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ECONOMIC

EFFECTS

of Generic
Promotion

Programs for

Agricultural
Exports



Editors

John P. Nichols
Henry W. Kinnucan
Karen Z. Ackerman

Economic Effects of Generic Promotion Programs for Agricultural Exports

Edited By

**John P. Nichols
Henry W. Kinnucan
Karen Z. Ackerman**

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Generic Promotion Programs for Florida Citrus

Jonq-Ying Lee, Robert M. Behr,
Mark G. Brown, and Gary F. Fairchild

The Florida citrus industry has been involved in export promotion programs for more than 20 years. During the 1960s and 1970s, interest in export promotion programs was stimulated by the prospect of increasing levels of Florida citrus production and a relatively mature U.S. market for citrus products. The industry's export promotion programs have been administered under the auspices of the Florida Department of Citrus (FDOC). During the past 25 years, the FDOC has maintained promotion programs for fresh grapefruit, grapefruit juice, and orange juice in Europe and Japan; all types of citrus products in Canada; and recently grapefruit products in the Pacific Rim.

Following a test program in 1966, an FDOC Cooperator Program in Europe was initiated on a full scale in 1967. The cooperator nature of the program stemmed from joint financing by the FDOC, the Foreign Agricultural Service of the U.S. Department of Agriculture (FAS-USDA), and European distributors. The initial program provided direct support to brand promotion activities of distributors in the European market.

During the last 14 seasons, the FDOC spent over \$54 million promoting citrus products in Japan, Canada, and Europe (Table 1). Expenditures have included a three-party program for orange juice and grapefruit products in Europe; a two-party program for orange juice in Canada; an FDOC promotion program for fresh grapefruit in Japan; Targeted Export Assistance (TEA) Programs for fresh grapefruit and grapefruit juice in Europe, Japan, and the Pacific Rim countries; and other FDOC generic promotion programs. During this period, the European market accounted for 43 percent of export promotion expenditures, followed by the Canadian market with 31 percent and the Japanese market with more than 20 percent.

Citrus was identified by FAS-USDA as a commodity to receive priority assistance from the TEA Program because of unfair trade practices by foreign countries with regard to U.S. citrus products.

TABLE 1. FDOC Export Promotion Expenditures for Citrus Products in Canada, the Pacific Rim, and Europe 1975-76 Through 1988-89

Season	Canada	Pacific Rim	Europe	Total
----- \$1,000 -----				
1975-76	715	0	579	1,294
1976-77	817	0	374	1,191
1977-78	980	260	619	1,858
1978-79	1,086	105	562	1,754
1979-80	1,198	259	610	2,066
1980-81	1,410	200	1,580	3,189
1981-82	1,424	210	1,262	2,896
1982-83	1,713	400	1,629	3,742
1983-84	887	461	1,052	2,400
1984-85	1,263	518	870	2,651
1985-86	1,327	784	670	2,781
1986-87	1,343	2,850	3,290	7,483
1987-88	1,250	3,180	4,553	8,984
1988-89	1,175	5,053	5,679	11,907
Average	1,185	1,020	1,666	3,871

Source: Florida Department of Citrus.

Recently, citrus was identified by FAS-USDA as a commodity to receive priority assistance from the TEA Program because of unfair trade practices by foreign countries with regard to U.S. citrus products (Gunter). The FDOC received \$4.6 million and \$7 million of the \$110 million TEA allocation during the 1986 and 1987 fiscal years, respectively. The authorized funding for the 1988 and 1989 fiscal years is \$7 million and \$10.5 million, respectively. TEA program support has been used to promote Florida grapefruit through television, printed media, public relations, in-store demonstrations and displays, and food service activities in Western Europe and the Pacific Rim. In addition to TEA Program

support, the FDOC currently has grower-financed commodity promotional programs in Canada, Europe, and Japan.

The purpose of this report is to provide an overview of Florida Department of Citrus economic research designed to measure the effectiveness of its export promotion programs. The report is organized as follows: first, a review of past research on the effectiveness of generic promotion programs for U.S. orange juice exports and then a summary of current research on the effectiveness of generic promotion programs for U.S. fresh grapefruit exports.

ORANGE-JUICE EXPORT PROMOTION RESEARCH

Europe

During the 1960s and 1970s, the FDOC actively promoted orange juice exports to Europe under cooperative programs. The promotion programs coincided with a period of increasing Florida orange juice production and export activity. Three studies (Lee; Lee et al.; and Lee and Brown) were conducted to quantify the impact of the FDOC/USDA-FAS Cooperator Program expenditures on exports of U.S. orange juice to Europe during this period of time. In these studies, time-series and cross-section pooling techniques were applied to annual observations by country to measure the economic impact of Cooperator Program activities on exports of orange juice.

