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ABSTRACT

Notwithstanding substantial federal financial support for the export promotion of agricultural products, ways to improve the efficiency of federal funding have not been discussed in empirical research. In this study, an equilibrium displacement framework was developed to evaluate whether the efficiency of export promotion expenditures could be increased by linking them with changes in the exchange rate. In our analysis, the gross gain to domestic cotton producers from the exchange-rate linked subsidy scheme was positive. Findings support exchange-rate linked subsidies for export promotion of agricultural products. [Econ-lit citations: Q 11,Q 13]

Key words: exchange rate, export promotion, government subsidy, exchange rate-linked subsidy

1. INTRODUCTION

The United States Department of Agriculture (USDA) supports a number of export promotion programs to strengthen the market position of US agricultural commodities in international markets. In 2001, the Foreign Market Development Program (FMDP) and the Market Assistance Program

(MAP) funding for export promotion was over $130 million (USDA, 2001). Research on export promotion has demonstrated the positive and significant impacts of export promotion programs in strengthening the market position of various US agricultural commodities in international markets (Le et al.,1997; Comeau et al., 1997; Halliburton and Henneberry,1995; Onunknwo and Epperson, 2000; Fuller et al., 1992; Lee et al.,1979; Solomon and Kinnucan, 1991). Notwithstanding the significant role of federal promotion programs, no previous research addresses the efficiency of federal allocations to further expand the marketing opportunities for US agricultural products. The issue of efficiency of each dollar invested in export promotion has emerged as a serious concern among policy makers because of the growing strength of the US dollar in export markets and the weakening position of some of US agricultural commodities in international markets. It is also supported by the trend of decreasing federal funding for agricultural export promotion.

In general, a stronger dollar makes US goods more expensive and promotes the entry of competitors in international markets. Concurrently, a strong dollar makes import goods cheaper in domestic markets. Realizing the negative impacts of strong US dollars on US agricultural products in international markets, It has been proposed that federal subsidies for export promotion of US agricultural commodities be linked to the exchange rate in order to increase its efficiency (Armbruster and Nichols, 2001). It was argued that exchange rate-linked subsidies could blunt the effect of adverse movements in the exchange rate on farm prices and increase the efficiency of export promotion subsidy schemes.

USDA economists have estimated that exchange rate fluctuation accounts for 25 % of the change in the value of US exports. By increasing federal subsidies for export promotion when the dollar is strong, and by reducing it when the dollar is weak, it might be possible to enhance the

effectiveness of the subsidy scheme and thereby to strengthen the market position of US agricultural goods in export market. For example, by raising export promotion expenditures when the export price is high (strong dollar), and reducing the export promotion expenditure when the export price is low (weak dollar), volatility in the domestic price would be potentially reduced, providing a welfare gain. In this study, we analyze the effectiveness of exchange rate-linked subsidies relative to the current regime of unlinked subsidies to increase the welfare of US cotton producers and to strengthen the market position of US cotton in international markets.

2. THEORETICAL MODEL SPECIFICATION

To assess the proposed policy innovation, the first step was to determine the effects of a simultaneous increase in export promotion and exchange rate on farm prices. Stated differently, "what would be the exchange rate pass-through with and without export promotion?" To answer the question posed above, we considered the following models that describe an initial equilibrium in a competitive industry producing homogeneous products for domestic consumption and export:

(1) $Q_d = D(P_d)$ (Domestic demand)

(2a) $Q_x = D(P_x, A_x)$ (A_x priced in US dollars)

(2b) $Q_x = D(P_x, A_x \cdot Z)$ (A_x priced in Foreign Currency Units)

(3) $P_x = (P_d + T)\, Z$ (Foreign price)

(4) $Q_s = S(P_d)$ (Domestic supply)

(5) $Q_s = Q_d + Q_x$ (Market clearing)

Where Q_d and Q_x are quantities consumed at home and abroad, respectively; P_d is the domestic price expressed in US dollars; P_x is the export price expressed in foreign currency units; A_x is expenditures of export promotion expressed in US dollars; Z is the exchange rate (FCU/US$); T is transportation cost in US dollars; and Q_s is domestic production. In this model all exogenous variables affecting supply and demand other than A_x, T, and Z are assumed to be constant and thus are suppressed. Thus, for example, no advertising expenditure variable appears in the domestic demand relation (1) even though in reality most US agricultural industries promote in both domestic and export markets.

