Analysis of Exchange Rate Linked Subsidies for Non-price Export Promotion: The Case of Cotton

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An equilibrium displacement framework was developed to evaluate the effect of exchange rate linked subsidies for non-price export promotion for US cotton. Study results show that an increase in promotion expenditure increased the dollar value and producer welfare of cotton growers. The gross gain to the domestic cotton producers from the exchange-rate linked subsidy scheme was positive. These evidences support exchange rate linked subsidies for US cotton export promotion.

Key words: export promotion, exchange rate linked subsidies, gross gain, producer welfare

The Foreign Agricultural Service (FAS) administers the Foreign Market Development Program (FMD) and the Targeted Export Assistance Program (TEA) to promote US agricultural commodities in overseas markets. In addition, the United States Department of Agriculture (USDA) supports a number of other export promotion programs and accounts for a substantial share of the total federal government funding on export promotion programs. Researchers have analyzed and reported the positive impacts of export subsidy (Duffy and Wohlgenant,1991), non-price export promotion (Solomon and Kinnucan, 1993; Kinnucan, Duffy, and Ackerman, 1995), and generic advertisement (Miao, 2000) on cotton export demand. In spite of substantial research work in the area of non-price export promotion and export subsidy in cotton and other agricultural commodities, none of the studies analyze the relationship between exchange rate and federal promotion subsidy. Currently, the federal funding for export promotion is provided on a yearly basis without regard to change in the value of US dollars.

Federal subsidies for export promotion of US agricultural commodities have proposed to be linked to the exchange rate (Armbruster and Nichols, 2001, and Anne, 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 by promoting international export of agricultural commodities. In particular, a strong dollar penalizes export-oriented industries by making agricultural products more expensive and thereby, reducing export demand in foreign markets. By increasing subsidies for export promotion when the dollar is strong, and by reducing subsidies when the dollar is weak, it might be possible to enhance the effectiveness of the subsidy scheme. For example, by raising export promotion expenditure when the export price is high (strong dollar), and lowering export promotion expenditure when the export price is low (weak dollar), volatility in the domestic price potentially would be reduced providing a welfare gain.

USDA economists estimated that exchange rate fluctuation accounts for 25 % of the change in the value of US exports (Anne, 2001) . This change in the value of US exports might also affect the market position of US agricultural commodities in international markets. Any export promotion program which fails to consider the impacts of the change in value of exchange rate would not produce the most desirable results. Therefore, whether the exchange rate linked subsidies increase the efficiency of subsidies scheme by increasing the net welfare of cotton producers is an issue of interest to researchers, the industry, and policy makers. No previous research appears to have analyzed the issue of exchange rate linked subsidies in terms of welfare gain. This paper evaluates the effectiveness of exchange rate linked subsidies relative to the current regime of exchange rate unlinked subsidies to increase the net welfare for US cotton producers..

Methodology and Data

In order to analyze the issue of exchange rate linked subsidies on the US cotton market, relevant data and information were collected from different sources, including previous research. These data were used to assign numerical values to different model parameters. The values for domestic prices, domestic quantities, export quantities, and export shares were collected from USDA. 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), While, the baseline value of promotion expenditure in the export market was taken from the work of Miao (2000). In our study, the value for short run supply elasticity was assigned as zero because of vertical or inelastic supply curve in the short run. The numerical values of exchange rate and transmission price elasticity were estimated 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.

Table 1 Model Parameters and Baseline Values, US Cotton Industry, Five 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 $)	20896
Q_d	Domestic consumption (Millions mt.)	10
Q_x	Export quantity (Millions mt.)	6
A_{tp}	US foreign third party outlet for export promotion ($ mil.)	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
$\hat{e}_d$	Domestic share (Q_d/Q_s)[d]	0.62
$\hat{e}_x$	Export share (Q_x/Q_s)[d]	0.38
$\hat{e}_j$	Proportion of cotton exports to Japan (Q_j/Q_x)	0.053
$\hat{e}_k$	Proportion of cotton exports to Korea(Q_k/Q_x)	0.073
$\hat{e}_t$	Proportion of cotton exports to Turkey (Q_t/Q_x)	0.0837
$\hat{e}_i$	Proportion of cotton exports to Indonesia (Q_k/Q_x)	0.0878
$\hat{e}_R$	Proportion of cotton exports to Mexico(Q_m/Q_x)	0.24
ò	Subsidy rate (A_g/A_x)	0.50
$\hat{a}_x$	Export promotion elasticity (short run, long run)	0.12, 0.066
ø	Transmission price elasticity (short run, long run)	0.11, 0.15
æ	Exchange rate elasticity (short run, long run)	0.27, 0.41
å	Domestic supply elasticity (short run, long run)	0, 0.30
$ç_d$	Domestic demand elasticity in absolute value	0.30
$ç_x$	Export demand elasticity in absolute value (short run, long run)	1.00, 2.00
Þ	Effective demand elasticity ($k_d\ n_d + k_x\ n_x$ ø) (short run, long run)	0.23, 0.30
Ù	Producer incidence {Þ/(Þ +å)} (short run, long run)	1 or 0.5,

[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.

