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EFFECTS OF NON-PRICE EXPORT PROMOTION: SOME EVIDENCE FOR COTTON*

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An Armington-type trade model is estimated to determine the effects of government-subsidized export promotion on the demand for U.S. cotton in the Pacific Rim. Results show a significant relationship between promotion expenditures and U.S. market share in four of the six countries examined. One of the two countries exhibiting a non-significant effect had very low promotion expenditures, suggesting that a minimal level of funding may be necessary to achieve a market response. The hypothesis that export promotion has a carryover period lasting beyond one year in general is supported by the data. The question of the economic impacts of export promotion on domestic producers and taxpayers must await additional research.

Despite the long history of non-price export promotion of wool and other agricultural commodities in Australia and recent decisions in the United States to increase federal subsidies for non-price export promotion (Ackerman and Smith 1990), surprisingly little scholarly work has been done to evaluate the economic impacts of these programs. The few studies that have been done are limited to wool, citrus products, soybeans, poultry, and selected specialty crops (Dewbre, Richardson, and Beare 1987; Lee and Brown 1986; Williams 1985; Rosson, Humming and Jones 1986; Moore and McCracken 1991). No rigorous econometric evaluations exist for commodities such as feed grains, wheat, and cotton that have been the target of relatively high levels of promotional spending.

Non-price export promotion programs are implemented to increase export demand by providing services or information to current or potential buyers in the targeted country (Kinnucan and Williams

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1988). The provision of information or services to foreign buyers at no (or low) cost lowers the shadow price of characteristics produced by the imported good (Nichols 1985; Stigler and Becker 1977), which in turn shifts the foreign demand curve for the promoted commodity to the right. This increase in import demand results in a rightward shift in the excess demand curve for the promoted commodity, which raises the world price of the commodity. Depending on the ability of the promoting country to differentiate its product from competitors' products and the slope of the excess supply schedule, the promoting country experiences an increase in demand for the promoted commodity and receives a higher price for each unit sold.

The purpose of the research reported in this paper was to assess the effectiveness of non-price export promotion using U.S. cotton as a test case. U.S. cotton was selected because of the duration and continuity of the promotional activities (in place since 1955); the relatively high level of spending; and the availability of suitable data. The analysis is limited to the Pacific Rim countries (Japan, South Korea, Taiwan, Hong Kong, the Philippines, and Thailand) because these countries historically have accounted for over 60 percent of U.S. cotton exports and have been a major target of non-price export promotion in recent years.

The research objective is accomplished by restricting attention to promotion-induced shifts in the relevant demand curves. Because welfare gains from export promotion in general cannot occur unless exports are enlarged, a major hypothesis is whether the promotional activities resulted in increases in the demand for U.S. cotton in the countries studied. The hypothesis is tested using an extended version of the Armington trade model in which variables are included to represent the effects of exchange rates, dynamic market adjustment, and export promotion.

A review of the institutional setting of non-price export promotion precedes a discussion of the model and data. The results of the econometric analysis are then presented. The paper is concluded with a brief summary of the findings, implications for promotion policy, and suggestions for future research.

Institutional Setting

Federal subsidies for non-price export promotion of cotton and other agricultural commodities in the United States are provided through the Export Incentive Program (EIP), the Market Promotion Program (MPP), and the Foreign Market Development Program. The basic goal of all three programs is to increase the demand for U.S. agricultural products through changes in the behavior of producers and consumers in the targeted country. The Export Incentive Program was established in 1971 to support branded advertising (e.g., Dole, Sunkist) of consumer-ready U.S. agricultural products. The intent of the Market Promotion Program, which began as the Targeted Export Assistance (TEA) program in 1985 and was renamed in 1990, was to

increase exports of high-value consumer-oriented products primarily through short-term promotions aimed at the final consumer. A purpose of the TEA program was to '. . . aid U.S. producers disadvantaged by foreign trade policies' (Spatz 1989, p. 3).

The Foreign Market Development (or Cooperator) Program, which is the focus of this paper, is the oldest of the U.S. non-price export promotion programs. It was established in 1955 under the authority of P.L. 480 '. . . to develop, maintain, and expand long-term foreign markets for U.S. agricultural exports' (Ackerman and Smith 1990, p. 32). In contrast to the MPP and EIP programs, the Cooperator Program focuses on bulk commodities (e.g., wheat, feed grains, soybeans, cotton) and emphasizes long-term market development rather than short-run sales gains.