Furthermore, it is assumed that the domestic market is sufficiently integrated with world markets so that the Law of One Price holds. Thus, the domestic and export prices are assumed to be identical once transportation costs and exchange rates are accounted. Importantly, two alternative specifications were developed for the export demand function. Specification (2a) refers to a situation where costs for export promotion are expressed in US currency. This specification applies when export promotion costs are insensitive to changes in the exchange rate and would be true if the costs of developing and implementing the promotion campaigns are incurred mostly in the United States. Specification (2b) refers to a situation where the costs for export promotion are expressed in foreign currency. This specification holds when export promotion costs are sensitive to the exchange rate and/or if promotion campaign costs are incurred primarily in the target market.

With this model, three questions were addressed:

1) How much would export promotion have to be increased to offset the effect of an X% increase in the value of the US dollar on the domestic farm price?

2) What would be the cost of this increase to the federal treasury?

3) Would welfare gains to farmers exceed the incremental treasury outlays?

To address these questions, we developed expressions to indicate the effect of isolated changes in A and Z on P_d. For this purpose, the model was first expressed in terms of the following percentage changes:

(1') $Q_d^* = -\eta_d P_d^*$

(2a') $Q_x^* = -\eta_x P_x^* + \beta_x A_x^*$

(2b') $Q_x^* = -\eta_x P_x^* + \beta_x (A_x^* + Z^*)$

(3') $P_x^* = \psi P_d^* + \zeta Z^* + \delta T^*$

(4') $Q_s^* = \epsilon P_d^*$

(5') $Q_s^* = k_d Q_d^* + k_x Q_x^*$

where the asterisked variables indicate relative change (e.g., $P_d^* = dP_d/P_d$); η_d and η_x are domestic and export demand elasticities expressed in absolute value; β_x is the export promotion elasticity; $\psi = 1/(1 + T/P_d) < 1$ is the international price-transmission elasticity; ζ is the exchange-rate transmission elasticity; δ is the transportation cost elasticity; ϵ is the farm supply elasticity; k_d (= Q_d/Q_s) is domestic quantity share; and k_x (= Q_x/Q_s) is the export quantity share. In this model we assumed that farm supply is upward-sloping ($\epsilon > 0$), promotion shifts the export demand curve to the right ($\beta_x > 0$), and that domestic and export demand are downward sloping ($-\eta_d < 0$ and $-\eta_x < 0$). (Here it is understood that $|\eta_x| \neq \infty$, i.e., the US accounts for a sufficiently large portion of world trade that the excess demand curve for the promoted product is not infinitely elastic.) In addition, the "markup model" specified in (3) implies the parametric restrictions $\psi = \zeta = (1 - \delta)$, which can be tested econometrically.

Setting $T^* = 0$ since this variable was not of policy interest, the structural model (1') - (5') yields two alternative reduced-form equations for changes in farm price as follows:

(6a) $P_d^* = (k_x \beta_x/D) A_x^* - (k_x \eta_x \zeta/D) Z^*$ (A_x priced in US dollars)

(6b) $P_d^* = (k_x \beta_x/D) A_x^* + [k_x (\beta_x - \eta_x \zeta)/D] Z^*$ (A_x priced in FCU)

where $D = (\epsilon + k_d \eta_d + k_x \eta_x \psi) > 0$. From (6), the model implies that an isolated increase in export promotion always increases the farm price under the stated assumptions. That is,

7) $P_d^*/A_x^* \big|_{Z^* = T^* = 0} = E_{Pd, Ax} = k_x \beta_x/D > 0$

where $E_{Pd, Ax}$ is the reduced-form elasticity of domestic price with respect to export promotion. This elasticity is directly related to the structural advertising elasticity β_x, and inversely related to the supply, demand, and price-transmission elasticities (ϵ, η_d, η_x, and ψ).

