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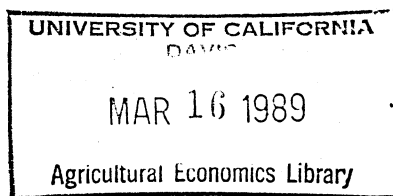
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ENHANCING U.S. EXPORTS:
A COMPARISON OF MARKETING LOANS AND EXPORT SUBSIDIES

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AAEA 1988

Commerce - Exports - U.S.

ENHANCING U.S. EXPORTS:
A COMPARISON OF MARKETING LOANS AND EXPORT SUBSIDIES

Abstract

Marketing loans and export subsidies have markedly different effects on commodity markets. While export subsidies are more cost effective in raising exports, marketing loans benefit both producers and domestic consumers and thus are more efficient from the standpoint of net social welfare. Furthermore, export subsidies destabilize domestic market prices.

ENHANCING U.S. EXPORTS:
A COMPARISON OF MARKETING LOANS AND EXPORT SUBSIDIES

The 1985 Food Security Act gave the Secretary of Agriculture several options in making U.S. crops more competitive in export markets (3)¹. These options include the authority to lower loan rates, issue generic certificates in lieu of cash, implement marketing loans, and subsidize exports. Lowering loan rates removes the price floor the loan rate sets for the commodity. Generic certificates free up stocks owned by the CCC or held under loan by producers. Marketing loans allow producers to repay nonrecourse loans at rates less than the loan rate. Export subsidy programs such as the Export Enhancement Program (EEP) allow importers to purchase U.S. commodities at prices less than the U.S. export price.

While these options make commodities more competitive in world markets, they have markedly different effects on domestic producers, consumers, and Government outlays. These effects have much bearing in choosing the optimal export enhancement policy.

In this paper we consider two export enhancement options: marketing loans and direct export subsidies. The marketing loan program considered would allow producers to repay their commodity loans at the lesser of the loan rate or the world price. The export subsidy program would pay exporters whatever subsidy was necessary to guarantee a minimum export level. We analyze the effects of such programs on the 1986/87 corn, wheat and soybean

¹Underscored numbers in parentheses refer to items listed in the References.

market.

The paper is organized as follows. In the first section, we present a model of a market for an annually produced storable commodity. The model draws on the recent storage literature (1,4,6,7,8,9,10). In the second section, we show how export subsidies affect markets differently than marketing loans using the 1986/87 soybean market as an example. The third section compares the effects of marketing loans and export subsidies on the 1986/87 crops of corn, wheat, and soybeans. In the final section we discuss policy recommendations.

The Market Model

Our market model for an annually produced, storable agricultural commodity comprises consumers, producers, private arbitrageurs, and the Government. Consumers base their decisions on current market price, producers on expected harvest price, and arbitrageurs on the difference between the current and expected future market prices. The Government manages a price support program to stabilize market price and provides marketing loans and export subsidies.

A typical year t begins with a given supply s_t^i held by private market participants and a given amount y_t^i held by the Government. Initial private supply s_t^i is composed of private carryover from the preceding year x_{t-1} and new production, which equals the acreage planted the preceding year a_{t-1} times a random per-acre yield, \bar{w}_t :

$$(1) \quad s_t^i = x_{t-1} + a_{t-1} \cdot \bar{w}_t.$$

Pipeline stocks are assumed constant from one year to the next and hence are not modeled explicitly. Initial Government stocks y_t^i are composed of Government carryout from the preceding year Y_{t-1} :

$$(2) \quad Y_t^i = Y_{t-1}.$$

The Government administers a price support program in which it attempts to contain market price between two specified prices through open market operations. At the support price p_S , the Government offers to buy and store unlimited quantities of the commodity. At the release price p_R , it offers to sell any quantities in its possession.