Theoretical Model Specification

In order to assess this proposed policy innovation in exchange rate links with subsidies, the first step was to determine the effects of a simultaneous increase in export promotion and exchange rate on farm prices. Stated differently, what is the exchange rate pass-through with and without export promotion? In order 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) $Q_d = D(P_d)$

(2a) $Q_x = D(P_x, A_x)$

(2b) $Q_x = D(P_x, A_x \cdot Z)$

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

(4) $Q_s = S(P_d)$

(5) $Q_s = Q_d + Q_x$

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. 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. This would be true if the costs of developing and implementing the promotion campaigns were to be 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 promotional expenditure and exchange rate on domestic price. Our study follows the model developed by Paudel (2001). In order to further proceed the analysis, the model was first expressed in terms of the following percentage changes.

(1') $Q_d^* = - ç_d P_d^*$

(2a') $Q_x^* = - ç_x P_x^* + \hat{a}_x A_x^*$

(2b') $Q_x^* = - ç_x P_x^* + \hat{a}_x (A_x^* + Z^*)$

(3') $P_x^* = ø\ P_d^* + æZ^* + ä\ T^*$

(4') $Q_s^* = å\ P_d^*$

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

where the asterisked variables indicate relative change (e.g., $P_d^* = dP_d/P_d$); $ç_d$ and $ç_x$ are domestic and export demand elasticities expressed in absolute value; $â_x$ is the export promotion elasticity; $ø = 1/(1 + T/P_d) < 1$ is the international price-transmission elasticity; æis the exchange-rate transmission elasticity; ä is the transportation cost elasticity; å 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 (å > 0), promotion shifts the export demand curve to the right ($â_x > 0$), and that domestic and export demand are downward sloping ($- ç_d < 0$ and $- ç_x < 0$). (Here it is understood that $*ç_x*$... 4, 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 ø = æ= (1 - ä), 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) $P_d^* = (k_x\ â_x/D)\ A_x^* - (\ k_x\ ç_x\ æ/D)\ Z^*$ (A_x priced in US dollars)

(6b) $P_d^* = (k_x\ â_x/D)\ A_x^* + [k_x\ (â_x - ç_x\ æ)/D]\ Z^*$ (A_x priced in FCU)

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

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

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, $\hat{a}_x$, and inversely related to the supply, demand, and price-transmission elasticities (å, $ç_d$, $ç_x$, and ø). 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., $\hat{a}_x > 0$, as assumed. By contrast, (6) indicates that the pass-through effect is uncertain, depending on how promotion is priced. Specifically,

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

(8b) $P_d^*/Z^*r = {}^*_{Ax^* = T^* = 0} = E_{Pd,\ Z}{}^r = k_x\ (\hat{a}_x - ç_x\ æ)/D$ (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 $E_{Pd,\ Z}{}^r$ 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 consumer's relative sensitivity to promotion and price. Specifically, if foreign consumers are relatively unresponsive to the promotion, such that $\hat{a}_x < ç_x\ æ$; then pass-through is negative; the opposite is true if foreign consumers are relatively responsive to a promotion such that $\hat{a}_x > ç_x\ æ$. The latter would hold, if international price linkages are weak (æ . 0), as

tends to be true when US exports are subject to tariffs or other protective trade measures (Bredahl, Meyers, and Collins). Ordinarily, however, one would expect $E_{Pd,\ Z}{}^{r}$ to be negative in sign, since promotion elasticities tend to be tiny in relation to demand elasticities (see, e.g., Ferrero *et al*.). 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) $A_x{}^*r = E_{Ax,\ Z}r\ Z^*$ (A_x priced in FCU)

where $E_{Ax,\ Z} = ç_x\ æ/â_x > 0$ 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 $E_{Ax,\ Z}r = E_{Ax,\ Z} - 1$ is the corresponding elasticity when the export promotion is priced in foreign currencies. Thus, for example, if $ç_x = 1$, æ= 0.90, and $â_x = 0.10$, then $E_{Ax,\ Z} = 9.0$ and $E_{Ax,\ Z}r = 8.0$. 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 priced 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, 1992), which implies that approximately 50% of total promotion expenditures comes from the federal subsidy. Denoting this subsidy rate as

ò (. 0.5), the treasury cost may be defined as follows:

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

(10b) $\text{ÄG}r = (E_{Ax,\,Z} - 1)$ ò $A_x^o\ Z^*$ (A_x priced in FCU).

where ÄG 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 2. 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*.

