Optimal International Promotion Expenditure for Differentiated Products

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1. Introduction

Food industries the world over are feeling increased economic pressures in both domestic and export markets. Negotiation of multilateral trade liberalization and desubsidisation have shifted policy scope from supply-side programs to demand-building marketing strategies. An ability to increase demand for a product and hence sales, or to increase market share, is essential therefore to remain competitive.

One method of increasing sales and/or market share is by the establishment of export promotion programs, such as international generic advertising. Such programs can be funded either by a cooperative of exporting countries or by a single exporting country. For example, the advertising of wool in the United States (US) and other importing countries is jointly funded by the country members of the International Wool Secretariat (IWS) - Australia, New Zealand, South Africa and Uruguay. Alternatively, the US has embarked independently on an advertising program for beef to Japan.

When considering undertaking export advertising and deciding on joint or single-country funding, two of the key criteria are international homogeneity of product and homogeneity of advertising programs.[2] The profitability of export advertising is dependent on importer demand responsiveness to changes in price and advertising, which, in turn depend on the structure and effectiveness of the advertising program and how the imported product is viewed by the importer.

If importers view the product as homogeneous across countries of origin, an advertising program may increase the importer's total demand for that product. If the advertising is done by a single exporting country, a free-rider effect may arise as other exporting countries would enjoy an increased demand for their product without incurring any advertising costs. If, however, importers view a product as heterogeneous, differentiated by country of origin, an advertising program initiated by a single country may increase the demand for the product from that particular country. The demand for the product from other exporting countries would be affected through cross-price elasticities of demand. The advertising country might then have increased its market share relative to other exporting countries.

Optimal advertising expenditure rules have been developed for a monopolist (Dorfman and Steiner 1954) and for an organization which has no control over supply of the product (Nerlove and Waugh 1961). These rules can be applied if a measure of the response in demand to advertising is known.

In this research, synthetic models for beef exported to Japan are developed given existing estimated elasticities. These models are than simulated to show the various levels of increased revenue available to a particular exporter, assuming different importer responses to advertising. Revenue/cost ratios of this activity are calculated and assessed for the US in the case of the beef exported to Japan.

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[2] Homogeneity of product refers to the degree of substitutability in an importing country, of one product from a particular country for the same product class from a different country of origin. Homogeneity of advertising programs refers to whether the program is generic (homogeneous) or country specific (heterogeneous).

2. The Impact of Advertising on Product Demand

2.1 Optimal Advertising Scenarios

Dorfman and Steiner (1954) developed a theoretical rule for an optimal advertising budget for a monopolist (cartel) producing a fixed quantity of one product. It is assumed that the firm can choose both the advertising expenditure and the price which will maximize its profits. Advertising expenditure is assumed to represent a fixed cost to the monopolist (cartel) and the monopolist's profit function is defined as:

$$\Pi = Q(P(Q,ADV)) - C(Q) - ADV,$$

where Π = profit;
Q = quantity;
P = price;
ADV = advertising expenditure; and
C = total cost.

From the first order conditions, it can be shown that the optimal advertising budget is:

$$\left(\frac{ADV}{R}\right) = \left(\frac{\eta qa}{\eta qp}\right) = \eta pa,$$

where $\left(\frac{ADV}{R}\right)$ = ratio of advertising to sales revenue;

ηqa = demand elasticity of quantity w.r.t. advertising;
ηqp = demand elasticity of quantity w.r.t. price; and
ηpa = demand elasticity of price w.r.t. advertising.

Advertising expenditure is optimal when the advertising to sales ratio is equal to the ratio of the elasticities of quantity demanded with respect to advertising and of quantity demanded with respect to price.

Nerlove and Waugh (1961) developed a theoretical rule for optimal advertising for an organization with no control over supply, which is similar to that of Dorfman and Steiner (1954) except that it allows for the supply response to an increase in advertising expenditure:

$$\frac{\eta qa}{\eta^S qp - \eta qp} = \frac{ADV}{R}$$

where $\eta^S qp$ = supply elasticity of quantity w.r.t. price; and the other terms are defined above.