Marketing activities under the Cooperator Program fall into three categories: trade servicing, technical assistance, and consumer promotions. Trade servicing is designed to facilitate interactions between foreign buyers and U.S. exporters through the dissemination of information about the availability, utility, and reliability of U.S. supplies of agricultural commodities. The goal of technical assistance is to increase the utilization of U.S. agricultural commodities in the production processes of foreign countries. This is done *inter alia* by conducting agronomic experiments and by providing consultancy services and training programs in new weaving and spinning technologies. Consumer promotions are directed at the retail level of the market with the intent of increasing demand by making oversees consumers more aware of U.S. products. In-store demonstrations, distribution of free samples, and media advertising are used to influence consumer preferences and to differentiate the U.S. product from competitors'.

Most funds for cotton promotion are allocated to consumer promotions and trade servicing (Solomon 1990; Henneberry, Ackerman, and Eshleman 1992).[1] Government monies provided through the Cooperator Program are matched by private sector and foreign third-party cooperators in a ratio of about 2:1. Private-sector financing is obtained through Cotton Council International, a non-profit trade organization. Foreign third-party contributions come from foreign governments and foreign firms that utilize U.S. cotton.[2] The overall

[1] The consumer promotions include fashion shows, educational booklets and films, press sheets, and direct media advertising. Trade servicing activities include the sponsoring of trade teams that travel to the importing country to establish direct contact with buyers, and cotton orientation programs in which foreign spinners are brought to the United States to learn about the unique characteristics of U.S. cotton.

[2] Although reported expenditures under the Cooperator Program are about evenly divided among the government, private sector, and third-party cooperators, it must be recognized that private sector and third-party contributions include overhead and non-cash expenses that may not contribute directly to the market development effort

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goal of the cotton promotion program was to '. . . convince people that cotton clothing helps them to feel better and to look better, and that cotton household products give them more comfortable and attractive homes' (Solomon 1990, p. 39).

Model

Theoretical Framework

Because U.S. cotton competes with cotton produced in other countries and because United States and rest-of-world cotton in general are not perfect substitutes (Jones-Russell 1987), the market share model developed by Armington (1969) was deemed appropriate for the purposes of this study. The Armington model posits that the utility function of a purchaser includes as arguments quantities of a product (say cotton) that are differentiable by the country of origin. In practice the Armington model is a two-stage allocation model. In the first stage the country's total demand for a particular commodity from all sources is determined. In the second stage this market demand is independently allocated among competing sources of supply, including domestic supply.

The tradition in the literature (e.g., Babula 1987; Duffy 1991; Duffy, Wohlgenant and Richardson 1990) is to focus on the second stage of the two-stage allocation problem. In following this tradition, it is assumed that cotton promotions affect U.S. market share and not the total size of the cotton market. Although a goal of the U.S. cotton promotion program is to '. . . acquire a larger share of the textile market, and of the consumer dollar, for cotton throughout the world' (Solomon 1990, p. 39) and there is evidence that *generic* advertising affects aggregate demand (e.g., Goddard and Amuah 1989; Goddard and Tielu 1988), the first-stage model was not tested. Recent studies (see Duffy (1991) and references cited therein) provide evidence that *brand* advertising has a limited to nil effect on aggregate demand. Because the cotton promotions sponsored by the Cooperator Program are designed in part to differentiate U.S. cotton from cotton produced elsewhere, the promotions are essentially branded in nature. To the extent that branded promotions have no effect on aggregate demand, the focus on the second-stage model is justified.