In particular, export promotion price effects were magnified as foreign consumers become more responsive to the promotion, and as domestic and foreign consumers and producers become less responsive to price. In all cases, however, the effect was positive, provided promotion was effective, i.e., $\beta_x > 0$, as assumed. By contrast, (6) indicates that the pass-through effect is uncertain, depending on how promotion is priced. Specifically,

(8a) $P_d^*/Z^* = \big|_{Ax^* = T^* = 0} = E_{Pd, Z} = - k_x \eta_x \zeta/D < 0$ (A_x priced in US dollars)

(8b) $P_d^*/Z^{*\prime} = \big|_{Ax^* = T^* = 0} = E_{Pd, Z}' = k_x (\beta_x - \eta_x \zeta)/D$ (A_x priced in FCU)

where $E_{Pd, Z}$ is the reduced-form elasticity of domestic price with respect to exchange rate when export promotion is priced in US dollars, and $E_{Pd, Z}'$ is the corresponding elasticity when export promotion is priced in foreign currencies. From (8) appreciation in the value of US dollar unambiguously decreases domestic price (negative pass-through) only if the export promotion is

priced in US dollars. The reason is that when promotion expenditure is priced in the foreign currency, an increase in the value of the dollar makes export promotion less expensive. In this situation, revaluation has two opposing effects. It increases export demand due to the ability to expand promotion expenditure, and it causes export demand to decrease due to induced increase in export price.

Which effect dominates depends on the foreign consumers' relative sensitivity to promotion and price. Specifically, if foreign consumers are relatively unresponsive to the promotion such that $\beta_x < \eta_x \zeta$, then pass-through is negative; the opposite is true if foreign consumers are relatively responsive to a promotion such that $\beta_x > \eta_x \zeta$. The latter would hold, if international price linkages are weak ($\zeta \approx 0$), as tends to be true when US exports are subject to tariffs or other protective trade measures (Bredahl, Meyers, and Collins,1979). Ordinarily, however, one would expect $E_{Pd,\,Z}'$ to be negative in sign, since promotion elasticities tend to be tiny in relation to demand elasticities. The overall message from (8) is that pass-through tends to be blunted when promotion is priced in the foreign currency. With the foregoing relationships in mind, question one can be answered by setting $P_d^* = 0$ and solving (6) for A_x^* to yield:

(9a) $A_x^* = E_{Ax,\,Z}\, Z^*$ (A_x priced in US dollars)

(9b) $A_x^{*\prime} = E_{Ax,\,Z}'\, Z^*$ (A_x priced in FCU)

where $E_{Ax,\,Z} = \eta_x \zeta/\beta_x > 0$ is the "neutralization" elasticity that indicates the percentage increase in export promotion expenditure required to offset the domestic price effect of a 1% currency appreciation when the export promotion is priced in US dollars, and $E_{Ax,\,Z}' = E_{Ax,\,Z} - 1$ is the corresponding elasticity when the export promotion is priced in foreign currencies. Thus, for example, if $\eta_x = 1$, $\zeta = 0.90$, and $\beta_x = 0.10$, then $E_{Ax,\,Z} = 9.0$ and $E_{Ax,\,Z}' = 8.0$. Under this scenario,

to neutralize the effect of a 10% dollar appreciation (Z* = 0.10), export promotion expenditures need to be increased by 90% when export promotion is price in US dollars and by 80% when export promotion is priced in a foreign currency.

To compute the treasury cost of this increase (question 2) we need to take into account the subsidy. Ordinarily, the government matches industry monies on a dollar-for-dollar basis (Kinnucan and Ackerman, 1995), which implies that approximately 50% of total promotion expenditures comes from the federal subsidy. Denoting this subsidy rate as ς (≈ 0.5), the treasury cost may be defined as follows:

(10a) $\Delta G = E_{Ax,\,Z}\, \varsigma\, A_x^o\, Z^*$ (A_x priced in US dollars)

(10b) $\Delta G' = (E_{Ax,\,Z} - 1)\, \varsigma\, A_x^o\, Z^*$ (A_x priced in FCU)

where ΔG is the increased government outlay associated with the exchange rate-linked subsidy scheme, and A_x^o is the initial total expenditure for export promotion. To address question 3, we need an industry's "profit" function, i.e., a function that indicates the increase in domestic producer surplus associated with the increased promotion outlay. Such a function can be derived by reference to Figure 1. In this figure ES is the excess supply curve, which is constructed as the horizontal difference between the domestic supply curve S and the domestic demand curve D.