In the short run, however, the supply of agricultural commodities is fixed (due to, for example, biological lags in production). No adjustment, therefore, can be made in supply (the supply elasticity is zero) and Nerlove and Waugh's rule reduces to that of Dorfman and Steiner. Thus, the optimal investment in advertising for an organization with no control over supply is the same with exogenous quantity as for a monopolist with fixed quantity.

2.2 Modelling the Demand for Imports

In modelling import demand a critical question that arises is whether or not a good from different countries can be considered to be homogeneous. The rationale for product heterogeneity includes the physical attributes of the traded goods, and, the attributes of the exporting countries (e.g. reliability, differences in business or legal practices, risk of embargo, bilateral trade arrangements). Armington (1969) proposed a two-stage demand system approach to modelling non-homogeneous import demand. The first stage of the model would describe the importer's allocation of expenditure to the broad category of good imported while the second stage disaggregates the expenditure on the aggregate good into expenditure by country of origin. The necessary conditions for consistent two-stage budgeting include weak separability of the goods at the second stage from all other goods consumed by the importing country and a linear homogeneous utility function at the second stage of the demand system (Green 1971). All further analysis will be conducted assuming that the Armington framework is appropriate to describe imports of goods distinguished by country of origin.

A two stage demand system for an importing country can be expressed as follows:

$$\ln(TEXP) = a_i + b_i \ln(P) + d_i \ln(Y) + e_i \ln(PS); \quad (1)$$

where TEXP = total expenditure on good

$$= \sum_i p_i q_i \ ;$$

P = weighted average price of good by country of origin (including domestic);
Y = disposable income;
PS = price of substitute good;
p_i = price of good from country i;
q_i = quantity of good from country i; and

$$w_i = a_{ii} + \sum_j b_{ij} \ln p_j + b_{iy}[\ln(TEXP) - \ln(P)]; \quad i,j = 1,2...n \qquad (2)$$

where $w_i = \left(\frac{p_i q_i}{TEXP}\right)$;

n = number of exporting countries;
p_j = price of good from country j; and
a_i, b_i, d_i, e_i, a_{ii}, b_{ij}, b_{iy} are estimated parameters.

In modelling a two stage demand system it is necessary to impose a functional form on the utility/cost function at the second stage. Armington (1969) proposed a CES functional form while AIDS (Epp 1990) and Generalized Box-Cox (Goddard 1984) functional forms have also been used previously. A linear approximate AIDS functional form for the second stage is used in the example above.

2.3 Modelling the Impact of Advertising on Demand for Imports

Few empirical studies exist on the impact of international generic advertising. The study on wool demand in the US (Dewbre *et al.* 1986) is one of the most recent studies of its kind. Given the paucity of studies in this area and without actually measuring the impact of advertising on demand it is possible to postulate a number of hypotheses about the role of advertising in international trade when goods are distinguished by country of origin.

If advertising is of a generic nature (with a slogan like "Consume more beef") then it is conceivable that the advertising, if effective, would increase total expenditure on the advertised product and leave the expenditure shares relatively unaffected except through the increased level of expenditure. Alternately, if advertising is aimed at the product from a particular country (with a slogan like "Consume more American beef") it is possible that consumers/importers may not change the overall level of total expenditure on beef but instead change the relative shares from each source (including domestic). A further alternative is that both stages of the demand system could be affected by a particular country's advertising expenditure level. For a particular exporting country the relevant question becomes, which strategy optimizes their return on investment?

The basic model of import demand can be adjusted depending upon the effect a single country's advertising campaign is likely to have.[3] If advertising were to affect the first stage then equation (1) could take the following form:

$$ln(TEXP) = a_i + b_i ln(P) + d_i ln(Y) + e_i ln(PS) + c_i ln(ADV) \qquad (3)$$

where ADV = real advertising expenditure; and
c_i = estimated parameter.

To apply optimal advertising criteria the equation must be twice differentiable with respect to advertising so that the reciprocal of advertising or the log of advertising are possible explanatory variables. Optimal advertising expenditure levels are not invariant to the advertising specification chosen as the shape of the response function changes.