To simplify the model and to provide a parsimonious specification for empirical work, Armington assumed a separable utility function and added the restrictions that elasticities of substitution in each market are constant and that the elasticity of substitution between any two products competing in a market is the same as that of any other

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(U.S.GAO 1987, p.40.). Non-cash expenses include such items as the value of time of program administrators. Henneberry, Ackerman, and Eshleman (1992, p. 68) estimate that for the cotton, tobacco and wool programs, administrative cost during 1986-88 represented 34 per cent of total program expenditures.

pair of products competing in the same market. These restrictions lead to the CES demand specification:

$$(1) \qquad MS_{ij} = b_{ij}^{\sigma} (P_{ij}/P_i)^{-\sigma}$$

where MS_{ij} is the market share of country j in country i, P_{ij} is the price of the commodity from country j in country i, P_i is the average world price of the commodity in country i, σ is the elasticity of substitution between any two products in a given market, and b_{ij} are country-specific constants. Thus Armington's trade model simplifies the import demand equation to one consisting of relative prices and the constant b_{ij}.

Specification

The literature on incorporating advertising into demand systems (Chang and Green 1989; Duffy 1991; Goddard and Amuah 1989; Goddard and Tielu 1988) indicates three basic ways in which advertising influences behavior: by altering preferences, by lessening search costs, and by changing perceptions about product attributes and characteristics. The empirical implications of these alternative frameworks are controversial. At issue is whether advertising generates utility directly (as in bandwagon effects) or affects utility indirectly through changes in tastes and preferences. The specification of advertising as a shift variable in the demand function implicitly assumes that advertising contributes indirectly to utility as a taste change parameter. This is the approach taken in the paper.

Previous studies employing the Armington model have incorporated non-price variables by specifying b_{ij} as a function of time or other shift variables (Duffy, Wohlgenant and Richardson 1990; Babula 1987; Figuero 1986). In this formulation, the intercepts of the individual country demand equations are assumed to vary systematically with time or time-related exogenous factors.

In addition to export promotion, a relevant exogenous factor to consider in international trade models is the exchange rate. As argued cogently by Chambers and Just (1981), the response of economic agents to exchange rate adjustments may differ from their response to price adjustments. To accommodate the hypothesis that the exchange rate may have a monetary effect independent of its price effect, the intercept in equation (1) is specified to be a function of both promotion and exchange rates:

$$(2) \qquad b_{ij} = A_{ij}\, EP_{ij}^{\beta}\, EX_{ij}^{\Omega}$$

[3] Promotional expenditures by other countries that compete with the United States for a share of the Pacific Rim cotton market are minimal to our knowledge. It is appropriate, therefore, to restrict attention to U.S. promotion efforts.

where EP_{ij} is U.S. promotion expenditures for cotton in country i, EX_{ij} is the bilateral exchange rate, i.e., the *ith* country's local currency per U.S. dollar, and A_{ij}, β, and Ω are constants.[3]

Substituting equation (2) into equation (1) and setting $MS_{ij} = MS_{ij}^*$ yields:

$$(3) \qquad MS_{ij}^* = (A_{ij}\, EP_{ij}^{\beta}\, EX_{ij}^{\Omega})^{\sigma^*} (P_{ij}/P_i)^{-\sigma^*}$$

where MS_{ij}^* is the desired market share and σ^* is the long-run substitution elasticity. The actual market share specified in equation (1) is replaced with the desired market share to accommodate Nerlove's (1958) partial adjustment model. A partial adjustment model is specified to account for the fact that the export promotion activities under the Cooperator Program emphasize long-term market development rather than immediate sales gains.

Previous research on generic promotion of food items suggest an advertising carryover period of less than one year (e.g., Kinnucan 1985). These studies, however, focus on media advertising campaigns for frequently-purchased low-cost items that are targeted directly at the final consumer. Because market development activities aimed at middlemen are likely to require more time to achieve increased consumer purchases than direct consumer-level media advertising and because cotton is a consumer durable, a carryover period of longer than one year is hypothesized. The effects of market development activities, moreover, are posited to be greatest in the period in which the activity takes place and to decline geometrically over time.