Government purchases and sales alter the distribution of total supply between Government and private hands. Denoting by g_t the net amount purchased by the Government on the open market in year t , final available private supply in year t is

$$(3) \quad s_t = s_t^i - g_t$$

and the final level of Government stocks in year t is

$$(4) \quad Y_t = Y_t^i + g_t.$$

The Government does not purchase stocks if the market price exceeds the support level and does not sell if the market price lies below the release level:

$$(5) \quad p_t > p_S \Rightarrow g_t \leq 0,$$

$$(6) \quad p_t < p_R \Rightarrow g_t \geq 0.$$

Since the Government is willing to acquire unlimited stocks at the support price, the market price never falls below this level:

$$(7) \quad p_t \geq p_s.$$

On the other hand, the Government can release only as much as it holds in the stockpile initially:

$$(8) \quad g_t \geq -y_t^i.$$

Thus, the market price can rise above the release level if the Government stockpile is depleted:

$$(9) \quad p_t > p_R \Rightarrow g_t = -y_t^i.$$

The Government has discretionary authority to implement a marketing loan program which would allow farmers producers to repay their loans at the lesser of the loan rate or the market price. The farm price, f_t , can be expressed:

$$(10) \quad f_t = \max\{p_t, p_s\}.$$

Arbitrageurs store an amount x_t of the final private supply s_t . Consumers purchase the remainder, $s_t - x_t$, at the market clearing price

$$(11) \quad p_t = \pi(s_t - x_t).$$

In addition, the Government has authority to offer importers a subsidized price, p_x , that would ensure exports equal or exceed a target export level:

$$(12) \quad p_x \leq p_t \Rightarrow EX_t \geq EX_{\text{target}}.$$

Competition among private, risk-neutral arbitrageurs eliminates expected speculative profit opportunities. This yields the familiar complementarity conditions:

$$(13) \quad \begin{aligned} p_t &\geq (1+r)^{-1} p_{t+1}^e - k_t; & x_t &\geq 0, \\ x_t [(1+r)^{-1} p_{t+1}^e - p_t - k_t] &= 0, \end{aligned}$$

where $(1+r)^{-1} p_{t+1}^e - k_t$, the discounted harvest price minus the

constant unit cost of storage, is the expected marginal revenue from storing the commodity. Arbitrageurs will not store if speculative losses are expected.

The acreage planted by producers depends on the price they expect for their product next year at harvest time:

$$(14) \quad a_t = a(f_{t+1}^e).$$

Arbitrageurs and producers form their price expectations rationally:

$$(15) \quad p_{t+1}^e = E_t p_{t+1}$$

$$(16) \quad f_{t+1}^e = E_t f_{t+1}$$

We make the following additional assumptions: The random yields \tilde{w}_t are independently and identically distributed. The discount factor is less than one and the unit storage cost k is positive. The inverse consumption demand function is strictly decreasing in quantity demanded and the acreage supply function is increasing in expected price. The demand and supply functions, the distribution of random yields, and all other market parameters are time-stationary.

Market equilibrium in period t is determined by the conditions prevailing at the beginning of the period. Thus, equilibrium market price p_t and farm price f_t are functions of initial private supply s_t^1 and initial government stocks y_t^1 :

$$(17) \quad p_t = \hat{p}(s_t^1, y_t^1)$$

$$(18) \quad f_t = f(s_t^1, y_t^1).$$

Although market equilibria cannot be expressed algebraically, it can be shown that the equilibrium price and

expected price functions exist, are unique, and can be approximated to an arbitrary degree of accuracy through the use of iterative computational methods (5). Because the functions are conditional on the underlying market parameters, we must reestimate them for each policy considered. While costly, the methods used to derive rational price expectations functions that fully reflect the new policy environment.

The Market and Welfare Effects of Export Enhancement

The analysis of marketing loans and export subsidies is based on the supply and demand estimates of the 1986/87 marketing year for soybeans. Demand elasticities of -0.45 and -0.50 were chosen for domestic and export demands, respectively. For the acreage supply equation, a price elasticity of 0.40 was selected. Yield was assumed to be lognormally distributed with a mean of 33 bushels per acre. We assumed a storage cost of 36 cents per bushel per year and a discount factor of .916.

For selected targeted export levels we derived approximations of the rational expected price functions given in (17) and (18). Having estimated the expected price functions, we performed Monte Carlo simulations to estimate the steady-state means and coefficients of variation for selected market variables. For the marketing loan simulations, a range of loan rates were selected that resulted in mean export levels approximately equal to the range of export subsidy programs considered.

Figures 1 and 2 show the effects export subsidies and

marketing loans have on farm and market prices. In the absence of marketing loans and export subsidies, mean market price is \$4.85. Mean soybean exports equal 765.6 million bushels. Export subsidies cause the mean export price to fall and exports to increase. As exports increase, fewer soybeans are available for domestic consumption and domestic prices rise. The rise in domestic prices encourages farmers to plant more, further increasing exports. As the target export minimum is raised, domestic and export prices diverge. For example, to achieve mean soybean exports of 852.4 million bushels, export subsidies would average \$1.50 per bushel.

