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Promotion in the Marketing Mix: What Works, Where and Why

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AN ANALYSIS OF THE EFFECTIVENESS OF U.S. NON-PRICE PROMOTION PROGRAMS: The Case of Red Meats in Japan

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ABSTRACT

The effectiveness of U.S. government non-price export promotion activities for red meats in Japan was analyzed using an extended Armington model. Results suggest that promotion activities had a significant impact on U.S. market share of beef offals in Japan. Returns per dollar of promotion were calculated.

Introduction

The United States has established a noticeable presence in red meat markets around the globe. Red meat exports accounted for a record $3.2 billion (or nearly 8 percent) of U.S. agricultural exports in fiscal 1992 (USDA, December 1992). As per capita consumption of red meats in the U.S. fell in recent years, export markets have become increasingly important outlets for the U.S. industry's production. For nearly two decades, U.S. red meat producers and processors have participated in federal government promotion programs to expand red meat sales abroad.

The Foreign Agricultural Service (FAS) of the U.S. Department of Agriculture has coordinated two non-price promotion programs for red meats: the Cooperator Market Development Program (CMDP) and the Market Promotion Program (MPP), which replaces its predecessor, the Targeted Export Assistance (TEA) Program. The non-price export promotion programs are three-party programs involving FAS, non-profit commodity groups (cooperators), and foreign third-party contributors. The Cooperator Program has been in operation since 1955 with the purpose to develop and maintain long-term access to commercial markets. The TEA Program went into effect in 1986 with the specific objective of offsetting the adverse effects of foreign subsidies, import quotas, or other "unfair trade practices" on U.S. exports of agricultural products (Henneberry et al.). Cooperator Program expenditures for red meats averaged about $1.4 million per year from 1986 through 1991, while TEA Program expenditures averaged $7.7 million.

Japan has been one of the major recipients of the U.S. government non-price export promotion programs for red meats. Japan has also been one of the most important and fastest growing foreign markets for U.S. red meats. The value of U.S. red meats exports to this country grew over tenfold from the early 1970's to 1988. Traditionally, more than half of U.S. exports have been concentrated in Japan.

The general objective of this study is to evaluate the effectiveness of U.S. non-price promotion programs on U.S. exports of red meats to Japan. The specific objectives are to estimate the impact of non-price export promotion programs on the U.S. share of the Japanese imported red meats market, and to compare the effectiveness of programs among various red meats (beef, pork, beef offals, etc.). The analysis is conducted for red meats as an aggregate group and for beef, pork, and beef offals as separate categories. Despite the significant funds spent for red meat non-price promotion programs, this is the first study attempting to evaluate the effectiveness of overseas promotion programs for red meats. Other studies exist for citrus, cotton, soybeans, poultry, and apples (Lee and Brown, Solomon and Kinnucan, Williams, Rosson et al.).

The Model

In this study, an extended Armington model was used to estimate export promotion parameters. In the Armington model, the products are assumed to be differentiated according to the source of production (Armington). This is an appropriate assumption for this study as red meats produced by different countries are considered imperfect substitutes. For example, it is reasonable to assume that Japanese perceive grain-fed beef from the U.S. to be of different quality than grass-fed beef from Australia. The pork meat processing techniques used in the U.S. are also different from those used in Denmark, Taiwan, or other countries which may result in different product characteristics.

The Armington model can be viewed as a two-stage budget allocation. In the first stage, the size of the market (total imports by Japan of red meats from all sources) is determined by income and prices of related goods (imported red meats, poultry meat, etc.). In the second stage, the price of products competing in the same market (U.S. red meats' price versus Australian red meats price) and the size of the market (total Japanese imports of red meats) will determine the imports from each country. Previous studies have analyzed import demand for U.S. agricultural products using an Armington model (Solomon and Kinnucan, Babula).

In this study, a model representing the second stage of the Armington model is specified to delineate the U.S. market share of the Japanese beef imports. The market share model used in this study[1] is :

$$W_{ij} = f\left(\frac{P_{ij}}{P_i}, E, T, HQBS\right) \tag{1}$$

where W_{ij} is the U.S. (the jth country) market share of Japanese total imports of product type i. W_{ij} is measured as X_{ij}/X_i, where X_i is the total Japanese imports of product type i and X_{ij} is the Japanese imports of product type i from the U.S. P_i is average import price of product i from all sources. P_{ij} is the import price of product type i from the U.S. E is the U.S. non-price promotion expenditure in Japan for red meats in real terms, expressed in 1985 yen.

T is time trend. This variable was included in the model to represent changes in demographic factors that are associated with lifestyle and may affect red meats demand and consequently imports.

Note that in all results presented in this study, the variable log T was replaced by T. This is because the starting value of time trend will not affect the results when T is used in place of log T.