Nerlove's (1958) model used to capture the foregoing dynamic responses to export promotion activities is (ignoring i,j subscripts):

$$(4) \qquad MS_t / MS_{t-1} = (MS_t^* / MS_{t-l})^{\lambda}$$

where λ is a parameter indicating the rate of decay of the market development efforts. Substituting equation (3) into equation (4), re-arranging terms, and taking logarithms yields the estimating equation:

$$(5) \qquad ln(MS_{ij}(t)) = \lambda\, \sigma_i\, ln\, A_{ij} + \lambda\, \sigma_i\, \beta\, ln\, EP_{ij} - \lambda\, \sigma_i\, ln\, (P_{ij}/P)$$
$$+ \lambda\, \sigma_i\, \Omega\, ln\, EX_{ij} + (1 - \lambda)\, ln(MS_{ij}\,(t-1)) + \varepsilon\,(t)$$

The above adjustment framework is similar to the one used by Duffy, Wohlgenant and Richardson (1990) and by Sirhan and Johnson (1971) for their studies of the export demand for cotton and by Chambers and Just (1981) for wheat. The coefficients of equation (5) are interpreted as short-run (market share or substitution) elasticities. The corresponding long-run elasticities are computed by dividing the short-run elasticities by λ.

Expected Signs

The coefficients of the relative price and exchange rate variables are expected to have negative signs; an increase in EX_{ij} implies an appreciation of the dollar against the respective foreign currency. If long-run market share (substitution) elasticities exceed short-run elasticities, the coefficient of the lagged dependent variable is expected to be between zero and 1. The coefficient of the export promotion variable is expected to be positive.

Limitations

Before passing to the empirical results, the limitations of the Armington model need to be discussed. As indicated by Alston *et al.* (1990, p. 466) 'The main advantage of the Armington approach is its parsimony with respect to parameters to be estimated while retaining compatibility with demand theory.' The parsimony is achieved, however, at the expense of imposing rather restrictive assumptions on preferences. In particular, the subgroup (second-stage) utility functions are assumed to be weakly separable and homothetic.

Separable and homothetic sub-utility functions imply that cross-price effects (other than those for the subgroup as a whole) and group expenditures can be ignored in estimating the conditional demand functions obtained from the second stage of the two-stage model. Testing the assumptions of separability and homotheticity for wheat and cotton in nine importing countries, Alston *et al.* (1990) found that in general they could not be supported by the data. Compared with results obtained from double-log and AIDS models, Alston *et al.* (1990) concluded that estimates of own-price elasticities obtained from an Armington model may be downward biased in absolute value.

There is a trade-off, however, in adopting a model with less restrictive assumptions. In particular, as noted by Alston *et al.* (1990, p. 466) 'When we use a parametrically more generous specification (such as the AIDS model), we lose the main advantage of the Armington model in exchange for . . . risk of getting wrong signs . . .'. They go on to note that the AIDS model, which, along with the double-log model, forms the basis for their estimates of the bias in the Armington model, may be mis-specified. Without knowledge of the true demand equation, it is difficult to judge the true magnitude of the Armington bias.[4] It has to be noted, too, that the focus of this paper is on estimating promotion effects, not own-price elasticities *per se*. To the extent that the omitted variables (group expenditures and prices of substitutes)

[4] Sissoko and Duffy (1991) note that rejection of the Armington assumptions may be sensitive to measurement errors and model specification. For example, extending the model to allow for intercepts shifts and dynamics (as in this paper and in Duffy, Wohlgenant, and Richardson 1990) may permit more definitive tests in that the implicit assumptions of constant tastes and static expectations can be relaxed.

implied by the Armington model are uncorrelated with the promotion expenditures, the estimated promotion effects will be unbiased.[5]

A less restrictive form of the Armington model, called the constant ratio elasticity of substitution homothetic (CRESH) model (Hanoch 1971), has been estimated, amongst others, by Deppler (1973). However, as noted by Duffy, Wohlgenant, and Richardson (1990, p. 469), 'The application of the CRESH model is substantially more complicated than the application of the CES function ... and there is no conclusive evidence for its superiority.'

An additional limitation of the model as it is used in this study is that it isolates one market share equation out of an entire set for each importer. For example, over 20 countries supply cotton to Japan, implying the existence of over 20 market share equations for Japan. The focus on the U.S. market-share equation is based on pragmatic considerations. First, the focus of the study is promotion and the United States is the only country engaged in the non-price promotion of cotton in the study countries. Second, the United States is by far the largest exporter to the region with market shares during 1978-81 ranging from 41 per cent in Japan to 94 per cent in South Korea (International Cotton Advisory Committee 1982). The next largest exporter to the region had market shares of 11 per cent or less. Finally, as pointed out by Duffy, Wohlgenant and Richardson (1990, p. 470) '. . . failure to estimate the entire set of market share equations . . . does not lead to biased estimates of σ for the region, although the variances of the single-equation estimates would be expected to be larger than for the pooled estimates.'