The intersection of ES with the excess demand curve ED gives the initial equilibrium price P_d^o. At this price domestic producers supply quantity Q_s^o and exports equal Q_x^o, the difference between domestic production and consumption. An increase in expenditures for export promotion results in an upward shift of excess demand curve to ED′. With higher foreign demand, US exports expand to Q_x', placing upward pressure on the domestic price owing to the

reduced quantity in that market. With the maintained hypotheis that the law of one price holds, the equilibrium price rises to P_d', which encourages domestic producers to expand output to Q_s'. The domestic producer surplus, defined as the area between the original price line P_d^o and the supply curve S, expands by an amount equal to area $P_d'abP_d^o$. Since this area equals the sum of a rectangle and a triangle, its formula can be obtained using elementary math. Specifically, the change in domestic producer surplus (ΔPS_d) associated with a shift in the excess demand curve from ED to ED′ is defined as follows:

$$\Delta PS_d = \text{area of rectangle A + area of triangle B}$$

$$= (P_d' - P_d^o)\, Q_s^o + \tfrac{1}{2}\,(P_d' - P_d^o)(Q_s' - Q_s^o)$$

$$= (P_d' - P_d^o)\,[Q_s^o + \tfrac{1}{2}\,(Q_s' - Q_s^o)]$$

$$= (P_d' - P_d^o)\, Q_s^o[1 + \tfrac{1}{2}\,(Q_s' - Q_s^o)/Q_s^o]$$

$$= [(P_d' - P_d^o)/P_d^o]\, P_d^o\, Q_s^o[1 + \tfrac{1}{2}\,(Q_s' - Q_s^o)/Q_s^o]$$

$$= P_d^*\, P_d^o\, Q_s^o\,(1 + \tfrac{1}{2}\, Q_s^*)$$

where P_d^* and Q_s^* are the relative increases in domestic price and production associated with the demand shift. Specifically, the above equation may be written equivalently as:

$$\Delta PS_d = [P_d^*/A_x^*]\, A_x^*\, P_d^o\, Q_s^o\,(1 + \tfrac{1}{2}\,[Q_s^*/A_x^*]A_x^*)$$

where P_d^*/A_x^* is the elasticity defined in (7) and Q_s^*/A_x^* is the corresponding elasticity with respect to domestic production. Noting from (4') that $Q_s^*/A_x^* = \epsilon\, P_d^*/A_x^*$, the above equation can be expressed strictly in terms of the price elasticity as follows:

$$\Delta PS_d = [P_d^*/A_x^*]\, A_x^*\, P_d^o\, Q_s^o\,(1 + \tfrac{1}{2}\,\epsilon\,[P_d^*/A_x^*]A_x^*),$$

which, upon substitution of (7) yields:

(11) $\Delta PS_d = E_{Pd,\,Ax}\, A_x^*\, P_d^o\, Q_s^o\, (1 + \tfrac{1}{2} \epsilon\, E_{Pd,\,Ax}\, A_x^*)$.

From (11), price enhancement is a necessary condition for export promotion to benefit producers, i.e., the reduced-form elasticity $E_{Pd,\,Ax} = k_x\, \beta_x/(\epsilon + k_d\, \eta_d + k_x\, \eta_x\, \psi)$ must be strictly positive. Equation (11) gives the producer gain for any given increase in export promotion expenditures. In the present analysis the actual increase in A_x is constrained by (9). Imposing this constraint on (11) yields gain formulas in terms of observed changes in the exchange rate as follows

(12a) $\Delta PS_d = E_{Pd,\,Ax}\, E_{Ax,\,Z}\, Z^*\, P_d^o\, Q_s^o\, (1 + \tfrac{1}{2} \epsilon\, E_{Pd,\,Ax}\, E_{Ax,\,Z}\, Z^*)$($A_x$ priced in US dollars)

(12b) $\Delta PS_d' = E_{Pd,\,Ax}\, E_{Ax,\,Z}'\, Z^*\, P_d^o\, Q_s^o\, (1 + \tfrac{1}{2} \epsilon\, E_{Pd,\,Ax}\, E_{Ax,\,Z}'\, Z^*)$ (A_x priced in FCU).

Equation set (12) represents the gross gain to domestic producers from the ERLS scheme, i.e., the gain prior to subtracting the producer cost of the incremental promotion outlay. The producer cost of the incremental promotion outlay (ΔA_p) may be defined as follows:

$\Delta A_p = (1 - \varsigma)\, \Omega\, A_x^o\, A_x^*$

where A_x^o is the initial expenditure on export promotion, i.e. the expenditure prior to the increase associated with ERLS, and $\Omega = \acute{\eta}/(\acute{\eta} + \epsilon)$ is the producer share of the promotion tax where $\acute{\eta} = k_d\, \eta_d + k_x\, \eta_x\, \psi$ is the "effective" demand elasticity. In situations where the funds for promotion are raised via per-unit levies on farm output, a portion of the levy is shifted to consumers unless farm supply is perfectly inelastic ($\epsilon = 0$). The incidence parameter Ω takes this "tax-shifting" phenomenon into account. Substituting (9) into the above relationship gives the incremental producer cost in terms of the observed change in the exchange rate as follows:

(13a) $\Delta A_p = (1 - \varsigma)\, \Omega\, A_x^o\, E_{Ax,\,Z}\, Z^*$ (A_x priced in US dollars)

(13b) $\Delta A_p' = (1 - \varsigma)\, \Omega\, A_x^o\, E_{Ax,\,Z}'\, Z^*$ (A_x priced in FCU).