Lee observed that the benefits from a Cooperative Program for frozen concentrated orange juice exceeded program costs over the period of analysis. Total exports of U.S. frozen concentrated orange juice (FCOJ) to the country of interest were considered a function of the U.S. FCOJ export price and total cooperator program expenditures. A dummy variable technique (Judge, Griffiths, Hill, and Lee, pp. 339-41) was used to estimate the variations over time and across countries. The study period was from fiscal year 1972-73 through fiscal year 1975-76 with observations on a fiscal-year basis. The estimated export returns (the additional increase in FCOJ export revenue due to promotion programs) for all program contributors averaged about \$1.33 per dollar invested.

In a follow-up study by Lee, Myers, and Forsee, the benefits of a cooperative program for FCOJ were reconfirmed. In this study, modifications were made in the analytical model to make the analysis more meaningful. The modifications included specifying U.S. orange juice exports to each European country on a per capita basis to account for the effect of population growth; the Brazilian FCOJ export price was added to the model as an explanatory variable to evaluate the competitive impact of Brazil on the export demand for U.S. orange juice; and price and cooperator program expenditure variables were adjusted for changes in exchange rates between the U.S. and the destination country. The same dummy variable technique used in the 1977 study was again used.

The time period studied was from fiscal year 1972-73 through fiscal year 1976-77. The estimated returns per dollar invested (in terms of additional sales) were \$4.85 for all contributors.

Lee and Brown also found that the benefits of an FCOJ cooperative program have exceeded program costs in a study that covered fiscal years 1973-74 through 1981-82. An error components model (Judge, Griffiths, Hill, and Lee, pp. 341-5) was used to estimate the variation in the demand for U.S. orange juice over time and across countries. The same analytical model from the Lee, Myers, and Forsee study was utilized. The results indicate that the returns associated with additional orange juice shipments generated by Cooperator Program expenditures averaged \$5.50 per dollar invested for all program contributors.

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Canada

Canada has been and continues to be an important export market for Florida citrus products. The FDOC has supported the Canadian market through various generic advertising programs, including programs for orange juice. Three studies have been conducted to estimate the impacts of FDOC generic orange juice advertising in Canada. The first study was completed in 1973 (Chern) and deals with the statistical estimation of consumer demand for FCOJ, chilled orange juice (COJ), and canned single-strength orange juice (CSSOJ). The study assumes that the quantity of a particular orange juice demanded is a function of its own price, prices of related orange juices (e.g., the prices of COJ and CSSOJ were used in the demand function for FCOJ), consumer income, current and lagged advertising expenditures, and seasonal dummy variables. The ordinary least squares method was applied to quarterly observations from July-September 1967 through October-December 1972 to obtain the parameter estimates. The results indicate: (1) FDOC generic advertising had a strong positive impact on the demand for FCOJ; (2) the demand for COJ and CSSOJ was not immediately responsive to advertising but was positively responsive to advertising after a lag; (3) the advertising impact for FCOJ was stronger than the advertising impacts for COJ and CSSOJ; and (4) generic advertising had a significant impact on the consumption per buying household for FCOJ and COJ, but the proportion of households buying COJ and CSSOJ was unaffected by advertising.

The second study was completed by Tilley and Lee in 1981. In this study a simultaneous equations model with five behavioral equations and one identity was estimated using two-stage least squares. The five behavioral relationships include a retail purchase relationship; a retail price transmission or margin function; and one import function each for the U.S., Brazil, and other countries. In addition, a market equilibrating identity was included.

The estimated structural form parameters show that all of the advertising coefficients were of the expected sign; however, the U.S. generic advertising coefficient was the only advertising parameter larger than its standard error. Even though the results were not conclusive, a number of findings were important. First, there was an estimated complementary relationship between advertising in the U.S. and in Canada (due to geographical proximity). Second, the results suggest that additional advertising expenditures in Canada would have enhanced U.S. export sales revenues to Canada. Third, the estimates show Brazilian imports into Canada benefitted from increases in consumer demand, some of which were generated by Florida advertising.