Data

Annual data of cotton imports from all sources, including local cotton production, were collected from various issues of World Cotton Statistics published by World Cotton International. The quantity data were transformed to a calendar-year basis to match the data on exchange rates and export promotion expenditures, which are reported on a calendar-year basis. Local cotton production for South Korea, the Philippines and Thailand were added to total imports in calculating the U.S. market share for these countries. The transformation of the quantity data from market-year (August/July) to calendar-year basis was performed by taking a two-year moving average of the market-year data.

[5] We thank Patricia Duffy for this observation. The statement is strictly true only if the Armington model is viewed as nested in a more general double-log specification. The omitted-variable argument may not be appropriate when considering other functional forms.

The price data were obtained from the various issues of World Cotton Statistics. U.S. cotton price is the c.i.f. Liverpool price of S.M. 1 1/16" cotton. The world average price index A was used to calculate a trade-weighted price index, which in turn was used to calculate the average world price of cotton in each market.

Export promotion expenditures for U.S. cotton were furnished by the National Cotton Council. These data represent aggregate expenditures by the United States, the U.S. cooperator organization, and the third-party foreign firm or government.[6] The expenditure data were divided by the Consumer Price Index (1967 = 100) to place the expenditures on a constant (inflation-adjusted) basis.

Exchange rates of each country's local currency per U.S. dollar were collected from various issues of the United Nations statistical yearbooks. (A data appendix, including a complete citation of sources, is available upon request from the authors.) The data for all the variables cover the 21-year period 1965-85.

TABLE 1
U.S. Cotton Exports and Promotion Expenditures in the Pacific Rim, 1965-85 and 1981-85 Averages

Country	Cotton Exports		Market Share		Promotion Expenditure[a]	
	1965-85	1981-85	1965-85	1981-85	1965-85	1981-85
	(1000 metric tons)		(percent)		(1967 U.S. dollars)	
Japan	233	270	32	38	419.0	667.0
S. Korea	170	251	90	72	115.0	181.0
Taiwan	90	96	47	32	8.7	19.1
Hong Kong	50	35	27	18	17.9	33.5
Philippines	24	11	81	61	59.0	20.0
Thailand	31	33	41	26	54.0	49.5

[a] Thousand U.S. dollars

Summary statistics indicate that Japan is the largest importer of U.S. cotton in the Pacific Rim, followed by South Korea and Hong Kong (Table 1). The United States accounted for about one-third of the total

[6] Recall that the 'expenditures' reported for co-operators and foreign third-parties include in-kind contributions to cover administrative costs. The expenditure data, therefore, overstate market development activity. Thus, the econometric results reported below may contain a downward bias with respect to the estimated promotion effect (e.g., see Kinnucan and Belleza 1991).

cotton imported by Japan over the sample period but, unlike the other countries' shares, the U.S. market share in Japan appears to be increasing over time. Not surprisingly, the majority of U.S. cotton promotion dollars over the sample period was devoted to Japan and South Korea. Real expenditures for export promotion increased over the sample period in all countries except the Philippines and Thailand.

Econometric Results

Preliminary tests indicated the absence of autocorrelation except in the cases of Japan and Taiwan. The market share model for these two countries, therefore, was estimated by generalized least squares (GLS). Because the model contains a lagged dependent variable, the GLS estimates were obtained using the procedure suggested by Wallis (1967). This procedure involves creating an instrumental variable for the lagged dependent variable, which is then used to obtain consistent estimates of the autocorrelation adjustment factor. The coefficients estimates obtained by this procedure are consistent and asymptotically efficient (Greene 1990, pp. 448-49). Unless indicated otherwise, the 5 per cent level is used to determine whether a coefficient is significant.