Combining (12) and (13), the net producer gain from the linked subsidy scheme may be computed as follows:

(14a) $\Delta NPS_d = \Delta PS_d - \Delta A_p$

(14b) $\Delta NPS_d' = \Delta PS_d' - \Delta A_p'$

A comparison of (10) and (14) provides a basis for determining whether a linked subsidy would yield a net societal gain in the second-best sense. In particular, the net "social" benefit (the net domestic producer welfare minus treasury outlay for the subsidy) may be measured as follows:

(15a) $\Delta SB = \Delta NPS_d - \Delta G$

(15b) $\Delta SB' = \Delta NPS_d' - \Delta G'$.

Positive values for (15a) or (15b) would constitute evidence in favor of exchange rate-linked subsidies for export promotion. Negative values, on the other hand, would indicate the opposite.

3. DATA AND PARAMETER VALUES

To analyze the issue, relevant data and information were collected from different sources especially from the previous research and used to assign numerical values to different model parameters. The value for domestic price, domestic quantity, export quantity, and export share were collected from USDA. The baseline values of domestic demand elasticity, domestic supply elasticity, export demand elasticity, and export promotion elasticity of US cotton were taken from the work of Ding (1996). Meanwhile, the baseline value of promotion expenditure in the export market was taken from the work of Miao (2000). In this study, the value for short run supply elasticity was assigned as zero. The numerical values of exchange rate and transmission price

elasticity were calculated by using an econometric model. The government subsidy was calculated by dividing the total government expenditure on Cotton by total export promotion expenditures. Table 1 summarizes the numerical values of all parameters collected from the different sources.

4. RESULTS AND DISCUSSIONS

Analysis of the effectiveness of exchange rate-linked subsidies in export promotion using available baseline parameter values for cotton yields promising results and supports exchange rate-linked subsidies as a more efficient way to increase the welfare of US cotton farmers. Study results indicate that increased export promotion expenditure when the value of the US dollar appreciates and vice versa always increases US producers' surplus and strengthens the marketing position of US agricultural firms in international markets.

Table 2 presents the reduced form elasticities for cotton when export promotion is expressed in US dollar and in foreign currencies. All reduced form elasticities of cotton yield expected signs and are consistent with economic theories. The results show that a 1% increase in exchange rate requires 3.083% increase in export promotion expenditure for cotton in the short run. That is, an increase of 3.083% of export promotion expenditure is required to mitigate the negative effect of a 1% increase in the exchange rate on domestic farm prices of cotton when the export promotion is expressed in US dollars. Similarly, offsetting negative impacts of a 1% increase in exchange rate on farm price of cotton requires an increase in 2.083% export promotion expenditure in the short run, if the promotion expenditure is priced in foreign currencies.

Further, the impacts of change in the strength of US dollars on domestic price of cotton show that a 1% increase in the value of US dollars against foreign currencies is associated with a 0.52% reduction in US farm prices of cotton in the short run (Table 2) and a 0.58% reduction in US farm prices of cotton in the long run when the promotion expenditure is expressed in US Dollars. The higher impacts of changes in the value of US dollars in the short run than the long run demonstrates that impacts of exchange rate declines with time. In the meantime, one per cent increase in US dollar against foreign currencies causes 0.35% and 0.54% reduction in US farm prices of cotton in the short run and long run when promotion is expressed in foreign currencies (FCU).

