11} + M_1 N_{21})$, and $D = N_{11} N_{22} - N_{12} N_{21} - N (R_1 \alpha_1 + R_2 \alpha_2)$. Because α_1 and α_2 are positive by assumption, the signs of (5a) and (5b) depend on the sign of D. D is signed by imposing the homogeneity condition:

(6a) $N_{11} - N_{12} = M_1$

(6b) $N_{22} - N_{21} = M_2$,

which yields:
$D = \alpha (1 - N)$ where $\alpha = \alpha_1 = \alpha_2 = (M_1 N_{22} + M_2 N_{11} - M_1 M_2) > 0$.
Thus, (5) reduces to:

(7) $d\ln P_i = [B / (1 - N)]\ d\ln A_G$ $(I = 1, 2)$.

Equation (7) yields the hypothesis that neutral generic advertising always increases the price of the individual goods that comprise the group. The extent to which price is enhanced is directly related to the advertising elasticity B and the revenue elasticity N.

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[1] Technically, this restriction excludes a first-stage demand that is perfectly inelastic. To see this, let $X = P\ Q$ where $Q = Q_1 + Q_2$. Taking the logarithmic total differential of this expression and dividing through by $d\ln P$ gives $d\ln X/d\ln P = 1 + d\ln Q/d\ln P$, or $N = 1 + \eta$ where η is the first-stage demand elasticity. For normal sloping first-stage demand, N is always less than one and equals one only if $\eta = 0$.

The direct relationship between the revenue elasticity N and advertising effectiveness indicated in (7) is consistent with Goddard and Conboy's finding that generic advertising becomes more effective as stage one demand becomes less elastic. The reason for this can be traced to the fact that group expenditure in the two-stage model is endogenous. In particular, advertising affects group expenditure directly through the first stage demand function (equation (1)) and indirectly through its effect on prices in the second stage demand functions (equations (3) and (4)). The indirect (second-stage) effect will be positive, neutral, or negative, respectively, depending on whether first-stage demand is inelastic ($0 < N < 1$), unitary elastic ($N = 0$), or elastic ($N < 0$). Thus, if first-stage demand is elastic, the indirect effect works in opposition to the direct effect, causing the expenditure effect of an increase in advertising to be muted. This, in turn, dampens the price effect of the advertising increase through the expenditure term in the second stage demand functions.

Since price in general must increase for producers to benefit from advertising, advertising becomes more effective as first-stage demand becomes less elastic. That advertising becomes more effective as demand becomes less elastic is a well-established hypothesis (Dorfman and Steiner; Nerlove and Waugh).[2]

The nexus between the expenditure elasticity and advertising effectiveness suggested by the foregoing analysis is consistent with Baye, Jansen, and Lee's theoretical analysis of advertising effects based on neoclassical consumer theory. In particular, Baye, Jansen, and Lee's (pp. 1088-89) advertising analogue of the Slutsky equation indicates that the magnitude of the advertising-induced shift in the Marshallian demand curve depends critically on whether the advertised good is inferior or normal, with normal goods experiencing the larger demand shift, *ceteris paribus*.

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[2] An importing dissenting view is that of Becker and Murphy, who contend that advertising elasticities are directly related to price elasticities so that, for example, goods with more elastic demands are also more responsive to advertising. Still, as argued by De Boer (p. 123), the demand shift required to secure a given increase in price is always larger the more elastic is the demand for the promoted commodity. Whether this shift is less costly to achieve when demand is more elastic is an as yet unaddressed empirical issue.

Nonneutral Generic Advertising

Nonneutral generic advertising refers to the case in which advertising is generic in nature, but affects the demand for the constituent products unevenly. An example of this would be if the United States and Canada were to conduct a cooperative beef promotion campaign in Korea. Because Korean consumers prefer U.S. beef to Canadian beef (Unterschultz, et al.), the joint advertising effort might be expected to increase the demand for U.S. beef more so than Canadian beef.