In the third study, Lee and Tilley examined U.S. and Brazilian market share relationships in Canada to test the hypothesis of irreversibility with respect to own- and cross-price effects. In this study, market shares of Canadian FCOJ imports were considered functions of import prices, FDOC advertising expenditures in Canada, a freeze dummy (to capture the impact of the 1977 freeze), and three seasonal dummies (to show seasonal variations in market shares of FCOJ imported during the year). The method of seemingly unrelated regression was used to estimate the relationships. The method of segmenting variables as described by Nelson was also used. The time period was from the first quarter of 1972 through the second quarter of 1981.

Results from this study indicate that Florida orange juice advertising in Canada had a significant positive effect on the U.S. market share reflecting an increasing focus on the Florida identity in advertising done in Canada. This response extended for one quarter beyond the quarter during which the advertising actually occurred. The initial impact of advertising was greater than the subsequent impact a quarter later. The estimated coefficients of the advertising variable in Brazil's market share equation show that Florida orange juice advertising efforts had a negative impact on the Brazilian market share in Canada. The results indicate that the impact was not evident during the quarter when advertising occurred, but the lagged impact was both negative and statistically different from zero.

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FRESH GRAPEFRUIT EXPORT PROMOTION RESEARCH

Florida has promoted fresh grapefruit exports since the early 1970s. In recent years, promotional activity has increased with support from TEA funds. Fresh grapefruit accounts for the largest portion of FDOC export promotion expenditures. In 1988-89, fresh grapefruit export promotion expenditures accounted for more than 80 percent of the FDOC's \$11.9 million export promotion expenditures.

The importance of fresh grapefruit in FDOC export promotion activities stems from the growing importance of fresh grapefruit exports. The value of Florida fresh grapefruit exports accounts for more than half of the value of all Florida citrus product exports. During the 1988-89 season, Florida fresh grapefruit exports totaled a record 27 million 42.5-lb. cartons and accounted for 58 percent of total Florida fresh grapefruit shipments. Since 1985-86, fresh grapefruit exports have increased by 88 percent.

The growth in export demand for fresh Florida grapefruit has likely been influenced by a number of factors, including export promotion activities. Other factors, such as the export price of fresh grapefruit, income, and population of the importing country, are also likely to be influencing export activity. Fluctuations of exchange rates in the international currency exchange markets may also be a significant factor.

In order to assess the impact of export promotion activity on fresh grapefruit exports, a study of U.S. fresh grapefruit export demand was undertaken. This study updates a previous study by Ward and Tang (WT) in 1978 that used data for the time period from 1971 through 1975. The major difference between the current study and the WT study is the treatment of exchange rates and the inclusion of Florida fresh grapefruit promotion program variables. In the WT study, the exchange rate was not included as an important explanatory variable because fixed exchange rates were in effect before 1974. The export demand equations employed in the present study specify that the quantity of U.S. fresh grapefruit demanded by a particular country depends on the price charged by U.S. exporters, a composite price for all other goods available to consumers, the consumer income, population, Florida fresh grapefruit promotional expenditures, and the exchange rate. Since grapefruit import information was not available for all countries of interest, the prices of grapefruit from competing suppliers were not included in this study. Formally, the demand equation can be written as:

$$(1) \quad q_{it}/n_{it} = f_i(r_{it}P_{1it}/P_{2it}, (r_{it}m_{it}/P_{2it})/n_{it}, r_{it}exp_{it}/P_{2it})$$

where subscript *i* and *t* refer to the *i*th country and the *t*th year, respectively; *q* is the quantity of U.S. fresh grapefruit demanded in million pounds; *n* is the population; *r* is the exchange rate, the number of units of foreign currency per U.S. dollar; *P*₁ and *P*₂ are the prices (nominal) in the U.S. dollars for U.S. fresh grapefruit and other goods available in country *i*; *m*

is the total expenditures or income of all consumers, and exp is Florida fresh grapefruit promotion expenditures in the i th country.

For this study, equation (1) had to be modified since the prices for other goods, P_2 , were not available, and income estimates were not available for all countries included for the period analyzed. In particular, country-specific consumer price indices (CPI) were employed to capture the influence of P_2 , i.e., fresh grapefruit prices were deflated by country-specific CPI's; and a time-trend variable was used for Hong Kong to capture the changes in income since the country-specific income variable is not available. A linear functional form was used as an approximation to equation (1), i.e.,

$$(2) \quad q^*_{it} = \alpha_i + \beta_{1i} p^*_{it} + \beta_{2i} m^*_{it} + \beta_{3i} \text{exp}^*_{it} + \epsilon_{it}$$

where $q^*_{it} = q_{it}/n_{it}$;
 $p^*_{it} = r_{it}P_{1it}/\text{CPI}_{it}$;
 $m^*_{it} = (r_{it}m_{it}/\text{CPI}_{it})/n_{it}$;
 $\text{exp}^*_{it} = r_{it}\text{exp}_{it}/\text{CPI}_{it}$;

ϵ_{it} is the random disturbance term;

and α 's and β 's are coefficients to be estimated.