HQBS is the ratio of the high quality beef quota over the total beef import quota. The beef quota system played a very important role in determining U.S. share of the Japanese red meats' import market (Lin et al., Alston et al. 1990). From 1983 to 1987, there was a percentage increase in the portion of the total beef quota corresponding to high quality beef (HQB) which was larger than the percentage increase in the total beef quota. It has been argued that the increase in the HQB share of total beef import quota favored the U.S., where a high concentrate ration is generally used in livestock production. The use of a high concentrate ration is required for the production of HQB. Since this study deals with red meats rather than just beef, the impact of this variable is expected to be moderated.

Moreover, it is assumed that there is an optimal combination of imports from different sources. This combination is determined by prices and perceived quality differences from different sources of the imported commodity based on the importing country's utility function. The perceived quality is assumed to be affected by promotion expenditures. In order to allow for the dynamic adjustment, the Nerlovian type partial adjustment model was used (Nerlove):

$$LnW^*_{ij,t} = \alpha_0 + \alpha_1 Ln\left(\frac{P_{ij}}{P_i}\right)_t + \alpha_2 LnE_t + \alpha_3 LnT_t + \alpha_4 LnHQBS_t + \alpha_5 Ln\varepsilon_t \tag{2}$$

where W^*_{ij} is the optimal share.

ε_t is random error.

Ln is natural logarithm of the variables.

Because of rigidities originated from contracts and other institutional factors, it is assumed the importing country (Japan) does not completely adjust to changes in the determinants of demand immediately. It is assumed that the market share is adjusted in each period by a percentage of the difference between desirable market share and lagged one-period market share:

$$LnW_{ij,t} - LnW_{ij,t-1} = \lambda\left(LnW^*_{ij,t} - LnW_{ij,t-1}\right) \tag{3}$$

where λ is the coefficient of adjustment.

Combining equations 2 and 3, we obtain:

$$LnW_{ij,t} = \beta_0 + \beta_1 Ln\left(\frac{P_{ij}}{P_i}\right)_t + \beta_2 LnE_t + \beta_3 LnT_t + \beta_4 LnHQBS_t + \beta_5 LnW_{ij,t-1} + \beta_6 \mu_t \quad (4)$$

where μ_t is random error.

In equation 4, β_2 measures the short-run elasticity of U.S. market share with respect to promotion expenditures. The long-run elasticity is measured by

$$\frac{\beta_2}{1-\beta_5}$$

Equation 4 was estimated for red meats as an aggregate group and for beef, pork, and beef offals as separate groups.

Data

The model was applied to annual data for the period from 1973 through 1991 for beef, and 1973 through 1988 for beef offals and red meats. The U.S. did not export any beef offals to Japan in 1972. Relevant non-price promotion programs during this period were the Cooperator and TEA Programs.

Data were collected from several sources, with consistency of data with meat categories and what was included in the categories in mind. For example, while the U.S. includes diaphragm beef in the beef category, Japan includes diaphragm beef in beef offals.

Data on prices were obtained by dividing the total value by total quantity (unit price). Data on total red meats and pork imports into Japan were compiled from the *Food and Agricultural Organization (FAO) Trade Yearbooks.* Data on beef and beef offals were obtained from the *Government of Japan, Japan Exports and Imports: Commodity by Country.*

Data on FAS's Cooperator and TEA Program expenditures in Japan were calculated based on expenditure data provided by FAS, USDA.

Lack of data was a major limitation to this study. Data on FAS's Cooperator and TEA Program expenditures in Japan were provided by FAS, USDA. This was an aggregate level data for all red meats. Data on expenditures by type of red meat and promotion contributions by other participants (USMEF and third-party) as well as promotion expenditures by U.S. competing countries were not available. The use of FAS contribution for red meats to represent total promotion expenditures and expenditures by type of red meat introduces measurement error. However, if expenditures for each red meat product (beef, pork, etc.) are assumed to be a constant proportion of total red meat promotion expenditures and if the other participant contributions is assumed to be a fixed proportion of FAS' contribution, and assuming that competing countries' expenditures are not correlated with that of the U.S., these data limitations will not bias the elasticity estimates.

Results

Equation 4 was estimated for red meats as an aggregate group and for beef, pork, and beef offals. The ordinary least squares (OLS) method of estimation was used. When there were serial correlation of regression disturbances, the model was estimated using a two-stage least squares procedure.

The current expenditure values were used to represent promotion expenditures in the model. To examine whether promotion activities influenced demand beyond the expenditure year (carry-over effect), in preliminary trials a moving average of two and three years and a polynomial distributed lag were used. The results were not improved using the lagged specification.

The estimation results are summarized in Table 1. For red meats, the two-stage least squares (2SLS) method of estimation was used to estimate the parameters. Although the signs of the coefficients were consistent with economic theory, none of the coefficients were statistically significant. Interestingly, when the red meats equation was estimated using OLS and omitting HQBS variable, the coefficient of promotion expenditure variable was equal to .02 and statistically significant at the 5 percent level. The coefficients of time trend and the intercept term also became statistically significant.