With nonneutral generic advertising, the generic advertising variable enters the second stage demand functions. The structural model is:

(8) $d\ln X = N\, d\ln P$

(9) $d\ln P = R_1\, d\ln P_1 + R_2\, d\ln P_2$

(10) $d\ln Q_1 = -N_{11}\, d\ln P_1 + N_{12}\, d\ln P_2 + M_1\, d\ln X + B_1\, d\ln A_G$

(11) $d\ln Q_2 = N_{21}\, d\ln P_1 - N_{22}\, d\ln P_2 + M_2\, d\ln X + B_2\, d\ln A_G$

where B_1 and B_2 are the second stage advertising elasticities, presumed to be positive in sign.

Setting $d\ln Q_1 = d\ln Q_2 = 0$ and solving (8) - (11) for the appropriate reduced-form relationships yields:

(12a) $d\ln P_1 = \{[B_2\, d_2 - B_1\, d_4] / [\alpha\, (1 - N)]\}\, d\ln A_G$

(12b) $d\ln P_2 = \{[B_1\, d_3 - B_2\, d_1] / [\alpha\, (1 - N)]\}\, d\ln A_G$

where:

$d_1 = M_1\, R_1\, N - N_{11}$ $\qquad d_2 = M_1\, R_2\, N + N_{12}$

$d_4 = M_2\, R_2\, N - N_{22}.$ $\qquad d_3 = M_2\, R_1\, N + N_{21}$

The sign of (12) depends on whether first-stage demand is elastic, inelastic, or unitary elastic. If first-stage demand is unitary inelastic (N = 0), so that group expenditure is constant, equations (12a) and (12b) reduce to:

(13a) $d\ln P_1 = [(B_1\, N_{22} + B_2\, N_{12}) / \alpha\,]\, d\ln A_G$

(13b) $d\ln P_2 = [(B_2\, N_{11} + B_1\, N_{21}) / \alpha\,]\, d\ln A_G.$

which is always positive, provided the advertising is effective, i.e., $B_1 > 0$ or $B_2 > 0$. From (13), the relationship between price and advertising depends only on stage two information, as might be expected owing to the invariance of group expenditures when first-stage demand is unitary elastic. In this case, group expenditure in essence is exogenous, so the indirect effect of advertising is nil.

If first-stage demand is inelastic ($0 < N < 1$), group expenditures increase with advertising-induced increases in price, and (13) is always positive. To see this, it is sufficient to show that:

$$d_1 = M_1 R_1 N - N_{11} < 0$$
$$d_4 = M_2 R_2 N - N_{22} < 0.$$

Substituting (6) to eliminate M_1 and M_2 yields:

$$d_1 = N_{11} (R_1 N - 1) - R_1 N_{12} N$$
$$d_4 = N_{22} (R_2 N - 1) - R_2 N_{21} N.$$

With the maintained hypothesis that $0 < N < 1$, both of these expressions are negative, as required. (Provided, of course, that the two goods are Marshallian substitutes, as assumed.)

If first-stage demand is elastic ($N < 0$), advertising-induced increases in price cause group expenditure to fall, which has a depressing effect on second-stage demand. In this case, the relationship between nonneutral generic advertising and price is indeterminate without specific information on the relative magnitudes of the first and second stage price elasticities and the expenditure elasticities. To see this, it is sufficient to note that the signs of d_2 and d_3 are indeterminate when $N < 0$.

The distributional impact of nonneutral generic advertising is examined by comparing the numerators of (13), the relationships that obtain when $N = 0$. In this case, nonneutral generic advertising will always favors good 1 if:

$$B_1 N_{22} + B_2 N_{12} > B_2 N_{11} + B_1 N_{21}.$$

Applying the homogeneity condition (6), the above inequality reduces to:

$$B_1 / B_2 > M_1 / M_2$$

Thus, whether good 1 or good 2 receives the larger benefit from an increase in generic advertising depends on each good's responsiveness to advertising and the relative size of expenditure elasticity. If the expenditure elasticities are equal, for example, good 1 receives the larger benefit only if its advertising elasticity is larger. If both goods are equally responsive to advertising, good 1 receives the larger benefit only if it has a smaller expenditure elasticity.[3]

Specific Advertising without Market Expansion

Specific advertising is defined as advertising whose primary aim is product differentiation. Examples include advertising that stresses source origin (e.g., Florida citrus, Washington State apples, Australian wool, U.S. beef), brand name (e.g., Blue Diamond almonds, Sunkist raisins), or production characteristics (e.g., farm-raised fish, organically-grown produce, environmentally-friendly cotton). With the emphasis on product differentiation, the emphasis shifts from market expansion to market share. The analysis begins by considering the case in which specific advertising is predatory, i.e., shifts market shares with no effect on market size. To simplify and focus the analysis, I will assume that only good 1 advertises, although in a more general analysis one would want to take into account possible retaliation by competing goods.