Analysis shows that the farm prices of cotton increase with the increase in export promotion irrespective of US dollars and foreign currency unit. The effect of a 1% increase in promotion expenditure on farm prices was 0.17% and 0.036% for cotton in the short and long runs, respectively (Table 2). That is, the long-run effect of a one percent increase in export promotion expenditure is smaller than the short-run effect largely because of perfectly inelastic supply elasticity in the short run. Table 3 shows the impacts of strong a US dollar on export promotion expenditure. USDA reports show that the value of the US dollar increased by 16% between 1996 and 2000. Our study results show that in order to offset the negative effect of a 16% US currencies appreciation on domestic prices, short and long-run export promotion expenditure must be increased by 49% and 257% for cotton, respectively, when the promotion expenditure is expressed in US dollars. An increase in export promotion expenditures by 32% and 240% for cotton in the short run and long run, respectively, is required to mitigate the

impacts of 16% increased strength of US dollar, when promotion expenditure is priced in foreign currencies.

The study results further reveal that increased strength of the US dollar and resultant increased export promotion expenditure affects both the government and producers in the short run. In the short run, increased export promotion expenditure does not affect consumers because of perfectly inelastic supply elasticity. However, in the long run consumers are also affected. Table 3 demonstrates the impacts of increased export promotion expenditures on the government, producers, and consumers.

In the period between 1996 and 2000, the US federal government contributed approximately 50% of the total export promotion expenditure of cotton without regards to the change in the value of US dollars. If the changing value of US dollar is considered (exchange rate-linked subsidies) government would need to contribute an additional $26 million for cotton in the short run, when the export promotion expenditure is expressed in US dollars. In the meantime, an additional $17 million federal support for cotton export promotion is required if government adopted the policy of exchange rate-linked subsidies and if export promotion is expressed in local currencies unit.

Expenditures for cotton export promotion are also shared by producers by using check-off dollars. Under the exchange rate-linked subsidies, producers must contribute an additional $26 million for cotton export promotion in the short run when export promotion expenditure is expressed in US currencies. However, the use of export promotion expenditure in local currencies requires an additional $17 million to mitigate the impacts of strengthening US dollars. In the short run, the producers and government bear all incidences of these impacts, but in the

long run, part of increased export promotion expenditure is also passed on to consumers (Table 3). That is, consumers bear $56 million of the increased export promotion expenditures of cotton.

The impacts of increased export promotion expenditures for the federal government, producers, and consumers and the social benefit of an exchange rate-linked policy on export promotion are shown in Table 4. Increased producer surplus minus increased government and producers expenditure to cover the additional cost of cotton export promotion expenditure reflect the total impacts of exchange rate-linked subsidies. Study results show that an increase in promotion expenditure due to the increase in dollar exchange rate increases producer welfare. In our analysis, the gross gain to domestic producers from the exchange rate-linked subsidy scheme was positive and greatly exceeded the increased total cost of export promotion expenditure contributed by producers and the federal government. Under an exchange rate-linked subsidies scheme, the net social welfare gains were $1,716 million and $ 1,759 million in the short and long runs, respectively, for cotton when export promotion is expressed in US dollars. Similarly, total social gains were $1,161 million and $1,648 million in the short and long runs, respectively, when cotton export promotion expenditure is expressed in foreign currencies.

In our analysis, short-run marginal returns under exchange rate-linked subsidies were $66 and $68 for cotton when the export promotions are expressed in US dollar and local currencies, respectively. However, in the long run, the marginal return under exchange rate-linked export promotion program was $23 irrespective of US dollar or local currencies. These results exhibit diminishing impacts of the export promotion program and an indifference between the impacts of US dollar and local currencies unit in the long run.

5. CONCLUSIONS

In our analysis of differential promotional expenditures linked to exchange rates, an increased export promotion expenditure was induced by increased strength of US currencies, showing a positive impact and significant producers gain to the US cotton producers. The return of the last dollar invested on the export promotion program tended to be higher in the short run than in the long run. The export promotion expenditure associated with the foreign currencies and US dollars did not demonstrated a crucial difference in terms of the returns and the incremental costs. The law of incidence holds for consumers in the short run, because of perfectly inelastic supply assumptions but a portion of the export promotion costs is shifted to consumers in the long run. The results of the study clearly support the concept of exchange rate-linked subsidies for export promotion of cotton relative to the classical subsidy scheme for export promotion programs . Study results suggest that producers and government consider the changing value of US dollars to increase the effectiveness of export promotion program and thereby the welfare of US cotton producers.

REFERENCES

Armbruster, W.J. & Nichols J.P. (2001). Commodity promotion policy. United States Department of Agriculture.

Bredahl, M E., Meyers, W. H., & Collins, K. J. (1979). The elasticity of foreign demand for U.S. agricultural products: the importance of the price transmission elasticity. American Journal of Agricultural Economics, 61, 249-57.