For beef, all coefficients, had the expected signs. However, the coefficients on promotion expenditures and the quota variables were not statistically significant. Whether U.S. beef exports to Japan during the study period were entirely determined by political factors such as trade barriers or by economic factors and market forces has been debated in the literature. Note that in this study the dependent variable is U.S. market share and not total U.S. exports of beef to Japan.

For pork, the results were unsatisfactory. The signs of the coefficients of relative price and promotion expenditures were inconsistent with what was expected from theory, and only the coefficient of the lagged dependent variable was statistically significant in various trials.

Table 1. Estimated Resuts of Market Share Equations, U.S. Exports of Red Meats, Beef, and Beef Offals to Japan. 1973-88 and 1973-91 (beef).

Commodity	Intercept (P_{ij}/P_i)	Price Ratio (E)	Promotion Expenditures (T)	Time Trend (HQBS)	High Quality Beef Quota Share ($W_{ij,t-1}$)	Lagged Market Share	R^2
Red Meats	-1.41 (1.21)[a]	-.73 (.97)	.007 (.54)	.025 (.71)	.005 (.48)	.37 (1.35)	.86
Beef	0.42 (1.06)	-1.55** (3.73)	.015 (0.64)	—	0.22 (1.46)	.64** (4.72)	.91
Beef Offals	-2.57 (1.17)	-1.99** (2.94)	.015** (2.61)	.0002 (.97)	—	.31** (2.34)	.99

[a] Figures in parenthesis are t statistics.
Asterisks indicate significance at 1 percent.
Data: 1973-91

For beef offals, all the signs of the estimated coefficients were consistent with economic theory. With the exception of the intercept term and the trend variable, all coefficients were statistically significant at the 1 percent level. The results of this study show that promotion expenditures have only been significant in U.S. market share of beef offals in Japan. This can be rationalized considering that the quality of diaphragm beef (which belongs to the category of beef offals) is affected by feeding management. If the U.S. market development activities are effective in changing Japanese consumer tastes in favor of diaphragm beef obtained from grain-fed cattle, it may result in an increase in U.S. share of Japanese beef offals' imports, ceteris paribus. Price relationships have supported this assertion; import unit values for U.S. beef offals in 1987 were more than 50 percent higher than Australian beef (Alston et al. 1989).

Return to Non-price Promotion Activities

Return to promotion activities can be divided into two parts: one corresponding to the increase in the U.S. export revenue due to an increase in the U.S. market share; the other related to the increase in the U.S. export revenue due to an expansion in the Japanese imports market. Because of the scope of this study, only the former effect is analyzed.

Given that in a double-log specification the coefficients are elasticities, it can be shown that:

$$\frac{\partial TR_{U.S.}}{\partial E} = \beta_2 \left(\frac{\overline{X}_{U.S.} \bullet \overline{P}_{U.S.}}{\overline{E}} \right) \tag{5}$$

where, TRu.s. is total U.S. revenue from red meat exports in dollars. $\overline{X}_{U.S.} \bullet \overline{P}_{U.S.}$ is the mean value of U.S. red meat exports to Japan. $\overline{E}$ is the mean value of promotion expenditures.

Using the promotion expenditure coefficient and the mean values in the sample period, return to investment to promotion expenditures in the long-run is calculated as $8.46 and in the short-run as $5.36. However, since only the FAS contribution to the Cooperator and TEA programs was used, the return per dollar invested in promotion activities is an overestimation of the true coefficients. For example, if actual promotion expenditures are three times that of FAS contribution, the return per dollar of total promotion expenditures will be one-third of the calculated returns.

Conclusions

The relatively large magnitude of non-price promotion expenditures (the Cooperator Program and TEA/MPP) has brought increased public and congressional scrutiny to the government's promotion programs in general. The effectiveness of promotion expenditures in developing new markets and increasing exports in existing ones has been an area of great interest. It would be useful for policy makers to know how much of the growth in U.S. export market share in Japan can be contributed to promotion expenditures.

This study uses an extended Armington model to analyze the effectiveness of U.S.

government promotion expenditures for red meats in Japan. Furthermore, this study compares the impact of promotion expenditures among different red meat products (beef, pork, and beef offals). Estimation results indicate that U.S. non-price promotion activities have a positive and statistically significant impact on the U.S. share of the Japanese imports of beef offals. Moreover, the return in the long-run to each dollar invested in red meats promotion activities in Japan is estimated to be equal to $8.46 dollars. In a comparison of short-run and long-run effects, 60 percent of this return is observed in the short-run.

ENDNOTES

[1]For a more detailed description of the model, variables, and data refer to DeBrito, 1991.

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