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[3] It would appear from the foregoing analysis that the speculation of Richards, et al. (p. 19) "when promotion has a stronger generic than country or brand effect, then the greatest impact will flow to those countries with the most inelastic demand" needs qualification. In particular, whether the hypothesis is valid depends on the relative magnitudes of cross-price elasticities. To see this, substitute the homogeneity condition into the foregoing inequality to yield: $B_1 / B_2 > (N_{11} - N_{12}) / (N_{22} - N_{21})$. Letting $B_1 = B_2$ so that both goods are equally responsive to the advertising, for good 1 to receive the larger benefit from the advertising, the following inequality must hold: $N_{11} - N_{12} < N_{22} - N_{21}$. Rearranging terms yields: $N_{11} - N_{22} < N_{12} - N_{21}$. The hypothesis states that good 1 receives the larger benefit if $N_{11} < N_{22}$, which implies $N_{12} - N_{21} \leq 0$. For the latter condition to hold, either the cross-price elasticities for the two goods have to be equal, or the cross-price elasticity for the less elastic good (N_{12}) has to be smaller than the cross-price elasticity for the substitute good (N_{21}). Returning to the original statement, the correct hypothesis appears to be: "if promotion has a stronger generic than country or brand effect, then the greatest impact will flow to those countries with the smaller expenditure elasticities, *ceteris paribus*."

With the assumption that specific advertising has no effect on market size, group expenditure is fixed, and the analysis focuses on the second stage of the demand system:

(14) $dlnQ_1 = - N_{11}\, dlnP_1 + N_{12}\, dlnP_2 + M_1\, dlnX + B_{11}\, dlnA_1$

(15) $dlnQ_2 = N_{21}\, dlnP_1 - N_{22}\, dlnP_2 + M_2\, dlnX - B_{21}\, dlnA_1$

where B_{11} and B_{21} is the own- and cross-advertising elasticities with respect to specific advertising. Owing to the negative sign attached to B_{21} in equation (15), B_{11} and B_{21} are both defined to be positive.

Setting $dlnQ_1 = dlnQ_2 = dlnX = 0$ (supply and group expenditure are fixed), the relevant reduced-form equations are:

(16a) $dlnP_1 = [(B_{11}\, N_{22} - B_{21}\, N_{12}) / \alpha\,]\, dlnA_1$

(16b) $dlnP_2 = [(B_{11}\, N_{21} - B_{21}\, N_{11}) / \alpha\,]\, dlnA_1$.

With group expenditures fixed, the advertising parameters in (16) must satisfy the adding-up condition (Basmann, p. 53):

(17) $R_1\, B_{11} - R_2\, B_{21} = 0$

(recall that B_{21} is defined to be positive). Substituting (17) into (16) yields

(18a) $dlnP_1 = [B_{11}\, (N_{22} - (R_1 / R_2)\, N_{12}) / \alpha\,]\, dlnA_1$

(18b) $dlnP_2 = [(B_{11}\, (N_{21} - (R_1/R_2)\, N_{11}) / \alpha\,]\, dlnA_1$.

Equations (18a) and (18b) yield the hypothesis that price effects of specific advertising are indeterminate. That is, an increase in specific advertising for good 1 may cause good 1's price to increase, decrease, or remain the same. The same is true for the spillover effect. That is, an increase in specific advertising for good 1 may cause good 2's price to fall, or it may not.

The indeterminacy, which is discussed in detail by Kinnucan, relates to the substitution engendered by the change in relative prices. That is, an increase in specific advertising for good 1 causes a simultaneous upward shift in good 1's demand curve and a downward shift in good 2's demand curve. Thus, the price of good 1 rises relative to the price of good 2, which causes substitution away from good 1 in favor of good 2. Depending on the strength of this substitution effect, the price of the advertised good may actually decrease.