If advertising only affects the first stage then equations (2) and (3) would make up the demand system. If advertising expenditure were to affect only the second stage then the expenditure share equations (2) would be of the following form:

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[3] The exposition to follow explicitly assumes that only one exporting country is advertising. In reality, more than one country could advertise their product necessitating the advertising variable at the first stage be an aggregate of all advertising activities (ADV = Σ ADV_i) and the advertising at the second stage be expressed as each individual advertising campaign

$$(eg. \sum_j C_{ij} \ln ADV_j \ \ instead\ of\ C_{ii} \ln ADV).$$

For more complete details of the incorporation of advertising into two stage demand systems see Goddard and Amuah (1989) and Goddard and Tielu (1988).

$$w_i = a_{ii} + \sum_j b_{ij} \ln p_j + b_{iy}(\ln(TEXP) - \ln(P)) + c_{ii} \ln ADV \ ,i,j = 1,2...n \quad (4)$$

where c_{ii} = estimated parameter.

The only condition on c_{ii} is that the sum of the c_{ii} coefficients over the demand system equate to zero to ensure adding up is not violated. In this case equations (1) and (4) make up the demand system.

It is conceivable that advertising expenditure could enter each stage of the demand system simultaneously. In this case the complete demand system would be composed of equations (3) and (4) although the advertising coefficients would not be equal to c_i and c_{ii}.

2.4 Optimal Advertising Rules for Two Stage Demand Models

To determine optimal advertising levels, the equilibrium condition for investment in advertising with exogenous quantity or with zero supply elasticity can be applied to the import demand model developed in the previous section. This scenario is chosen because it minimizes the problems associated with determining whether the single country exporter operates as a monopolist or not. If goods differ by country of origin the scope does exist for monopolistic behaviour. However, other constraints in the international marketplace may reduce the effects of monopolistic behaviour considerably. In the short run the scenarios to follow represent the impact of increased advertising by an exporter in a particular market with supply to that market held fixed. The optimal advertising condition can be restated as:

$$MVP_a = |\eta q_i p_i|$$

where MVP_a = marginal value product of advertising, $\left(\frac{\partial q_i \ p_i}{\partial ADV}\right)$, and $\eta q_i p_i$ = price elasticity of demand, $\left(\frac{\partial q_i}{\partial p_i}\right)\left(\frac{p_i}{q_i}\right)$.

If the own price elasticity of demand is derived across the two stages of the demand system proposed previously then:

$$if \ q_i = w_i \frac{TEXP}{p_i}$$

$$\frac{\partial q_i}{\partial p_i}\frac{p_i}{q_i} = \frac{\partial w_i}{\partial p_i}\frac{p_i}{w_i} + \left(\frac{\partial w_i}{\partial TEXP}\frac{TEXP}{w_i} + 1\right)\frac{\partial TEXP}{\partial p_i}\frac{p_i}{TEXP} - 1.0.$$

For the functional forms selected and allowing total expenditure to be an endogenous variable then the price elasticity of demand can be derived as:

$$\frac{\partial q_i}{\partial p_i}\frac{p_i}{q_i} = \frac{b_{ii}}{w_i} - b_{iy} + b_{iy}b_i + b_i w_i - 1.0,$$

where b_{ii}, b_{iy} are estimated coefficients of the second stage of the demand system, b_i is an estimated coefficient from the first stage of the demand system and w_i is budget share.

The marginal value product of advertising expenditure on good i (MVP_a) depends on whether the advertising expenditure affects the first, second or both stages of the demand system. If the advertising effect is isolated at the first stage of the demand system then the own advertising elasticity can be expressed as:

$$\left(\frac{\partial q_i}{\partial ADV}\right)\left(\frac{ADV}{q_i}\right) = \frac{\partial w_i}{\partial TEXP}\frac{\partial TEXP}{\partial ADV}\frac{ADV}{q_i} \cdot \frac{TEXP}{p_i} + \frac{w_i}{p_i}\frac{\partial TEXP}{\partial ADV}\frac{ADV}{q_i}$$

$$= \left(\frac{\partial w_i}{\partial TEXP}\frac{TEXP}{w_i} + 1\right)\frac{\partial TEXP}{\partial ADV}\frac{ADV}{TEXP}.$$

In a similar fashion the marginal value product of advertising by country i can be defined as:

$$\left(\frac{\partial q_i}{\partial ADV}\right) p_i = (w_i b_{iy})\, c_i \ \frac{TEXP}{ADV},$$

where c_i is the advertising coefficient from the first stage total expenditure equation.