Under a marketing loan program, exports are increased primarily through an increase in production. Raising loan rates under the marketing loan program encourages producers to produce and market more soybeans, thus resulting in lower market prices. (For a marketing loan, domestic prices are assumed equal to export prices.) As market prices fall, both domestic and export demands increase.

Marketing loans and export subsidies have markedly different effects on farm and market price variability (Figures 3 and 4). Export subsidies tend to stabilize export prices. If prices rise above a critical level, p_x , subsidies are provided to ensure a minimum target level is reached. This places an effective ceiling on export prices. As the targeted level is increased export price variability falls to zero (Figure 3). Conversely, domestic price is destabilized under export subsidies. In

Figure 1 Market Prices

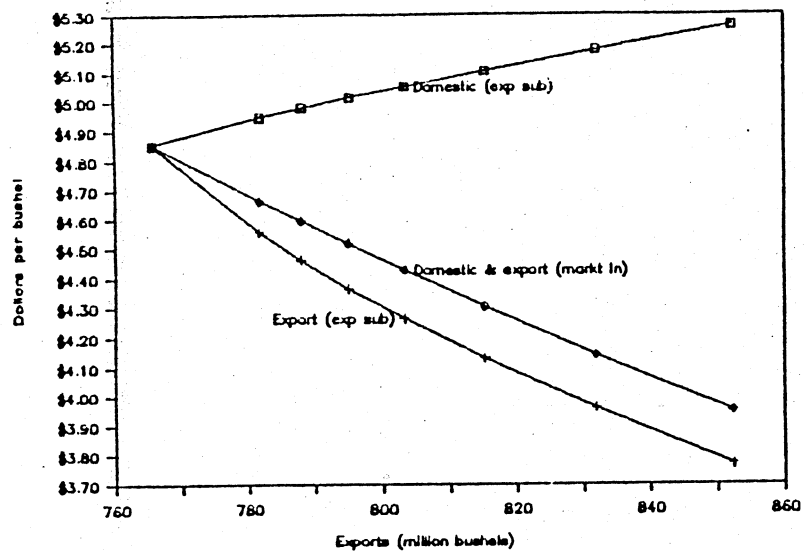


Figure 2 Farm Prices

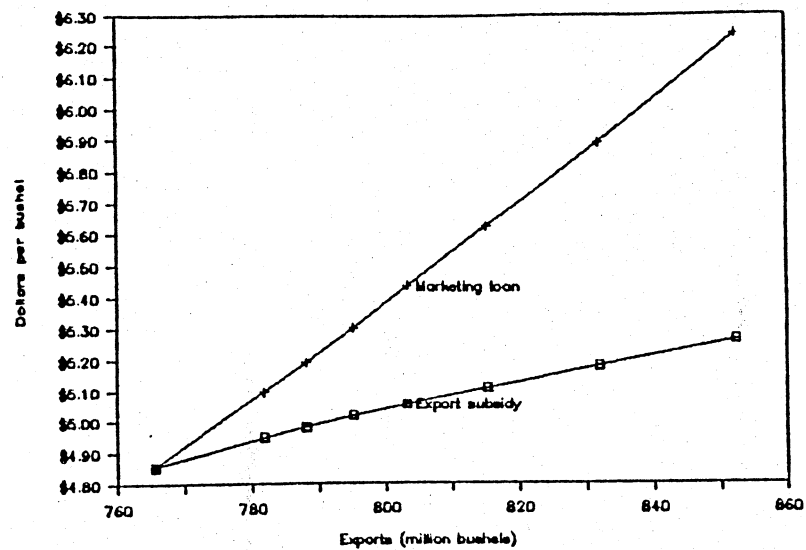


Figure 3 Market Price Variability

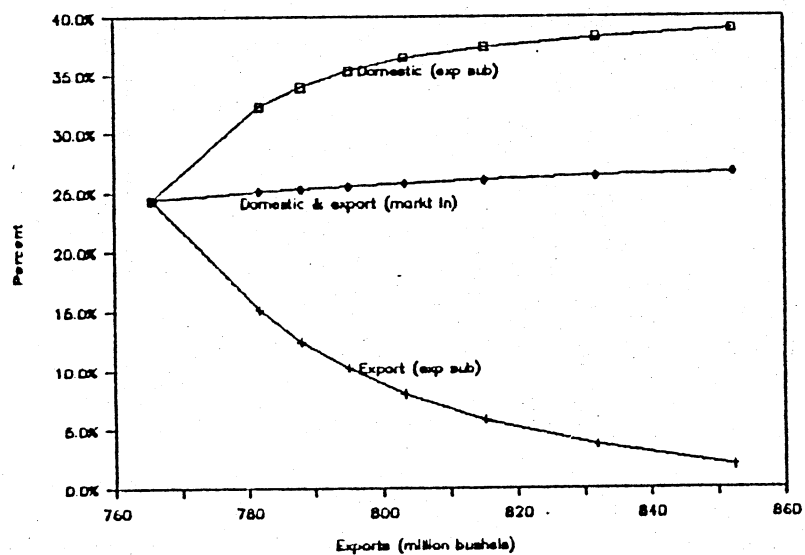
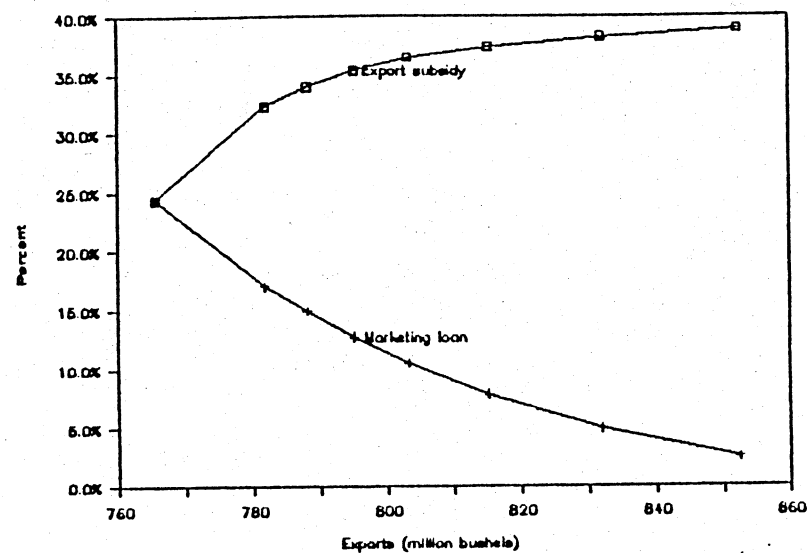


Figure 4 Farm Price Variability



effect, the domestic market acts as a buffer stock to stabilize the export market. Because the domestic price is destabilized, producers face more uncertain prices.

Under a marketing loan, increased loan rates moderate high prices only indirectly by encouraging greater planted acreage. As loan rates are increased, the probability of market prices exceeding the loan rate falls to zero. Farm price variability falls (Figure 4). However, domestic and export price variability is virtually unaffected since marketing loans do not truncate the distribution of market prices as do price supports (7).

Which of the programs is more cost effective in raising exports? Figure 5 shows the per-bushel subsidy required to raise exports to specified levels. For export subsidies, we measure the subsidy as the difference between the domestic market and export price. For marketing loans, the subsidy is measured as the difference between the farm price and the domestic price. Export subsidies are more cost effective in raising exports because they affect only the export market. Marketing loans cause domestic and export prices to fall. Secondly, marketing loans payments are made on all production while export subsidies apply only to those bushels exported. For example, to achieve a mean export level of 852.4 million bushels, marketing loan payments are over four times that of export subsidies (not shown).

Figures 6-8 present the welfare effects of marketing loans and export subsidies. Domestic consumer benefits were measured