Export information reported by the U.S. Department of Commerce and consumer price indices and exchange rates reported by the International Monetary Fund for the period from 1976 through 1987 were used. Equation (2) was used to estimate the fresh grapefruit import demand relationships for the 15 countries that have at least 12 years of data (except Taiwan and Hong Kong which have only nine years of data). These countries are Sweden, Norway, the United Kingdom, the Netherlands, Belgium, France, West Germany, Switzerland, Italy, Singapore, Hong Kong, Taiwan, Japan, Australia, and New Zealand. Of these 15 countries, the FDOC has had promotion programs in 11 of them, i.e., the FDOC did not have a program in Norway, Italy, Australia, and New Zealand.

Because the demand relationships represented by (2) are measured at common points in both time and space, it is likely that the errors in the demand equations are related. When the errors are correlated across equations and ordinary least squares estimators are employed, the results, although unbiased, are no longer efficient (Kmenta). Unbiased and efficient estimates, however, can be obtained by using the seemingly unrelated regression (SUR) method. The SUR method was, therefore, used in the present analysis. Since there are more equations to be estimated than observations available, five SUR equation systems were estimated. The 15 countries mentioned above were divided into four groups according to their geographical locations or cultural backgrounds. All European countries formed one subgroup. Because of transshipment problems among the European Community (EC) countries, all EC countries were aggregated into one group; in the EC country equation, price and income were deflated by the French CPI and expressed in

TABLE 2. Seemingly Unrelated Regression Estimates for Foreign Demand for U.S. Fresh Grapefruit--1976 Through 1987^a

Country	Constant	Price	Income	Promotional Expenditures
Sweden	-0.6385 (0.5256)	0.2143 (0.1752) .6443	11.6260* (8.4055) 2.5556	.0003 (.0007) .0148
Norway	0.0206 (0.0560)	-0.0476** (0.0227) -1.8156	1.1240 (1.0445) 2.1272	
EC Countries	0.7048 (0.2858)	-0.2919** (0.1324) -.3860	13.9830 (31.8780) .2237	.0182* (.0115) .0643
Singapore	-158.4100** (66.4820)	-1.3057* (0.8608) -0.5212	-0.1332 (.4085) -0.1648	0.0696* (0.0376) 0.0665
Hong Kong	273.8500* (163.6400)	-5.3812* (3.2279) -0.9190	38.3440** (7.7281)	0.3556** (0.0579) 0.1875
Taiwan	-558.6300** (205.3000)	-0.0372 (0.0335) -0.1584	0.8078** (0.2294) 3.1508	0.0337** (0.0034) 0.5294
Japan	5.2356** (1.7564)	-.2682 (0.2236) -0.3349	-102.5900 (97.9350) -0.7112	.0004* (.0002) 0.1182
Australia	-1.2562** (0.1783)	-5.9669** (1.4726) -1.7786	18.6690** (2.4803) 23.8357	
New Zealand	-2.1183* (1.1311)	-38.5400** (4.4510) -1.5211	50.2340** (15.8150) 6.1080	

^a The numbers on the first line are SUR parameter estimates of equation (2), the ones in parentheses are estimated standard errors, and the ones on the third line are demand elasticities estimated at the sample means.

* Statistically significantly different from zero at $\alpha = .10$ level.

** Statistically significantly different from zero at $\alpha = .05$ level.

French currency. The Pacific Rim countries, Australia, and New Zealand were grouped into three subgroups: Hong Kong and Taiwan, Japan and Singapore, and Australia and New Zealand. Results are presented in Table 2. The numbers on the first line for each country are the coefficient estimates for equation (2), the numbers on the second line are the standard errors for coefficient estimates, and the numbers on the third line are elasticity estimates.

In general, most coefficient estimates have the expected signs and are statistically different from zero at the $\alpha = .10$ level. All price coefficient estimates have the expected negative signs except the Swedish price coefficient estimate, which is positive and insignificant. All income coefficient estimates are positive except the ones for Singapore and Japan. All coefficient estimates for the promotional expenditure variable are positive. However, the coefficient estimate for promotional expenditures for Sweden is statistically insignificant, which may be related to the lack of continuous promotional activities (there were no promotional activities during 1976-77 through 1985-86) in Sweden during the study period.

