United States Agricultural Trade: Where Are the Gains?

Andrew Schmitz

This paper discusses the interface between the U.S. agricultural policy and the economic gains from exports. The theory shows that the net gains from trade after government subsidies are accounted for can be small or nonexistent. Some empirical evidence is discussed to support this claim. Policy options are presented to enhance gains from trade from U.S. exports.

Key words: export enhancement, monopoly power, slippage effect, trade gains.

U.S. agriculture in the 1950s and 1960s was relatively stable, but this situation changed in the 1970s and 1980s, where trade brought about a greater deal of upheaval for North American agriculture. In the 1970s export expansion by the United States was rapid, and the export sector provided the engine of growth for U.S. agriculture. The 1970s boom ended with the 1980s crash, where export demand collapsed and North America found itself in an excess capacity situation. The United States attempted to deal with this problem by lowering loan rates under the 1985 farm bill and by providing additional export subsidies through the Export Enhancement Program (EEP).

The purpose of this paper is to consider future designs of U.S. agricultural policy. Options are discussed in the context of gains from trade theory within which the economic costs and benefits that result from pursuing different policy paths are illustrated. Often, trade theory is totally neglected in discussions of U.S. policy. In addition, by linking trade to the domestic sectors, which include taxpayers and consumers, it is possible to highlight not only the economic costs associated with government transfers to producers but also the consumer stake in farm policy design. The consumer effects are often ignored in policy discussions.

The Closed Economy Case

Modeling the effects of agricultural policy originated in a closed economy setting where gains from trade discussions are absent. Such an example is the Brannon plan illustrated in figure 1. The supply curve is S, and the domestic demand schedule is D. The competitive equilibrium price is P, and quantity is Q. The Brannon plan proposed a target price of P_s. At output Q_s, the market clears at consumer price P_c. The net cost of this type of program is abd, derived as follows: (a) producer gain (P_sabP), (b) consumer gain ($PbdP_c$), and (c) government expenditures (P_sadP_c). The important point is that the net cost of the program is small relative to the size of government expenditure. This is because a large percentage of the government expenditure, which results in a deadweight loss, is a transfer to domestic producers and consumers.

Often there is a confusion over the meaning of government payments and producer subsidies. In this context, the producer subsidy is only P_sabP, which is less than the size of the government transfer. The transfer also represents a subsidy to consumers.

The Slippage Effect with Trade

As will now be discussed, the above framework takes on added dimensions once an open

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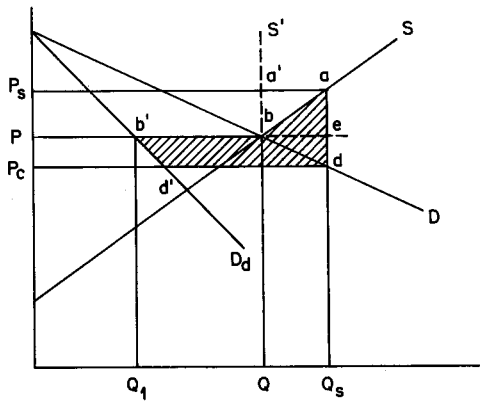

Figure 1. Target prices in a closed and open economy

economy is considered. Trade has to be modeled explicitly. Consider a Brannon-type proposal in an open economy framework. This can be illustrated also in figure 1 by having D represent total demand and D_d domestic demand. Without target prices, price is P and output is Q; domestic consumption is Q_1 and exports are QQ_1. If a target price P_s is introduced, output becomes Q_s. Now note that the net cost is no longer the triangle *abd,* but rather it is the entire crosshatched area. The net cost increases because part of the benefit from government expenditures goes to importers. The so-called "slippage" effect is $b'bdd'$, which is the gain to importers because of lower prices brought about through both higher producer prices and output as a result of producer price supports. In this model, the greater the industry's dependence on exports, the larger the net cost of producer price support programs. In other words, the slippage effect increases as the percentage of production which is exported increases.[1]

The above is the large country case which is used throughout the remainder of the paper. If the small country assumption were made, then the net welfare loss would only be *abe,* which is small relative to the slippage under the large country case. This is because most of the government transfers go to domestic producers since their increase in output does not lower product price. As a result, importers do not gain from domestic target prices.

There is an additional point which is the effect of price supports combined with acreage set-aside requirements. Suppose S' is the supply curve with acreage controls. Now resources are not misallocated since overproduction does not occur. The government cost of $P_s a'bP$ is merely a transfer to producers. However, the latter are worse off by $a'ab$ relative to a combined policy of target prices and uncontrolled supply, but this loss is much less than the net cost (the crosshatched area) without controls. This latter result occurs because, with a combination of target prices and output controls, importers are no longer being subsidized.