Figure 5 Per-bushel Subsidy

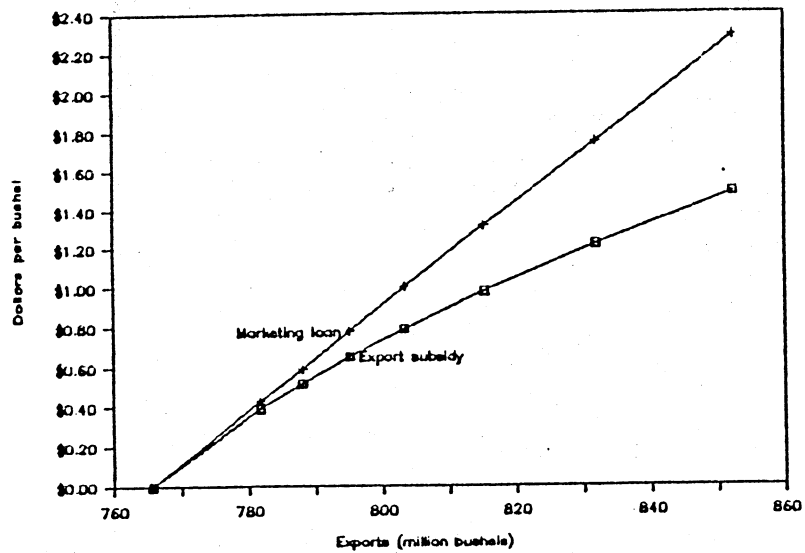


Figure 6 Producer Gains

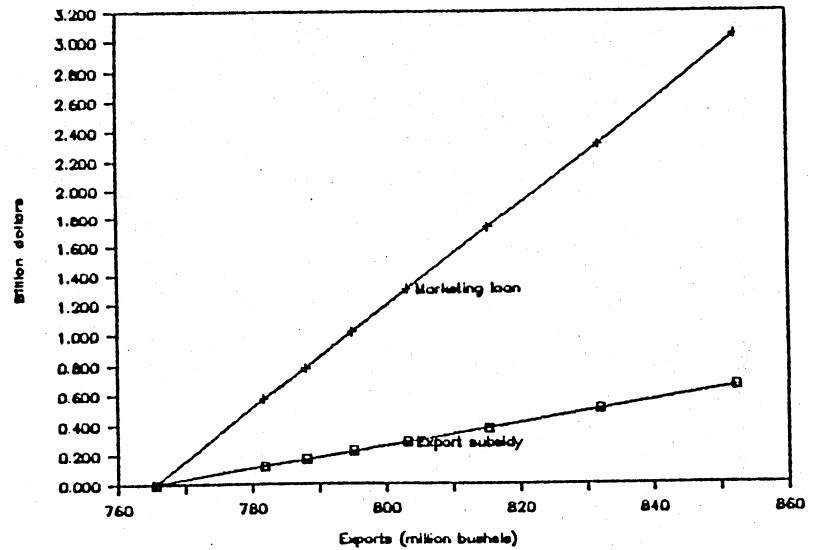


Figure 7 Domestic Consumer Gains

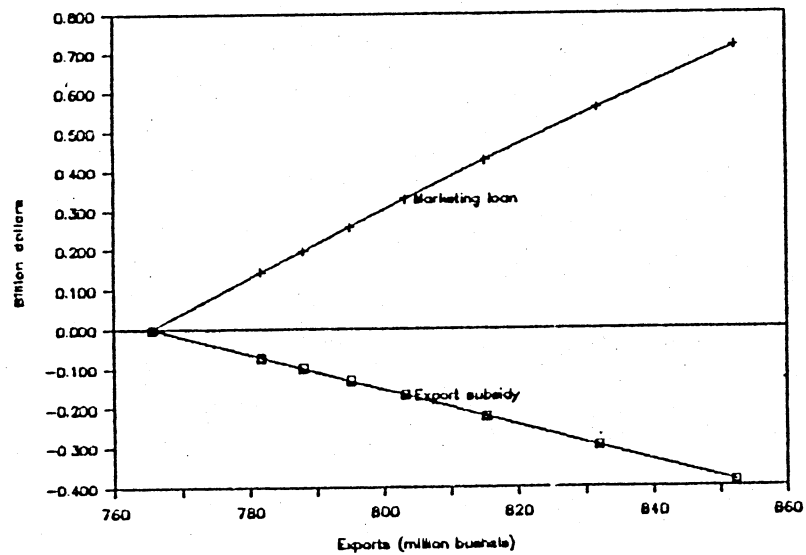
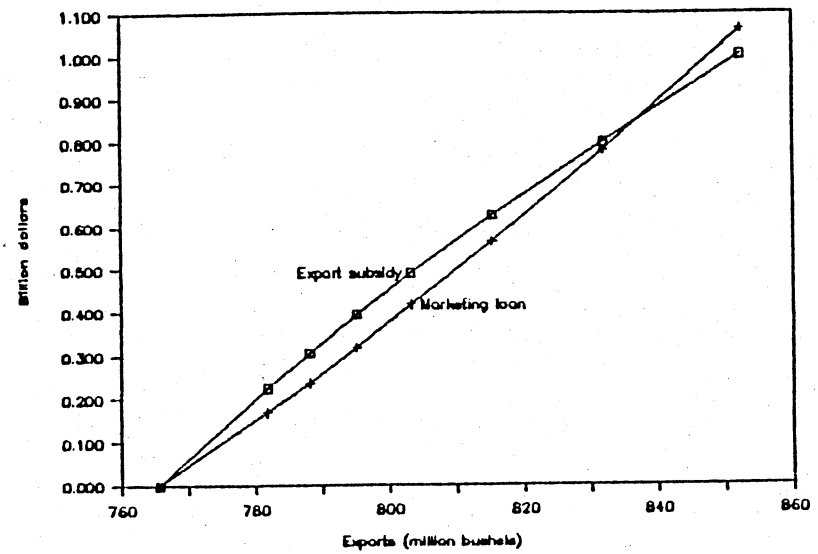