The strength of the substitution effect is related to the advertised good's market share. Intuitively, the more important Q_1 is in the market, the larger will be its loss resulting from substitution for a given increase in its advertising. This can be seen more vividly by considering the term in parentheses in equation (18a). In particular, an increase in A_1 causes Q_1's price to increase only if:

(19a) $R_1/(1 - R_1) < N_{22} / N_{12}$.

This condition is more easily satisfied the smaller R_1, the advertised good's budget share.

Turning to the spillover effect, the indeterminacy of (18b) suggests that Goddard and Conboy's conclusion (p. 61) "when countries use advertising of their own country's product, other countries are disadvantaged by the program" needs to be qualified. In particular, from (18b) an increase in good 1 advertising creates a *positive* externality for good 2 if:

(19b) $R_1 / (1 - R_1) < N_{21} / N_{11}$.

To investigate the practical implications of the foregoing indeterminacy, (19a) and (19b) were "simulated" for a range of elasticity values that appear to be relevant for agriculture to determine under what conditions the inequalities are violated. The simulations assume that the advertised good enjoys a 51 percent market share. To focus on how own-price and expenditure elasticities affect the price-enhancement ability of specific advertising, the homogeneity condition (6) is substituted into (19) to eliminate the cross-price elasticities. The simulations show the maximum market share for each combination of elasticity values consistent with a positive price effect for each good.

The simulations are categorized into three groups: win-win (no violation), win-lose ((19b) violated), and lose-lose ((19a) and (19b) violated). A win-win outcome, for example, describes a situation in which the price of both the advertised good and the nonadvertised good increases.

Results indicate that for the range of elasticity values considered for a variety of outcomes is possible depending on the relative magnitudes of the own-price and expenditure elasticities (Table 1). The most favorable situation occurs when the demand for the advertised good is considerably less elastic ($N_{11} = 0.5$) than the demand for the nonadvertised good ($N_{22} = 2.00$), in which the outcome is always win-win. Smaller expenditure elasticities favor the nonadvertised good but have relatively little effect on the advertised good. Conversely, larger expenditure elasticities, *ceteris paribus*, favor the advertised good. If own-price elasticities for both goods are equal, the outcome is always win-lose.

Table 1. Simulations of Inequalities (19a) and (19b) for Alternative Values of the Own-Price Elasticities (N_{11} and N_{22}) and Expenditure Elasticities (M_1 and M_2) for the Advertised Good (Q_1) and the Substitute Good (Q_2)

N_{11}	N_{22}	M_1	M_2	R_1 MaxP$_1$ [b]	R_1 MaxP$_2$ [b]	Outcome if $R_1 = 0.51$[a]		
						win-win	win-lose	lose-lose
0.5	2	0.5	1	1.00	0.67	x		
0.5	2	0.5	0.5	1.00	0.75	x		
0.5	2	0.25	1	0.89	0.67	x		
0.5	2	0.25	0.5	0.89	0.75	x		
0.5	1	0.5	1	1.00	0.00		x	
0.5	1	0.5	0.5	1.00	0.50		x	
0.5	1	0.25	1	0.80	0.00		x	
0.5	1	0.25	0.5	0.80	0.50		x	
0.5	0.5	0.5	0.5	1.00	0.00		x	
0.5	0.5	0.5	0.25	1.00	0.33		x	
0.5	0.5	0.25	0.5	0.67	0.00		x	
0.5	0.5	0.25	0.25	0.67	0.33		x	
1	2	1	1	1.00	0.50		x	

Table 1 (Continued).