The market share model performs reasonably well (Table 2). The R^2s, ranging from 0.75 for Hong Kong and Thailand to 0.89 for the Philippines, are higher than those obtained from simpler specifications of the Armington model. For example, the R^2s for the Armington model for cotton specified by Duffy, Wohlgenant and Richardson (1990) are all less than 0.59. The relatively high R^2s, coupled with the high incidence of significant coefficients and general lack of serial correlation, suggest the extended model as represented by equation (5) offers an improvement over Armington's basic specification.

Estimated parameters in general are consistent with *a priori* expectations (Table 2). Price and exchange rate coefficients are uniformly negative in sign, in agreement with theory, and are significant in all cases but one. The significance of the exchange rate variable lends support to the Chambers and Just (1981) hypothesis that exchange rates may have a monetary effect independent of the price effect.

The estimated (short-run) substitution elasticities, ranging from –9.72 in the Philippines to –2.31 in Taiwan, are consistent with those contained in previous studies. For example, based on annual data for 1959-83, Duffy, Wohlgenant and Richardson (1990) estimate short-run substitution elasticities for U.S. cotton ranging from –2.16 for 'Other Asia' countries to –18.91 for Centrally Planned countries. Their estimate of –3.12 for Japan compares favorably with the estimate of –2.82.[7]

[7] Care must be exercised in interpreting the coefficients of the relative price variable in that these coefficients are *substitution* elasticities, not ordinary demand elasticities. The ordinary (import) demand elasticity implied by the Armington model can be

cont. . . .

TABLE 2
Estimated Market Share Equations for U.S. Cotton in the Pacific Rim, Extended Armington Model, Based on 1965-85 Annual Data

Country	Estimation Procedure	Constant	Lagged Market Share	Price Ratio	Exchange Rate	Export Promotion	R^2
Japan	GLS	0.77 (0.49)	0.53 (2.71)	–2.82 (–4.13)	–0.53 (–2.29)	0.25 (1.99)	0.85
S.Korea	OLS	1.56 (4.23)	0.18 (2.00)	–2.96 (–6.22)	–0.29 (–4.46)	0.04 (3.35)	0.83
Taiwan	GLS	0.60 (0.08)	0.19 (0.71)	–2.31 (–2.76)	–0.02 (–0.54)	–0.44 (–0.21)	0.80
Hong Kong	OLS	1.59 (1.58)	0.08 (0.45)	–4.11 (–2.98)	–2.01 (–3.21)	0.19 (3.40)	0.75
Philippines	OLS	0.30 (1.14)	0.81 (2.28)	–9.72 (–6.97)	–0.31 (–2.59)	0.05 (1.45)	0.89
Thailand	OLS	5.24 (2.73)	0.12 (0.24)	–3.37 (–2.91)	–2.14 (–3.00)	0.04 (0.87)	0.75

Note: Figures in parentheses are *t*-statistics.

The adjustment coefficient associated with the lagged dependent variable is significant for three of the six countries. The estimated adjustment coefficients are all between zero and one, suggesting that long-responses are more elastic than short-run responses. The coefficient for Japan indicates a carryover period of about 4.7 years, i.e., it takes the market about 4.7 years to achieve 95 per cent adjustment to the new equilibrium market share in response to a one-time sustained increase in export promotion expenditures (ln 0.05/ln 0.53 = 4.7). The response in South Korea is much faster (1.75 years); the Philippines's response is much slower (14.2 years). Because the countries showing a significant carryover effect (Japan, Korea, Philippines) represent the bulk of promotion spending, the data support the hypothesis that the carryover period for export promotion is greater than one year.

The hypothesis that export promotion of cotton increases the demand for U.S. cotton in the Pacific Rim in general cannot be rejected by the data. The estimated coefficient of the export promotion variable is significant at the 10 per cent level or better in all countries except Taiwan and Thailand. The export promotion coefficients for Japan and South Korea, the countries receiving the heaviest level of spending (see Table 1), are significant at the 5 per cent and 1 per cent levels, respectively. The lack of significance of the export promotion variable in the case of Taiwan may reflect the relatively low level of expenditures, i.e, the average annual expenditures of $8,730 (in 1967 U.S. dollars) may have been insufficient to generate a response.