If, on the other hand, advertising effects are isolated to the second stage of the demand system the own advertising elasticity can be expressed as:

$$\left(\frac{\partial q_i}{\partial ADV}\right)\left(\frac{ADV}{q_i}\right) = \frac{TEXP}{p_i}\frac{\partial w_i}{\partial ADV}\frac{ADV}{q_i}$$

$$= \frac{\partial w_i}{\partial ADV}\frac{ADV}{w_i}.$$

Again the marginal value product of advertising by country i can be expressed as:

$$\left(\frac{\partial q_i}{\partial ADV}\right) p_i = \frac{c_{ii}}{ADV} TEXP.$$

If advertising effects run across both stages of the demand system the own advertising elasticity is:

$$\left(\frac{\partial q_i}{\partial ADV}\right)\frac{ADV}{q_i} = \frac{\partial w_i}{\partial ADV}\frac{ADV}{w_i}$$

$$+ \left(\frac{\partial w_i}{\partial TEXP}\frac{TEXP}{w_i} + 1\right)\frac{\partial TEXP}{\partial ADV}\frac{ADV}{TEXP}.$$

The marginal value product of advertising across the two stages of the demand system can be expressed as:

$$\left(\frac{\partial q_i}{\partial ADV}\right) p_i = \frac{c_{ii}}{ADV} TEXP$$

$$+ \frac{b_{iy}c_i TEXP}{ADV} + \frac{w_i c_i TEXP}{ADV}.$$

Under each scenario (advertising at first, second or both stages of the model) optimal advertising expenditure for a particular exporting country i will be generated by equating the relevant marginal value product of advertising with the price elasticity of demand.

In general the optimal advertising criterion for a particular exporter where demand is determined in a two-stage system is as follows:

Table 1 : Optimal Advertising Expenditure With Different Price and Expenditure Elasticities

Advertising Elasticity = .05

$$\eta_{TEXP,p_i} = \left(\frac{\partial TEXP}{\partial p_i}\frac{p_i}{TEXP}\right) Stage1$$

$\eta_{q_i p_i} = \frac{\partial q_i}{\partial p_i}\frac{p_i}{q_i}$, *Stage2*

	-.5	.4	
-.5	5 percent of sales	50 percent of sales	second stage expenditure elasticity = 1
	3 percent of sales	8 percent of sales	second stage expenditure elasticity = .5
-1.2	3 percent of sales	6 percent of sales	second stage expenditure elasticity = 1
	2 percent of sales	3 percent of sales	second stage expenditure elasticity = .5

$$\frac{\eta\ qiADV}{\eta\ qipi} = \frac{\frac{\partial q_i}{\partial ADV}\frac{ADV}{q_i} + \frac{\partial q_i}{\partial TEXP}\frac{TEXP}{q_i}\frac{\partial TEXP}{\partial ADV}\frac{ADV}{TEXP}}{\frac{\partial q_i}{\partial p_i}\frac{p_i}{q_i} + \frac{\partial q_i}{\partial TEXP}\frac{TEXP}{q_i}\frac{\partial TEXP}{\partial p_i}\frac{p_i}{TEXP}} = \frac{ADV}{p_i q_i}$$

The impact for a particular exporter is thus dependent on the magnitude of the own price elasticity at each stage and the second stage expenditure elasticity. The relative magnitudes of various elasticities are essentially an empirical question within the constraints of consumer theory. Results provided in Table 1 are an attempt to show the relationship between the magnitudes of the various elasticities and optimal advertising sales ratios. With a combination of first stage elastic, second stage inelastic (Row 1, Column 1), results are very similar to those for first stage inelastic, second stage elastic (Row 2, Column 2). A combination of both inelastic (Row 1, Column 2) or both elastic (Row 2, Column 1), provides respectively the largest or smallest investment in advertising. The size of the expenditure elasticity directly modifies the investment in advertising.

If the advertising campaign were generic in nature then it may be possible for the exporting countries to contribute jointly to the campaign (similar to current activities by the IWS). In that case the exporting countries would be operating to maximize a particular importing countries' expenditure on imported product. If the Dorfman-Steiner condition were applied under these circumstances, optimal advertising expenditure would occur where the price elasticity of demand (at the first stage of the model) is equated to the marginal value product of advertising (at the first stage of the model). In other words:

$$-\eta\ qp = -\frac{\partial q}{\partial p}\frac{p}{q} = -(b_i - 1) \text{ and}$$

$$MVP_a = \frac{\partial q}{\partial ADV}\ p = c_i\ \frac{TEXP}{ADV}.$$

where q = total quantity of good = $\sum_i q_i$,

p = weighted average price of good.