Figure 8 Domestic Welfare Loss



as the change in Marshallian consumer surplus and producer benefits as the change in producer quasi-rent. Domestic welfare loss is defined as Government outlays minus producer and domestic consumer benefits.

Producers benefit from both programs, but more so under marketing loans than export subsidies (Figure 6). To meet targeted export levels under marketing loans, production must rise to meet both the increased export and domestic demand. This necessitates high loan rates. Under export subsidies, exports are increased at the expense of domestic consumers (Figure 7). While export subsidies cause domestic prices to rise, the rise in farm price is less than under a marketing loan.

Lastly, domestic welfare loss is surprisingly similar under the two programs. Under export subsidies, losses to domestic consumers and taxpayers exceed the welfare gains to producers. For marketing loans, the gains to producers and domestic consumers are not enough to offset the large Government program costs.

The Effect on Corn, Wheat, and Soybean Market, 1986/87

To estimate the effect of marketing loans and export subsidies on corn, wheat and soybeans, 1986/87 parameters were selected. For comparison we assumed a baseline case of price supports (and deficiency payments for corn and wheat) with no export subsidies. All export subsidies and deficiency payments were assumed to be made in cash (no generic certificates). Alternative A was the same as the baseline case except export

Table 1 Effects of Export Subsidies and Marketing Loans on Selected Crops 1986-87 ^{1/}

Crop/Item	Price Supports	Export Subsidies	Marketing Loans
<u>Corn</u>			
Domestic Price (\$/bu)	1.84	1.85	1.20
Export Price (\$/bu)	1.84	1.16	1.20
Exports (mil bu)	1,358	1,713	1,713
Government Costs (mil \$)	--	44	671
Domestic Welfare Loss (mil \$)	--	1	-3,179
<u>Wheat</u>			
Domestic Price (\$/bu)	2.76	2.91	2.67
Export Price (\$/bu)	2.76	2.59	2.67
Exports (mil bu)	951	974	974
Government Costs (mil \$)	--	12	20
Domestic Welfare Loss (mil \$)	--	133	-96
<u>Soybeans</u>			
Domestic Price (\$/bu)	5.00	5.05	4.56
Export Price (\$/bu)	5.00	4.45	4.56
Exports (mil bu)	741	784	784
Government Costs (mil \$)	--	261	318
Domestic Welfare Loss (mil \$)	--	228	-235
<u>Total</u>			
Government Costs (mil \$)	--	317	1,009
Domestic Welfare Loss (mil \$)	--	362	-3,510

^{1/}Government costs and domestic welfare loss are expressed relative to price supports.

subsidies were offered. Alternative B was the same as the baseline except producers could repay their their loans at the market price.

Table 1 shows the effects of export subsidies and marketing loans on corn, wheat, and soybeans. It is estimated that the costs of a marketing loan program for these crops would increase program costs over the current program by over a billion dollars. Export subsidies were less expensive, but still cost over \$300 million more than the current program. Interestingly, marketing loans resulted in a net social gain to the domestic economy of over \$3.5 billion. This was largely due to the benefits accruing to domestic corn consumers.

Conclusions

Marketing loans and export subsidies have markedly different effects on commodity markets. While export subsidies are more cost effective in raising exports, marketing loans benefit both producers and domestic consumers and thus are more efficient from the standpoint of net social welfare. Furthermore, export subsidies destabilize domestic market prices.

This study provides an analytical and empirical framework through which a more thorough analysis of export enhancement programs may be undertaken. Future research includes modeling generic certificates and analyzing these policies in a spatial as well as intertemporal framework.

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