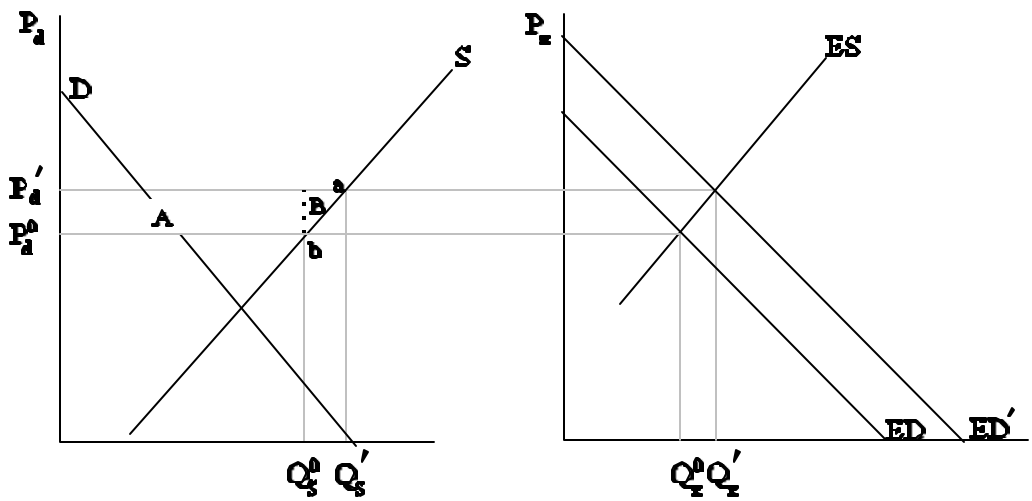

Figure 2. Effect of Export Promotion on Domestic Producer Surplus for Large Exporter

Panel A: Domestic Demand **Panel B: Export Market**

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 *EDr*. With higher foreign demand, US exports expand to Q_xr, placing upward pressure on the domestic price owing to the reduced quantity in that market. With the maintained hypothesis that the law of one price holds, the equilibrium price rises to P_dr, which encourages domestic producers to expand output to Q_sr. 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_dr*ab*P_d^o. Since this area equals the sum of a rectangle and a triangle, its formula can be obtained readily. Specifically, the change in domestic producer surplus (ÄPS_d) associated with a shift in the excess demand curve from *ED* to *ED*r is defined as follows:

(11) ÄPS_d= area of rectangle A + area of triangle B

$$= (P_d r - P_d^o)\, Q_s^o + ½\, (P_d r - P_d^o)(Q_s r - Q_s^o)$$

$$= (P_d r - P_d^o)\, [Q_s^o + ½\, (Q_s r - Q_s^o)]$$

$$= (P_d r - P_d^o)\, Q_s^o[1 + ½\, (Q_s r - Q_s^o)/Q_s^o]$$

$$= [(P_d r - P_d^o)/P_d^o]\, P_d^o\, Q_s^o[1 + ½\, (Q_s r - Q_s^o)/Q_s^o]$$

$$= P_d^*\, P_d^o\, Q_s^o\, (1 + ½\, Q_s^*),$$

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:

(12) ÄPS_d = $[P_d^*/A_x^*]\, A_x^*\, P_d^o\, Q_s^o\, (1 + ½\, [Q_s^*/A_x^*]A_x^*)$

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 $Q_s^*/A_x^* = å\ P_d^*/A_x^*$, the equation 12 can be expressed strictly in terms of the price elasticity as follows:

(13) $ÄPS_d = [P_d^*/A_x^*]\ A_x^*\ P_d^o\ Q_s^o\ (1 + ½\ å\ [P_d^*/A_x^*]A_x^*)$,

which, upon substitution of (7) yields:

(14) $ÄPS_d = E_{Pd,\ Ax}\ A_x^*\ P_d^o\ Q_s^o\ (1 + ½\ å\ E_{Pd,\ Ax}\ A_x^*)$.