Equating the two above expressions would allow for the solution of optimal advertising expenditure for all exporting regions in the particular importing region.

3. Empirical Model

3.1 Demand for Beef in Japan

In previous research (Goddard 1984; Epp 1990) the demand for beef in Japan has been modelled using the two stage demand system approach as above, without advertising as an explanatory variable. These previous elasticity estimates and actual data can be used to synthesize a two stage demand system to represent 1987 imports of beef by Japan. The elasticities reported in those earlier studies are presented in Table 2.

The synthesized equations in their various forms are provided in Table 3. It should be noted that the advertising elasticity used was 0.05 on the first and second stages of the model and in aggregate across the two stages, as no previous estimates exist of the advertising elasticity of Japanese import demand for beef. The advertising elasticity assumed falls within the range of other studies of domestic advertising effectiveness (e.g. Forker (1990) for dairy products) and is used for illustrative purposes only.

The model is also specified as if imported beef were weakly separable from domestic beef since over the estimation period of the previous analyses binding import quotas were in effect in Japan. Beef trade liberalization in Japan has opened the door for increased promotional activity by beef exporters. The first stage price elasticity of demand for imported beef in Japan is sensitized in later simulations since it is difficult to extrapolate from past data under trade restrictions what the price elasticity will be in the absence of trade restrictions. The base first stage elasticity used is -0.85, taken from Goddard (1984). Symmetry and homogeneity were imposed on the derived equations. Since linear homogeneity of the second stage utility function was statistically rejected in the previous research it

Table 2 : Elasticities Used in the Beef Model

Price and Expenditure Elasticities for Beef (Goddard 1984)[1]

	US	NZ	Aust	Expenditure
US	-1.920	0.345	-0.743	2.320
NZ	-0.180	-1.700	0.966	0.554
Aust	0.017	0.134	-1.170	1.020

Substitution Elasticities for Beef (Goddard 1984)[2]

	US	NZ	Aust
US	-37.85	4.31	1.37
NZ		-9.25	1.79
Aust			-0.48

Price and Expenditure Elasticities for Beef (Epp 1990)

	US	NZ	Aust	Expenditure
US	-0.76	0.00	-0.72	1.48
	(0.26)	(0.08)	(0.29)	(0.27)
NZ	0.55	-1.84	0.86	0.43
	(1.01)	(0.98)	(0.90)	(0.57)
Aust	-0.28	0.06	-0.36	0.58
	(0.20)	(0.06)	(0.38)	(0.32)

Substitution Elasticities for Beef (Epp 1990)[2]

	US	NZ	Aust
US	-0.11	1.58	-0.01
	(0.66)	(2.01)	(0.53)
NZ		-47.67	2.20
		(28.23)	(1.53)
Aust			-0.16
			(0.50)

[1] standard errors were not available from this reference
[2] Allen partial substitution elasticities

has not been imposed here.

3.2 Simulation Results for Optimal Advertising Investment by the US in Japan

Simulations of optimal advertising expenditure levels were conducted using each of the beef models and assuming supplies of each product to be perfectly inelastic. The results from simulating for optimal advertising expenditure levels are pre-

Table 3 : Example Synthesised Demand System for Beef (Goddard 1984)

First stage without advertising

$$ln\ TEXP = 10.51 + .15ln(P)$$

First stage including advertising as a shift parameter yields:

$$ln\ TEXP = 10.26 + .15ln(P) + .05ln(ADV)$$

First stage including advertising as a shift parameter at both stages yields:

$$ln\ TEXP = 10.46 + .15ln(P) + .01ln(ADV)$$

Second stage without advertising yields:

$$W_1 = -3.050 - 0.139ln(P_1) + 0.085ln(P_2) - 0.053ln(P_3) + 0.629ln\left(\frac{TEXP}{P}\right)$$

$$W_2 = 0.081 + 0.085ln(P_1) - 0.023ln(P_2) - 0.062ln(P_3) - 0.014ln\left(\frac{TEXP}{P}\right)$$

where 1= United States 2= New Zealand 3= Australia

Including advertising at the second stage yields:

$$W_1 = -3.171 - 0.139ln(P_1) + 0.085ln(P_2) + 0.053ln(P_3) + 0.629ln\left(\frac{TEXP}{P}\right) + .024ln(ADV)$$

$$W_2 = 0.139 + 0.085ln(P_1) - 0.023ln(P_2) - 0.062ln(P_3) - 0.014ln\left(\frac{TEXP}{P}\right) - .011ln(ADV)$$