In terms of figure 1, the more elastic the U.S. supply curve and the more inelastic total demand, the smaller the gain to domestic producers relative to importers from target prices. Also, as exports become a larger percentage of production, the relative gains favor importers. It would be easy to reconstruct figure 1 such that area $P_s abP$ would be less than area $b'badd'$.

Government Expenditures and Gains from Trade

The above model does not explicitly deal with the trade-offs between government expenditures and the gains from trade resulting from the exportation of the good which is being subsidized. A model was developed by Schmitz, Sigurdson, and Doering to illustrate that the cost of government payments to agriculture may well offset the gains from trade, hence greatly reducing or eliminating any net gains from trade using, as a norm, the standard free-trade arguments. This model is presented in figure 2 and then extended to tie together explicitly the domestic and trading sectors.

In figure 2 the excess supply curve for the export good is ES, while ED is the corresponding free-trade excess demand curve. Exports are Q at a price P. In this context, Pac is the gains from trade for exporters (Letiche, Chambers, and Schmitz). Suppose now that, because of tariff and nontariff barriers (e.g., quotas and health regulations), the excess demand curve shifts to ED', and the exporter responds by a subsidy which shifts the excess supply to ES'. Exports would not change, but now the im-

[1] In this formulation, only one exporter is assumed. As a result, the areas illustrated in figure 1 accurately reflect the gain to importers from target prices. If more than one exporter is assumed, then what the area under the net export demand function implies depends on how this schedule is constructed. Under certain specifications, importers would actually gain more than the area shown implies because of the loss incurred by other exporters from a target price policy in one of the exporting countries.

porter would pay a price P_1 which is lower than in the free-trade case.[2] Producers of the exportable are unaffected but, to achieve this result, government payments of $PabP_1$ are needed. This area equals the gains from trade area and, hence, the gains from trade are entirely offset by government payments to producers.[3]

Two additional cases are illustrated in figure 2 to show that the gains from trade can be either larger or smaller than the size of the subsidy. For a given subsidy, if the excess demand shifted only to ED^0, production would exceed the free-trade level of output from QQ_0. In this case the gains from trade exceed government payments. If, on the other hand, the excess demand schedule shifts to ED_1, then output Q_1 is less than the free-trade output. In this case the gains from trade are less than the government cost, implying that a no-trade position is preferred to trade in the presence of distortions.

The gains-from-trade framework is now extended to deal with the effects of policy options highlighting export subsidies and their apparent costs. In figure 3 the domestic sector, along with the trade sector, is modeled explicitly. The U.S. supply is S, and domestic demand is D_d (for simplicity, the domestic demand is assumed to be price inelastic). The U.S. excess supply is ES_{us}, corresponding to a free-trade excess demand curve of ED. The free-trade price is P, and exports are Q; domestic production is Q_1 while domestic consumption is Q_2.

The existence of world nontariff and tariff barriers shifts the excess demand curve inward to ED' and, because of domestic agricultural policies, it becomes more price inelastic. Without government intervention by the United States, there is a gains from trade loss measured by the crosshatched area. However, producers lose $PefP_1$, which is greater than the gains from trade area, but consumers gain PP_1ga through lower prices.

Consider now the effects of several policy options where governments attempt to lessen the hurt to U.S. producers due to trade barriers which curtail exports.

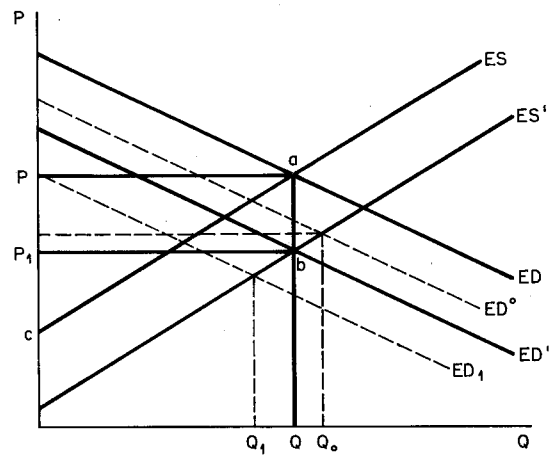

Figure 2. Trade-offs between gains from trade and subsidies

Case I. Target Price and No Controls

Consider the case where the United States sets a producer price support level at the former free-trade price P and output is maintained at the original free-trade position. This clearly results in a misallocation of resources since output increased beyond Q^*. However, producer welfare is restored to the free-trade level. Note that, for the market to clear, price has to fall to P_c. The domestic consumers gain by gP_1P_cb. However, government costs now total PP_che. The net cost is the entire area $ehbgf$. In this case the net cost is roughly half of the total government expenditure, a much different result from the closed economy case in figure 1. The outcome is a function of the position of ED (the larger the share of exports in production, the larger the costs and the slope of the excess demand curve).