From (14), price enhancement is a necessary condition for export promotion to benefit producers. i.e., the reduced-form elasticity $E_{Pd,\ Ax} = k_x\ â_x/(å + k_d\ ç_d + k_x\ ç_x\ ø)$ must be strictly positive. Equation (14) 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 (14) yields gain formulas in terms of observed changes in the exchange rate as follows:

(15a) $ÄPS_d = E_{Pd,\ Ax}\ E_{Ax,\ Z}\ Z^*\ P_d^o\ Q_s^o\ (1 + ½\ å\ E_{Pd,\ Ax}\ E_{Ax,\ Z}\ Z^*)$ (A_x priced in US dollars)

(15b) $ÄPS_d r = E_{Pd,\ Ax}\ E_{Ax,\ Z} r\ Z^*\ P_d^o\ Q_s^o\ (1 + ½\ å\ E_{Pd,\ Ax}\ E_{Ax,\ Z} r\ Z^*)$ (A_x priced in FCU).

Equation set (15) 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 ($ÄA_p$) may be defined as follows:

(16) $ÄA_p = (1 - ò)\ Ù\ A_x^o\ A_x^*$

where A_x^o is the initial expenditure on export promotion; i.e' the expenditure prior to the increase associated with ERLS, and $Ù = Þ/(Þ + å)$ is the producer share of the promotion tax where $Þ = k_d\ ç_d + k_x\ ç_x\ ø$ 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 (å = 0). The incidence parameter Ù 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:

(17a) $ÄA_p = (1 - ò)\ Ù\ A_x^o\ E_{Ax,\ Z}\ Z^*$ (A_x priced in US dollars)

(17b) $ÄA_p r = (1 - ò)\ Ù\ A_x^o\ E_{Ax,\ Z} r\ Z^*$ (A_x priced in FCU).

Combining (15) and (17), the *net* producer gain from the linked subsidy scheme may be computed as follows:

(18a) $ÄNPS_d = ÄPS_d - ÄA_p$

(18b) $ÄNPS_d r = ÄPS_d r - ÄA_p r$

A comparison of (10) and (18) 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:

(19a) $ÄSB = ÄNPS_d - ÄG$

(19b) $ÄSB r = ÄNPS_d r - ÄG r$.

Positive values for (19a) or (19b) would constitute evidence in favor of exchange rate linked subsidies for export promotion. Negative values, on the other hand, would indicate the opposite.

Simulation Results

Evaluation of effectiveness of exchange rate linked subsidies by using the given baseline parameter values and the theoretical models yield promising results. Results indicate that an increased expenditure on export promotion when the value of US dollars appreciates always increases US

producer surplus in the baseline parameter values. Based on the foregoing parameter values, the reduced form elasticities of both scenarios (export promotion expressed in US dollars and foreign currency units) are presented in Table 2. All reduced form elasticities have the expected signs. The result of reduced form elasticity shows that a 1% increase in exchange rate would optimally require 2.25% increase in export promotion expenditure. That is an increase of 2.25% of export promotion expenditure would be required to offset the negative effects of a 1% increase in the exchange rate on domestic farm prices when the export promotion is expressed in US dollars. Similarly, a 1.25 % increment in export promotion expenditure is needed if the promotion expenditure is priced in foreign currency units. A one percent increase in US dollars against foreign currency would result in a 0.45% reduction in US farm prices in the short run and a 0.52% reduction in US farm prices in the long run, when the promotion expressed in the domestic currency (USDollars), and 0.25% and 47% decreases in the short and long run, respectively, when the expenditure is expressed in the foreign currency.

Table 2 Reduced Form Elasticities

Elasticity	Short Run	Long Run
A_x in US dollars:		
$E_{Pd,Ax}$	0.20	0.042
$E_{Pd,Z}$	-0.45	-0.52
$E_{Ax,Z}$	2.25	12.42
A_x in Foreign currency units:		
$E_{Pd,Ax}'$	0.20	0.042
$E_{Pd,Z}'$	-0.25	-0.47
$E_{Ax,Z}'$	1.25	11.42

To observe the effect of a 1% increase in promotion expenditure on the farm prices, the farm price is increased when export promotion is expressed in both currencies (US dollars and FCU) in the export markets. The effect of a 1% increase in promotion expenditure on farm prices was 0.2 % and

0.042% in the short run and long run, respectively. If the consumer is more responsive to the promotion and less responsive to the price, then the promotion has more effect on the farm price. It can be observed that the long-run effect is smaller than the short-run effect, since supply elasticity is perfectly inelastic in the short run. The result demonstrates that the price effect is larger than the promotion effect. An increase in US dollars decreases domestic prices, if the export promotion is expressed in US currency. An increase in the export promotion has two effects on the export markets. First, it causes an export demand increase due to the ability to expand promotion expenditure. Further, it causes an export demand decrease due to the induced increase in export price.