Including advertising at both stages yields a second stage

$$W_1 = -3.116 - 0.139ln(P_1) + 0.085ln(P_2) + 0.053ln(P_3) + 0.629ln\left(\frac{TEXP}{P}\right) + .013ln(ADV)$$

$$W_2 = 0.112 + 0.085ln(P_1) - 0.023ln(P_2) - 0.062ln(P_3) - 0.014ln\left(\frac{TEXP}{P}\right) - 0.006ln(ADV)$$

The advertising parameters have been determined by an assumed elasticity for the US share equation and by an equal negative response distributed to the other two share equations to maintain adding up.

sented in Tables 4, 5 and 6. Since two estimates of beef import demand elasticities were available it was decided to use both of them in an attempt to illustrate the sensitivity of the results to elasticity estimates. The results are presented in terms of expenditure shares, quantities imported from individual countries, prices paid for product from each exporting country, total import expenditure across

Table 4 : Results For Beef Promotion Using Elasticities From Goddard (1984)

VARIABLES	BASE	MODEL 1	MODEL 2	MODEL 3	MODEL 4
EXPENDITURE SHARES					
US	.47671	.47671	.47622	.47832	.47671
NZ	.03196	.03196	.01819	.02430	.03196
AUST	.49133	.49133	.50558	.49738	.49133
QUANTITIES (MT)					
US	119	119	119	119	119
NZ	12	12	12	12	12
AUST	177	177	177	177	177
PRICE ($/MT)					
US	341.4	409.9	341.4	351.4	426.2
NZ	220.7	264.9	125.8	172.1	275.5
AUST	237.8	285.6	245.0	246.9	296.9
TEXP ($ US)	85519	102675	85612	87724	106757
ADV. EXP (000$ US)	145	3237	1163	1194	6279
REVENUE ($ US)					
US	40768	48946	40768	41817	50892
NZ	2733	3281	1510	2065	3411
AUST	42018	50447	43365	43701	52453
REVENUE/COST RATIO OF ADDITIONAL ADVERTISING		2.6:1*	0:1*	1:1*	3.5:1** (1.6:1)*

Model 1 assuming optimal advertising expenditure for United States, stage 1
Model 2 assuming optimal advertising expenditure for United States, stage 2
Model 3 assuming optimal advertising expenditure for United States, stage 1 and 2
Model 4 assuming optimal advertising expenditure for all regions, stage 1
* change in United States exporter revenue/change in advertising expenditure
** change in all exporter revenue/change in advertising expenditure

exporting countries, sales revenue to exporting countries and the revenue-cost ratio[4] of the individual country undertaking the promotion (US) moving from actual to optimal advertising expenditure level.

The base model with actual 1987 advertising ex-

[4] Results are presented in terms of additional revenue per additional dollar of investment. In fact the optimization is done on producer surplus rather than revenue. However, when supply is fixed and prices increase the additional revenue may be considered producer surplus. At optimum $1 of advertising would return $1 of surplus. That this does not happen is because the comparison is from actual to optimal, not zero to optimal.