Ding, L. (1996). Optimal static decision rules for allocating advertising funds between domestic and export markets: The case of cotton. MS Thesis. Department of Agricultural Economics and Rural Sociology. Auburn University.

Miao, Y. (2000). Generic advertising evaluation: Case studies for US cotton and non-alcoholic beverages. Ph.D. Dissertation. Department of Agricultural Economics and Rural Sociology. Auburn University.

Cameau, A., Mittelhammer, R.C., & Wahl, T.I. (1997). Assessing the effectiveness of MPP and TEA advertising and promotion efforts in Japanese markets for meats. Journal of Food Distribution Research, 28, 27-35.

Fuller, B., Bellow, H., & Capps, O. (1992). Import demand for US fresh grapefruit: Effects of US promotion programs and trade policies of importing nations. Southern Journal of Agricultural Economics, 24, 251-260.

Halliburton, K., & Henneberry, R.S. (1995). The effectiveness of US nonprice promotion of almonds in the Pacific Rim. Journal of Agricultural and Resources Economics, 20, 108-120.

Kinnucan, H.W., & Ackerman, K.Z. (1995). Public funding of foreign market development programs. Public Policy in Foreign and Domestic Market Development. College Station: Texas A&M University. 121-134.

Le, C.T., Kaiser, H.M., & Tomek, W.G. (1997). Export promotion and import demand for US red meat in elected pacific rim countries. National Institute for Commodity Promotion Research and Evaluation. NICPRE 97-04,R.B. 97-12, Department of Agricultural and Managerial Economics, Cornell University, Ithaca, NY.

Lee, J., L.H. Myers, & Forsee, F. (1979) Economic effectiveness of brand advertising programs for Florida Orange Juice in European Markets." Gainesville, Florida Department of Citrus, ERD REP.79-1.

Onunkwo, I.M., & Epperson, J.E. (2000). Export demand for US pecans: Impacts of US export promotion programs. Agribusiness: An International Journal, 2, 253-265.

Soloman, H.& Kinnucan, H.W., (1991). Effects of nonprice export promotion: some evidence for Cotton. Australian Journal of Agricultural Economics, 37, 1-15.

U.S. Department of Agriculture, Foreign Agricultural Service (2001). Trade in the United States, FATUS, Calendar Year 2001, Washington D.C.

Table 1. Model Parameters and Baseline Values, US Cotton Industry, 5 Years Cumulative, 1996-2000

Item	Definition	Value
P_d	Domestic price ($/mt.) [a]	1306
Q_s	Total production (millions mt.) [b]	16
$P_d.Q_s$	Industry Revenue (millions $)	20896
Q_d	Domestic consumption (Millions mt.)	10
Q_x	Export quantity (Millions mt.)	6
A_{tp}	US foreign third party outlet for export promotion	27
A_I	US industry outlays for export promotion ($ mil.)	24.5
A_g	Government outlays for export promotion ($ mil.)	53
A_x	Total outlays for export promotion ($A_I + A_{TP} + A_g$)[c]	104.5
κ_d	Domestic share (Q_d/Q_s)[d]	0.62
κ_x	Export share (Q_x/Q_s)[d]	0.38
κ_j	Proportion of cotton exports in Japan (Q_j/Q_x)	0.053
κ_k	Proportion of cotton exports in Korea(Q_k/Q_x)	0.073
κ_t	Proportion of cotton exports in Turkey (Q_t/Q_x)	0.084
κ_i	Proportion of cotton exports in Indonesia (Q_k/Q_x)	0.088
κ_m	Proportion of cotton exports in Mexico(Q_m/Q_x)	0.24
κ_c	Proportion of cotton exports in China(Q_m/Q_x)	0.041
κ_c	Proportion of cotton exports in Canada (Q_m/Q_x)	0.043
κ_t	Proportion of cotton exports in Taiwan (Q_m/Q_x)	0.056
κ_t	Proportion of cotton exports in Thailand (Q_m/Q_x)	0.035
ς	Subsidy rate (A_g/A_x)	0.50
β_x	Export promotion elasticity	0.12, 0.066
ψ	Transmission price elasticity	0.21, 0.27
ζ	Exchange rate elasticity	0.24, 0.36
ϵ	Domestic supply elasticity	0, 0.30
η_d	Domestic demand elasticity in absolute value	0.30
η_x	Export demand elasticity in absolute value	1.00, 2.00
$\acute{\eta}$	Effective demand elasticity ($k_d\, n_d + k_x\, n_x\, \psi$)	0.27, 0.69
Ω	Producer incidence $\{\acute{\eta}/(\acute{\eta} + \epsilon)\}$	1 or 0.57,

[a] Prices data refer to average value for the 1996-2000 crop years. Source: FAS/USDA 2001.
[b] Production, export and domestic consumption data refers to total values for the year 1996-2000 marketing years as reported in FAS/USDA (table 11).
[c] Total outlays for export promotion of 1996 multiplied by 5 years
[d] Total values for 1996-2000.