The long-run (market share) export promotion elasticities, obtained by dividing the coefficients of the export promotion variable in Table 2 by one minus the estimated coefficients of the lagged dependent variable, are 0.53 (Japan), 0.045 (South Korea), 0.21 (Hong Kong), and 0.26 (the Philippines). Interpreted literally, these elasticities imply that if export promotion expenditures for cotton in the selected Pacific Rim countries were to increase 10 per cent (in 1967 dollars), *ceteris paribus*, the U.S. market share of cotton would increase 0.45 per cent to 5.3 per cent depending on the country.

The estimated response elasticities, although not strictly comparable to promotion elasticities based on models having quantity (rather than market share) as the dependent variable, seem reasonable in that the magnitudes are small (i.e., generally closer to zero than to one). For example, export promotion elasticities for soybeans estimated by Williams (1985) (based on a quantity-dependent linear model) range from 0.02 to 0.08. The long-run export promotion elasticity for Australian wool in the United States estimated by Dewbre,

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computed provided information is available on the expenditure share of cotton from country j in country i and the overall demand elasticity of cotton in country i (see Duffy, Wohlgenant and Richardson 1990, p. 469). Because ordinary import demand elasticities in general are smaller (in absolute value) than the corresponding substitution elasticities, the substitution elasticities in Table 2 overstate price elasticities.

Richardson and Beare (1987) from household panel data (using quantity as the dependent variable) is 0.086.

Implications

The empirical results suggest several implications for resource allocation and international competition. First, the differing promotional responses across the countries, ranging from zero to 0.45, suggest a different geographical allotment of the funds would have yielded a higher net return for American taxpayers and the private-sector entities funding the program. Bearing in mind the potential limitations of the estimates, the insignificance of the promotion estimates for Taiwan and Thailand suggest the promotion activities in these countries may need to be re-assessed.

Second, any decision about the reallocation of funds needs to take into account the free-rider problem. Although the United States still enjoys relatively large market shares in all of the Pacific Rim markets examined in this study, with the exception of Japan they have been decreasing over time. Thus, to the extent that the non-price export promotion affects market size as well as market share (an issue for future research), emphasis should be placed, *ceteris paribus*, on those countries in which the United States enjoys the largest market share.

Because other countries do not engage in non-price promotion of cotton in the Pacific Rim to any known degree, increases in U.S. market share induced by promotion in general would come at the expense of other cotton exporters, especially if the promotion were successful at differentiating U.S. cotton. However, the small market shares of other nations that export cotton to the region (11 per cent or less in general; 4 per cent or less for Australia) suggest that no single nation is much affected by the promotion efforts of the United States. This may not be the case, however, at a more aggregated level in which, for example, cotton may displace wool.

Concluding Comments

An extended Armington model was estimated to determine the effects of government-subsidized non-price promotion on the demand for U.S. cotton in the Pacific Rim. Results suggest that the promotional efforts were successful, at least in terms of generating increases in U.S. market share. For four of the six countries examined, a significant and positive relationship between market share and export promotion expenditures was found. These countries include Japan and South Korea, countries that received the bulk of the promotion spending in the region over the sample period. Promotion did not appear to be effective in Taiwan or Thailand. The apparent failure of promotion in Taiwan may be related to the level of spending, which was far less than in the other countries studied. Carryover effects from the market development activities were estimated to range from 1.8 to 14.2 years. Coefficients for the exchange rate variable were significant for five of the

six countries, lending support to the 'money illusion' hypothesis of Chambers and Just (1981).

Although the results support the hypothesis that government subsidized non-price promotion activities can increase agricultural exports, the question about the economic impacts of the promotion on, *inter alia*, domestic consumers and taxpayers is still an open issue. Given the magnitude of the substitution elasticities estimated in this study, it is possible that other policy instruments, such as price subsidies, may be more effective at increasing market share than non-price promotion has been.

An additional caveat is that the separability and homotheticity assumptions embedded in the CES form of the Armington model may be overly restrictive (Alston *et al.*, 1990). To the extent that this criticism applies to the extended Armington model estimated in this study, the estimated price effects may contain a downward bias. Finally, no attempt was made to determine whether promotion affects the first stage of the two-stage allocation model (e.g., Goddard and Amuah 1989; Goddard and Tielu 1988). Still, the evidence presented in this study suggests non-price promotion is a viable policy instrument for increasing agricultural exports.

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