Table 5 : Results For Beef Promotion Using Elasticities From Epp (1990), and a First Stage Price Elasticity of -0.85

VARIABLES	BASE	MODEL 1	MODEL 2	MODEL 3	MODEL 4
EXPENDITURE SHARES					
US	.47671	.47671	.64684	.60589	.47671
NZ	.03196	.03196	.01570	.01952	.03196
AUST	.49134	.49134	.33746	.37459	.49134
QUANTITIES (MT)					
US	119	119	119	119	119
NZ	12	12	12	12	12
AUST	177	177	177	177	177
PRICE ($/MT)					
US	341.41	423.89	481.42	462.05	426.20
NZ	220.65	273.96	112.69	143.54	275.45
AUST	237.85	295.31	169.77	193.08	296.92
TEXP ($ US)	85519	106178	88872	91062	106757
ADV. EXP (000$ US)	145	5725	2817	3114	6280
REVENUE ($ US)					
US	40768	50616	57289	54984	50892
NZ	2733	3393	1352	1722	3411
AUST	42018	52169	30049	34175	52453
REVENUE/COST RATIO OF ADDITIONAL ADVERTISING		1.8:1*	6.2:1*	4.8:1*	4.4:1** (1.6:1)*

Model 1 assuming optimal advertising expenditure for United States, stage 1
Model 2 assuming optimal advertising expenditure for United States, stage 2
Model 3 assuming optimal advertising expenditure for United States, stage 1 and 2
Model 4 assuming optimal advertising expenditure for all regions, stage 1
* change in United States exporter revenue/change in advertising expenditure
** change in all exporter revenue/change in advertising expenditure

penditure is provided to enable a comparison of results with optimal advertising expenditure levels. All four models (advertising at the first stage, advertising at the second stage, advertising at both stages and joint advertising at first stage) are calibrated to result in the same base solution. To each of the four models the optimal advertising expenditure scenarios developed in the previous section are applied and the results presented in the respective columns.

The results suggest that for two of the empirical examples (Tables 5 and 6), the "specific" advertising (aimed at the second stage of the demand system or market share directly) returns producers in the US the highest additional revenue per addi-

Table 6 : Results For Beef Promotion Using Elasticities From Epp (1990), and a First Stage Price Elasticity of -0.5

VARIABLES	BASE	MODEL 1	MODEL 2	MODEL 3	MODEL 4
EXPENDITURE SHARES					
US	.47671	.47671	.68816	.63141	.47671
NZ	.03196	.03196	.01246	.01708	.03196
AUST	.49134	.49134	.29938	.35151	.49134
QUANTITIES (MT)					
US	119	119	119	119	119
NZ	12	12	12	12	12
AUST	177	177	177	177	177
PRICE ($/MT)					
US	341.41	528.71	659.54	591.05	537.21
NZ	220.65	341.71	115.10	154.19	347.20
AUST	237.85	368.33	193.94	222.40	374.25
TEXP ($ US)	85519	132433	114442	111775	134563
ADV. EXP(000$ US)	145	11471	6122	6379	13456
REVENUE ($ US)					
US	40768	63132	78485	70335	64148
NZ	2733	4233	1381	1850	4300
AUST	42018	65070	34327	39365	66115
REVENUE/COST RATIO OF ADDITIONAL ADVERTISING		2.0:1*	6.3:1*	4.7:1*	4.6:1** (1.8:1)*

Model 1 assuming optimal advertising expenditure for United States, stage 1
Model 2 assuming optimal advertising expenditure for United States, stage 2
Model 3 assuming optimal advertising expenditure for United States, stage 1 and 2
Model 4 assuming optimal advertising expenditure for all regions, stage 1
* change in United States exporter revenue/change in advertising expenditure
** change in all exporter revenue/change in advertising expenditure

tional dollar of advertising expenditure. For these two cases increasing revenue from "generic" advertising with no direct impact on second stage market share is the least effective strategy in terms of returns to producers per additional dollar of advertising expenditure. The existence of any advertising campaign in the market place is likely to cause some adjustment in the expenditure allocated to the group of goods, suggesting that Model 3 might be better than Model 2 as a reflection of how a specific country advertising campaign might impact. The results from Model 3 are slightly lower than those from Model 2, in both cases, but higher than those of Model 1 where the price elasticity of

demand at both first and second stages is inelastic. However, when using Goddard's (1984) beef elasticities where demand for the advertised good at the second stage is price elastic (Table 4), returns to producers from Model 3 are higher than those from Model 2 and returns from Model 1 are the highest. For the examples (Tables 5 and 6) with inelastic second stage price elasticities, Model 2 produces the highest revenue-cost ratio. The more price inelastic the demand at the first stage the greater the returns from "specific country" advertising when second stage price elasticities are fixed (comparing Tables 5 and 6).