Table 2. Reduced Form Elasticities

Elasticity	Short Run	Long Run
A_x in US dollars		
$E_{Pd,Ax}$	0.172	0.036
$E_{Pd,Z}$	-0.52	-0.58
$E_{Ax,Z}$ (	3.083	16.06
A_x in FCU		
$E_{Pd,Ax}$'	0.172	0.036
$E_{Pd,Z}$'	-0.358	-0.546
$E_{Ax,Z}$'	2.083	15.06

Table 3. Increase in Export Promotion Expenditures Required to Neutralize the Effect on the US Cotton Price of a 16% Appreciation in the US Dollar, 1996-2000.

Item	Scenario 1		Scenario 2	
	SR	LR	SR	LR
1. Increase in Total Expenditures (%)	49	257	32	240
2. Increase in Total Expenditures (mil. $)	52	267	34	250
3. Government share (G), mil. $	26	134	17	125
4. Industry share (A_p), mil $	26	77	17	72
5. Consumer share (Item 2 - 3 - 4), mil. $	0	56	0	52

Note: Scenario 1 assumes export promotion expenditures are priced in US dollars: scenario 2 assumes the expenditures are priced in foreign currencies

Table 4. Net Social Benefit of an Exchange-Rate Linked Export Promotion Policy as Applied to US Cotton, 1996-2000[a]

	SR	LR	SR	LR
1. Change in producer surplus, mil. $	1768	1970	1195	1846
2. Increased industry outlays for promotion, mil. $	26	77	17	72
3. Net increase in producer surplus (item 1 - 2)	1742	1893	1178	1774
4. Government outlays for promotion, mil $	26	134	17	126
5) Net social benefit (item 3-4)	1716	1759	1161	1648

[a] Based on percent increases in promotion expenditures indicated in table 3. See that table for scenario definitions

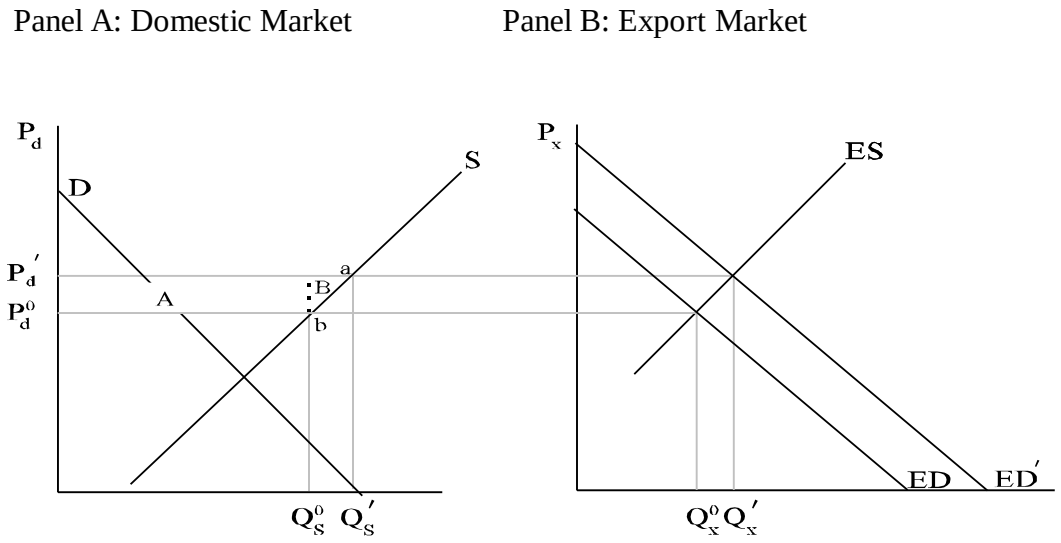

Figure 1. Effect of Export Promotion on Domestic Producer Surplus for Large Exporter