Price elasticity estimates for export demand ranged from -0.13 to -1.81 with grapefruit-producing countries (Australia and New Zealand) having higher price elasticities than non-producing countries (except Norway with a price elasticity estimate of -1.81). Income elasticity estimates ranged from less than unity to more than 20. Given the wide range, there is some doubt that all of these estimates actually indicate income effects. Elasticity estimates for the promotional expenditure variable are less than one, which seems to be reasonable.

In order to evaluate the impact of promotional expenditures on the exports of Florida fresh grapefruit, the coefficient estimates for the promotional expenditure variable can be used as follows. The increase in per capita exports of U.S. grapefruit for a one-dollar increase in promotional expenditure in country i , in year t is:

$$(3) \quad \partial q^*_{it} / \partial \text{exp}_{it} = \hat{\beta}_{3it} / \text{CPI}_{it}$$

and the revenues generated (in terms of U.S. currency) from promotion programs can be estimated as:

$$(4) \quad (\partial q^*_{it} / \partial \text{exp}_{it}) \cdot n_{it} \cdot p_{1it} \cdot \text{exp}_{it} = \hat{\beta}_{3it} \cdot n_{it} \cdot p^*_{1it} \cdot \text{exp}_{it}$$

The benefit-cost ratio (BCR) can be obtained by dividing the estimate of revenue given by (4) by actual promotional program expenditure. A BCR value of greater than one means that the program benefit exceeded the cost of the program; a value of less than one means that the benefit is smaller than the cost of the program.

Total program expenditure for EC countries and Pacific Rim countries during the study period was \$11.36 million during the study period and the estimated benefit from the programs was \$35.37 million, giving a BCR of 3.11. This ratio indicates that U.S. fresh grapefruit

exports (predominantly from Florida) to EC countries and Pacific Rim countries increased by more than \$3 for every dollar that Florida spent on promotion.

CONCLUDING REMARKS

Foreign markets have been and continue to be important for Florida citrus. Research on the effectiveness of export promotion programs indicates the various programs have been effective in expanding demand in targeted countries. However, the research carried out thus far focuses on short-run demand impacts and has not examined long-run impacts such as stimulation of supply increases from competitive producers. In general, long-run supply response is important in the citrus industry as it typically takes a citrus tree three to four years after planting to bear fruit and a number of additional years to reach full production. Given the potential for widespread citrus production in the world, long-run supply responses of different producing countries to increased demand created by export promotion programs can be expected to be important for program evaluations.

Another research area important for program evaluation and in need of further work is the allocation of promotional program budgets across markets (e.g., EC countries versus Pacific Rim countries, etc.) and across citrus varieties and product forms (e.g., fresh versus processed orange and grapefruit products). Determination of optimal allocations will require knowledge of demand and supply parameters in the various world markets. With such knowledge, BCR comparisons across countries and products could measure past effectiveness of various programs as well as estimate future market potential. To estimate future BCR values, projections of basic supply and demand explanatory variables will also be required.

Despite the effectiveness of export promotion programs, U.S. orange juice exports have declined in the 1980s due to supply-reducing freezes in Florida and rapid orange juice supply expansion in Brazil. For example, the U.S. market share of orange juice imported by Canada decreased from 41 percent in 1978 to 33 percent in 1987. During the same period the U.S. market share of Japanese orange juice imports also decreased from 58 percent to 16 percent. Although the quantity of U.S. orange juice exports to EC countries increased from 17 million single-strength equivalent (SSE) gallons in 1978 to 19 million SSE gallons in

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1987, Brazilian orange juice exports to Europe increased from 136 million SSE gallons to 471 million between 1978 and 1987.

The major gains of Brazilian orange juice in Japan and EC countries may be related to the fact that in these markets consumers do not consume pure juices; instead, most imported juices are mixed with sugar and other food additives to produce juice-based beverages. In such cases, juices cannot be differentiated by country of origin or type of juice. On the other hand, Canadian consumers largely drink 100 percent pure juices and maintain a strong preference of U.S. brands.

Research results discussed in this study indicate that promotional effort had positive impacts on orange juice and fresh grapefruit imports from the U.S. in export markets. The implication of these results is that without continued promotion for citrus products, U.S. citrus exports to these markets could have been even worse than what we have observed.

Citrus export promotion programs have had positive impacts on market share. But the further lesson to be learned is that long-term effectiveness cannot be inferred without evaluation of the ability to differentiate the citrus product from that of other producing regions and analysis of cost competitiveness and supply response across producing countries.

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