The results from optimizing advertising expenditure across all exporters (instead of just one exporter) are provided under Model 4 in Tables 4 through 6. For all exporters to maximize profits from advertising the expenditure levels are higher than for a single exporter.

Extrapolating from the results reported under Model 4 and assuming that the advertising expenditure would be distributed among the exporting countries on the basis of quantity sold, it is possible to calculate the additional revenue per additional advertising dollar for the US (provided in brackets in Tables 4 through 6). These are all lower than the revenue cost ratios for all exporters and lower than the revenue cost ratio achieved by the individual exporter maximizing profit from either generic or specific advertising activity. There is no case, in the empirical examples presented, where a country would be better off contributing to a joint campaign rather than running their own, either generic or specific.

An exporting country is better off conducting generic advertising for product in importing countries or, possibly contributing to a joint generic advertising campaign, than trying to advertise the product of their country as a differentiated product, as long as the second stage demand is elastic. The opposite is true for the case of inelastic second stage demands. It becomes clear from the examples, that as first stage demand elasticities decline, *ceteris paribus*, in combination with inelastic second stage elasticities, the optimal strategy shifts even more from generic advertising to single country advertising. However, it should be remembered that with double log equations which are asymptotic to the axes, large changes in producer surplus are generated by changes in advertising expenditure and unrealistically large optimal advertising expenditure levels are likely suggested when demand is very price inelastic. Even so, the optimal advertising strategy for the exporter is to conduct generic advertising for their product rather than to attempt to differentiate the product with elastic second stage elasticities, and vice versa with inelastic second stage elasticities. If demand across two stages has an elasticity that is larger than the marginal value product of advertising, advertising expenditures should be reduced.

4. Conclusions

Various hypotheses about the role of advertising in an import market where goods are distinguished by country of origin were developed. These hypotheses, as well as their attendant optimal advertising expenditure levels (based on theory developed by Dorfman and Steiner 1954), were incorporated into synthetic commodity models to investigate their implications. To investigate the appropriate method of measuring returns to export advertising, synthetic models of Japanese import demand for beef were developed. These models were based on previously estimated own and cross price and expenditure elasticities from other studies (Goddard 1984; Epp 1990). It is worth noting that the empirical results depend critically on the previous estimates of own and cross price, and expenditure, elasticities and the assumed response to advertising expenditure for each of the commodities. Since the advertising elasticities are not measured empirically the results reported can not be considered prescriptions for the markets. The results are intended to provide an illustration of how the magnitude of the own price elasticity of demand can affect the direction and magnitude of the impact of international promotion activity.

The results presented suggest that even with products distinguished by country of origin, a generic or co-operative advertising effort has the potential to be more beneficial to an individual exporter than to advertise its own product, as long as the second stage demand is elastic (suggesting that individual country products are somewhat substitutable). The

opposite is true the less elastic the second stage demands are. The results are derived from maximizing the returns to an individual exporter and generating the exporter's optimal advertising expenditure level. It should be noted that with optimal advertising expenditure by a single exporter, in a generic sense, other exporters are also advantaged. When countries use advertising of their own country's product other countries are disadvantaged by the program. The empirical question remains as to whether or not there is a significant enough first stage effect to encourage other countries to free ride or embark upon their own campaign. When all exporters contribute to the campaign, advertising expenditure levels are higher (at optimal across all exporters) but the returns to the individual exporter are not higher than advertising the individual countries' product except in the case of price elastic second stage demands. It is important to remember that in the analysis conducted here, only one country (or all countries collectively) was assumed to advertise. The impact of competitive advertising by other exporters was not examined.

As might be expected the elasticities of demand critically affect the optimal advertising expenditure level for a particular exporter. Whether one country benefits more from a cooperative advertising effort or from promoting its own product depends on the own price elasticities of demand. It also depends to a certain extent on the marketing characteristics of the import market, for example, whether or not consumers can identify the country of origin of the exporter. If they cannot identify the source and advertising is aimed exclusively at product from one country, then it is likely that the measured response to advertising would be even lower than the conservative estimates used here.

Further empirical analysis is required to provide estimates of own and cross advertising elasticities of demand for exported products in import markets. These will provide the basis for further analysis of the optimal strategy for exporters to pursue in selecting either joint or competitive advertising efforts.

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