N_{11}	N_{22}	M_1	M_2	R_1 $MaxP_1$ [b]	R_1 $MaxP_2$ [b]	Outcome if $R_1 = 0.51$[a]		
						win-win	win-lose	lose-lose
1	2	1	0.5	1.00	0.60	x		
1	2	0.5	1	0.80	0.50		x	
1	2	0.5	0.5	0.80	0.60	x		
1	1	1	1	1.00	0.00		x	
1	1	1	0.5	1.00	0.33		x	
1	1	0.5	1	0.67	0.00		x	
1	1	0.5	0.5	0.67	0.33		x	
1	0.5	1	0.5	1.00	0.00		x	
1	0.5	1	0.25	1.00	0.20		x	
1	0.5	0.5	0.5	0.50	0.00			
1	0.5	0.5	0.25	0.50	0.20			x
2	2	1	1	0.67	0.33		x	
2	2	1	0.5	0.67	0.43		x	
2	2	0.5	1	0.57	0.33		x	
2	2	0.5	0.5	0.57	0.43		x	
2	1	1	1	0.50	0.00			x
2	1	1	0.5	0.50	0.20			x
2	1	0.5	1	0.40	0.00			x
2	1	0.5	0.5	0.40	0.20			x
2	0.5	1	0.5	0.33	0.00			x
2	0.5	1	0.25	0.33	0.11			x
2	0.5	0.5	0.5	0.25	0.00			x
2	0.5	0.5	0.25	0.25	0.11			x

[a] R_1 is good 1's market share.

[b] R_1 $MaxP_1$ indicates the maximum market share for $_1Q$ that can be tolerated for an increase in advertising of Q_1 to have a positive effect on P_1; R_1 $MaxP_2$ indicates the maximum market share for Q_1 that can be tolerated for an increase in advertising of Q_1 to have a positive effect on P_2.

The simulations highlight the importance of market share in determining the economic impacts of specific advertising. If a single advertiser dominates the market, public policy permitting specific advertising is likely to generate negative externalities for substitute goods with smaller market shares. Conversely, if the market consists of a large number of suppliers, not one of which enjoys a significant market share, specific advertising could be beneficial to all parties, especially if the demand facing suppliers electing not to advertise is relatively price elastic or relatively expenditure inelastic.

Specific Advertising with Market Expansion

Although specific advertising is aimed at product differentiation and not market expansion *per se*, empirical evidence suggests that specific advertising in some instances can enlarge market size. Brester and Schroeder, for example, found that branded advertising of meat products in the United States increased meat demand more so than generic advertising. In a study of U.S. apple promotion in Singapore and the United Kingdom, Richards, et al. found that U.S. apple promotion altered the exporting countries' market shares, but also increased the total demand for apples in each importing country. The market expansion hypothesis is incorporated into the analysis by specifying the specific advertising variable to appear in both stages of the two-stage system:

(20)

$$dlnX = N\,dlnP + B^S\,dlnA_1$$

(21)

$$dlnP = R_1\,dlnP_1 + R_2\,dln\,P_2$$

(22)

$$dlnQ_1 = -\,N_{11}\,dlnP_1 + N_{12}\,dlnP_2 + M_1\,dlnX + B_{11}\,dlnA_1$$

(23)

$$dlnQ_2 = N_{21}\,dlnP_1 - N_{22}\,dlnP_2 + M_2\,dlnX - B_{21}\,dlnA_1$$

where B^S is the specific advertising elasticity with respect to first-stage demand, hereafter referred to as the "market expansion elasticity." This elasticity is assumed to be positive in sign.

The relationship between advertising and price in this model is determined by setting $dlnQ_1 = dlnQ_2 = 0$ and solving (20) - (23) simultaneously for changes in the second-stage prices, which yields:

(24a) $$dlnP_1 = \{[b_2\,d_2 - b_1\,d_4\,] / [\alpha\,(1 - N)]\}\,dlnA_1$$
(24b) $$dlnP_2 = \{[b_1\,d_3 - b_2\,d_1] / [\alpha\,(1 - N)]\}\,dlnA_1$$

where $b_1 = M_1\,B^S + B_{11} > 0$ and $b_2 = M_2\,B^S - B_{21}$. The signing of (24) hinges on the sign of b_2 and the elasticity of first-stage demand. For brevity, I will focus on the case in which first-stage demand is inelastic ($0 < N < 1$), the most likely scenario for many agricultural commodities (e.g., Goddard and Conboy). In this case, d_2 is positive and d_4 is negative, meaning that the sign of (24a), the own-price effect, is assured to be positive only if b_2 is positive, i.e., $M_2\ B^S > B_{21}$. This, in turn, implies that market expansion effect B^S must outweigh the spillover effect B_{21}, an outcome that is more likely the larger the expenditure elasticity for the substitute good. In general, however, the own-price effect of specific advertising cannot be determined *a priori.*