Table 3 illustrates the results relating to changes in the value of the US dollar between 1996-2000. It is estimated that during 1996 - 2000, the value of the US dollar increased by 16%. In order to offset the negative effect of a 16% currency appreciation on domestic prices, short-run export promotions and long-run export promotions should be increased by 36% and 199%, respectively, when the promotion expenditure is expressed in US dollars. Export promotions should be increased by 20% and 183% in the short-run and long-run, respectively, when promotion expenditure is priced in foreign currency units. Increased export promotion costs both the government and producer in the short run. However, in the long run, it costs consumers as well. Since in the short run supply elasticity is perfectly inelastic, the consumer does not bear any incidence of the policy immediately.

Table 3 also illustrates how exchange rate linked subsidies affect the government, producers, and consumers. In the period 1996 - 2000, the government subsidy for cotton was approximately 50% of the total expenditures. With this level of subsidy, the increased in the government treasury is less in the short run than in the long run. The result also shows that the increased total expenditure is higher when it is expressed in dollars rather than in foreign currency. In the short run, the producer bears a

greater incidence, but in the long run, part of the policy is passed on to consumers. In the short run, the consumer does not have any incidence, but in the long run, consumers bear a higher incidence than the government and producers.

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 (%)	36	199	20	183
2. Increase in Total Expenditures (mil. $)	38	208	21	191
3. Government share (G), mil. $	19	104	11	96
4. Industry share (A_p), mil $	19	52	10	48
5. Consumer share (Item 2 - 3 - 4), mil. $	0	52	0	47

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

The net social benefit of an exchange rate linked policy on export promotion is illustrated in Table 4. The increase in promotion expenditure due to the increase in dollar value increases producer welfare. The gross gain to the domestic producer from the exchange rate linked subsidy scheme was positive. This result also suggests that welfare gains to farmers exceed the incremental treasury outlays. The net social welfare is $1,467 million in the short run and $1,592 million in the long run, when export promotion is expressed in US dollars. Similarly, gains are $815 millions in the short run and $1,478

millions in the long run, when expressed in foreign currency. This result provides evidence in favor of of using exchange-rate-linked subsidies for export promotion.

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

Item	Scenario 1		Scenario 2	
	SR	LR	SR	LR
1. Change in producer surplus, mil. $	1505	1747	836	1622
2. Increased industry outlays for promotion, mil. $	19	52	10	48
3. Net increase in producer surplus (item 1 - 2)	1486	1696	826	1574
4. Government outlays for promotion, mil $	19	104	11	96
5) Net social benefit (item 3-4)	1467	1592	815	1478

Based on percent increases in promotion expenditures

The resulting marginal returns from the exchange rate linked subsidies for cotton to US producers are illustrated in table 5. The finding of this study suggests that under exchange rate linked subsidies the return of last per dollar spent in cotton would be high.

Table 1.5. Marginal Return for Increased Cotton Promotion Expenditure of Producers in Exchange Rate Linked Subsidies Policy[a]

Length of Run	Scenario I	Scenario II
Short Run	88	82
Long Run	18	31

Policy Implications

Analysis of effectiveness of exchange rate linked subsidies in cotton clearly shows increased efficiency of cotton promotion expenditure and higher producer welfare under exchange rate linked subsidies. It gives an clear message to government and cotton farmers to adopt the policy of exchange rate linked subsidies to increase the efficiency of promotion expenditure and capture more economic benefits. Major parts of the cotton expenditure promotion arise from the mandatory check off program and use of exchange rate linked subsidies policy to pay the check off for cotton promotion would ensure best use of farmers' dollars.

Conclusions

In this analysis, an increase in export promotion related to an increase in the value of US currency would have a significant positive return to US producers. The net producer return per last dollar spent on export promotion expenditure tended to be higher in the short run than in long run. The export promotion expenditure associated with the foreign currency rather than US dollars did not have a substantive difference between the returns and the incremental cost. In the long run, a portion of the cost is shifted to consumers, since the supply elasticity is not perfectly inelastic. In the short run, no incidence was shifted to the consumers (law of incidence). The results of the study clearly support the idea of exchange rate linked subsidies on export promotion relative to the classical subsidy program for promotion programs. That is any export promotion programs should consider the change in the value of US dollars in order to increase the welfare of domestic producers and subsidy schemes. One caveat of this analysis was the assumption of an isolated cotton market, not its variety of products. It was also assumed that there would not be any retaliation from foreign governments.

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