Turning to the cross-price effect (equation (24b)), an inelastic first-stage demand implies that d_1 is negative and d_3 is positive, so the sign of the cross-price effect depends on b_2. If b_2 is positive (the condition that must obtain for the own-price effect to be unambiguously positive) the cross-price effect is positive as well. Thus, the likelihood of a win-win solution increases if specific advertising affects both stages of the demand system rather than just the second stage. In general, however, all that can be concluded about specific advertising is that its affects on price are indeterminate without specific information on the relative magnitude of market expansion and spillover effects.

Incorporating Supply Response

A basic conclusion thus far is that the relationship between second-stage prices and generic advertising is always positive so long as first-stage demand is inelastic. The task now is to see if this result still holds when supply is upward-sloping. The analysis proceeds by adding to the structural model (equations (8) - (11)) the following supply equations.

(25) $\quad d\ln Q_1 = E_1\, d\ln P_1$

(26) $\quad d\ln Q_2 = E_2\, d\ln P_2$

where E_1 and E_2 are the supply elasticities, respectively, for good 1 and good 2. Since supply is assumed to be upward-sloping, the elasticities are positive in sign.

Substituting (25) and (26) into (10) and (11) and solving the resulting system simultaneously with (8) and (9) for $d\ln P_1$ and $d\ln P_2$ yields:

(27a) $dlnP_1 = \{[B_2\, d_2 + B_1\, (E_2 - d_4)] \,/\, [\alpha'\, (1 - N)]\}\; dlnA_G$

(27b) $dlnP_2 = \{[B_1\, d_3 + B_2\, (E_1 - d_1] \,/\, [\alpha'\, (1 - N)]\}\; dlnA_G$

where $\alpha' = [M_1\, (E_2 + N_{22}) + M_2\, (E_1 + N_{11}) - M_1 M_2\,] > 0$. Comparing (27) with (12), it can be seen that incorporating supply response into the analysis reduces the magnitude of the price effects, but alters nothing of substance. In particular, with inelastic first-stage demand ($0 < N < 1$), the d_1 and d_4 terms in (27) are negative, yielding the hypothesis that an increase in generic advertising always causes second-stage prices to increase. The magnitude of the price increase is attenuated when supply response is permitted because $\alpha' > \alpha$ when either supply elasticity is not zero. In essence, incorporating supply response softens the price effects, but does not alter any of the basic conclusions drawn from the fixed supply case.

Generic versus Specific Advertising

Returning to the case in which supply is fixed, a strong conclusion from Goddard and Conboy's (G-C) analysis (p. 60) is that an advertiser will prefer generic advertising to specific advertising if the second stage demand for the advertised product is elastic ($N_{11} > 1$). The validity of this hypothesis can be checked by comparing (24a) with (7) for neutral generic advertising and with (12a) for nonneutral generic advertising. The confirmation exercise will assume that first-stage demand is inelastic, a hypothesis maintained in G-C's study.

Taking neutral advertising first, the G-C hypothesis implies that:

(28) $B\,\alpha > b_2\, d_2 - b_1\, d_4$

so long as $N_{11} > 1$. Unfortunately, the sign of the right-hand side of (28) is indeterminate, so the hypothesis cannot be confirmed. However, some insight can be obtained by assuming that the market expansion elasticity is zero, i.e., $B^S = 0$. (This would correspond to model 2 in G-C's study.) In this case, (28) reduces to:

(29) $B\,\alpha > B_{11}\, d_4 - B_{21}\, d_2$.

Since B, α, B_{11} and B_{21} are positive by assumption, d_4 is negative, and d_2 is positive when first-stage demand is inelastic, the right-hand side of (29) is negative and the

G-C hypothesis is confirmed. However, in this case it is not necessary that second-stage demand be elastic; it is sufficient that the demand elasticity for the advertised commodity merely exceed (in absolute value) the corresponding expenditure elasticity, i.e., $N_{11} > M_1$.[4]

Turning to nonneutral generic advertising, and maintaining the hypothesis that $B^S = 0$, for generic advertising to be preferred to specific advertising the following condition must hold:

(30) $B_2 d_2 - B_1 d_4 > B_{11} d_4 - B_{21} d_2.$

With an inelastic first-stage demand, the left-hand side of (30) is positive and the right-hand side is negative, so the G-C hypothesis is confirmed for nonneutral advertising as well. However, as before, the critical condition is merely that $N_{11} > M_1$. If the advertised good is normal ($M_1 > 0$), this is tantamount to requiring that $N_{12} > 0$, i.e., that the second stage goods are Marshallian substitutes.

Concluding Comments

Two-stage demand models permit simultaneous testing of market expansion and market redistribution effects of advertising and for this reason provide an attractive framework for investigating the welfare implications of advertising, especially in situations involving differentiated goods. The analysis presented in this paper builds on Goddard and Conboy's study by eschewing particular functional forms and parameter values in favor of a general analysis, and by considering supply response.

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[4] To see this, note that $d_2 = M_1 (R_2 N - 1) + N_{11}$ when the homogeneity condition is used to eliminate N_{12}. The first term in this expression, $M_1 (R_2 N - 1)$, is negative when first-stage demand is inelastic ($0 < N < 1$) and the advertised good is normal ($M_1 > 0$). Thus, $d_2 > 0$ implies $N_{11} > M_1 (1 - R_2 N)$, which is always true if $N_{11} > M_1$. Apparently, G-C's conclusion that second-stage demand must be elastic for generic advertising to be preferred stems from the fact that the expenditure elasticities for the advertised commodity in their simulations are all greater than one.

A key finding is that specific advertising aimed at product differentiation need not disadvantage substitute goods, nor need it necessarily increase the price of the advertised good. The outcome depends on the advertised good's market share and the relative magnitude of the own-price and expenditure elasticities for the advertised good and its substitutes. In general, for specific advertising to create a generalized price increase, demand for the advertised good must be relatively price inelastic and expenditure elastic, demand for the substitute good must be relatively price elastic and expenditure inelastic, and the market share of the advertised good must be relatively small.

Whether generic advertising aimed at market enlargement is beneficial for all suppliers depends on the first stage demand elasticity and on how generic advertising affects market share. If generic advertising is neutral, i.e., affects total demand without altering the distribution of demand among suppliers, generic advertising is always beneficial in the sense that the prices of all goods in the group increase. If generic advertising is nonneutral, i.e., it increases total demand in a redistributive fashion, it is unambiguously beneficial for all suppliers only if first-stage demand is unitary elastic or price inelastic.

The relative effectiveness of generic versus specific advertising, a key issue for many industries financing cooperative advertising ventures, is *a priori* indeterminate unless first-stage demand is price inelastic and the market expansion effect of specific advertising is nil. In this case, generic advertising in general is preferred to specific advertising. If specific advertising affects market size as well as market share (positive market expansion effect), specific advertising will be preferred to generic advertising only if the market expansion effect is large relative to the specific advertising spillover and generic advertising effects. In general, the choice between the two advertising approaches is an empirical issue.

Several qualifications are apparent. First, the analysis implicitly assumes that prices of substitutes in the first stage are exogenous. This assumption, which is common in the literature (e.g., Goddard and Conboy; Richards, et al.), is probably innocuous if the commodity group in question represents a small proportion of the consumer budget, as is true in many food demand applications. In a more general analysis, however, it would be desirable to take into account substitution effects at the first stage, otherwise the own-price effects of advertising at the second stage are likely to be overstated (Kinnucan).

A second caveat is that the analysis assumes second-stage cross-price elasticities are positive, i.e., the goods are Marshallian substitutes. Although this assumption appears plausible, especially in situations involving differentiated goods, the empirical evidence on substitution effects is mixed. If second-stage goods are gross complements (negative cross-price elasticities) rather than gross substitutes, the theoretical relationships between price and advertising developed in this paper may not hold. Still, the analysis provides insight into the determinants of the price effects of generic versus specific advertising, insight that should lead to a better understanding of the welfare implications of industry-funded advertising ventures.

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