Why the large cost? This is due to the slippage effect discussed earlier. Importers now pay a much lower price than in either the free-trade case or the trade distorting case without U.S. government response. The importers gain $P_1e'f'P_c$ as a result of U.S. government response to trade barriers erected by importers. In essence, there is a transfer from the U.S. Treasury to importers. Such a policy response by the United States in response to trade barriers is extremely beneficial to importers.

Case II. Target Price and Controls

Consider the model in figure 3 where a target price of P is set (given the existence of ED')

[2] To derive the result, one can assume that either the domestic demand curve in the exporting nation is price inelastic or the internal price is held at the free-trade level P.

[3] In the original Schmitz, Sigurdson, and Doering paper, the case of price supports was considered. In this case smaller distortions are needed to arrive at the no-gains-from-trade result.

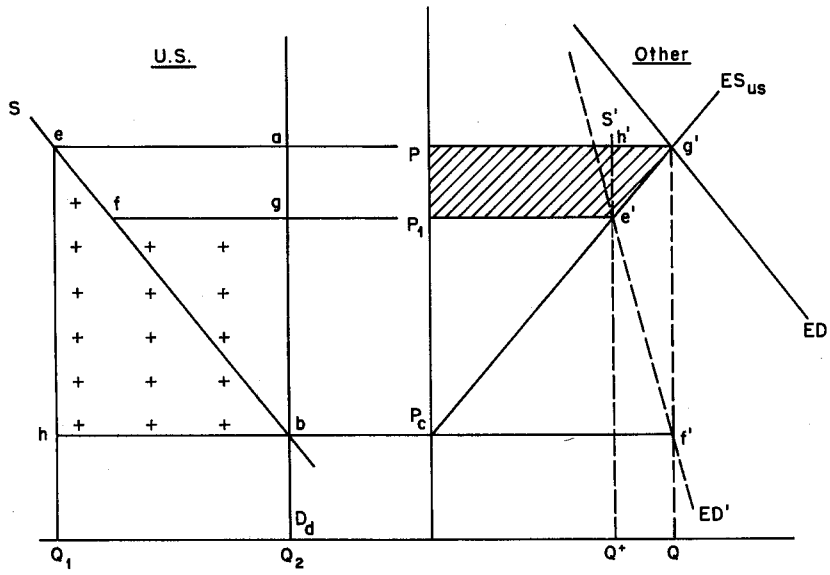

Figure 3. Policy options in an open economy

and coupled with acreage diversion such that the excess supply curve becomes S'. In this case overproduction does not occur (Babcock, Carter, and Schmitz). The government transfers to producers $Ph'e'P_1$. Relative to free trade, the producers now only lose $h'e'g'$. However, note now the effect on consumers. Prices in both countries remain at P_1. Hence, unlike above, consumers domestically and abroad do not gain from producer price supports.

In this case there is no net cost as a result of government policy since there is a one-to-one money transfer from the government to producers. This does not result in a misallocation of resources as measured in the traditional sense. However, note that there is still an economic cost involved. However, the cost to the United States is due to trade distortions which shifted ED to ED'. In the model the producers share part of this loss along with taxpayers. The gains to consumers through the consumption effect occurred because of the trade distortions, not because of policy response to these distortions.

Case III. A Consumption Food Tax

A great deal of discussion by Runge and Halbach and others has been on the use of a food tax to support farm incomes. Consider one aspect of this argument in figure 3. Case I was where producer price was supported at P with no acreage controls. The government cost was $PehP_c$. If domestic consumers were taxed through raising the price of food (i.e., a tax of gP_1P_cb), government expenditures would be reduced to P_1gbheP. However, with inelastic demand, there is no net change in the welfare cost of farm programs since there is a one-to-one transfer assumed between losses in consumer welfare through higher prices and gains from lower taxes.

The interesting point in this discussion is that, for the United States to gain from a food tax, it also has to tax importers. A tax only in the United States still leaves foreign price at P_c. This is clearly an export subsidy. In fact, relative to the free-trade position, the export subsidy is $(PP_c)(Q)$. What is needed also is an export tax; however, as pointed out in Case II, there is an easier solution: All of this can be accomplished through the use of price supports and production controls (Carter, Gallini, and Schmitz).

The previous models highlighted the relationship between domestic food prices and alternative government policies. The current policy (i.e., the 1985 farm bill) achieves low food prices but at large treasury costs. A tax on food clearly raises food prices, reduces treasury costs, and adds to inflation. In addition, it taxes the poor because, with deficiency payments, the tax revenue comes from people who have income above minimum wages. Also,

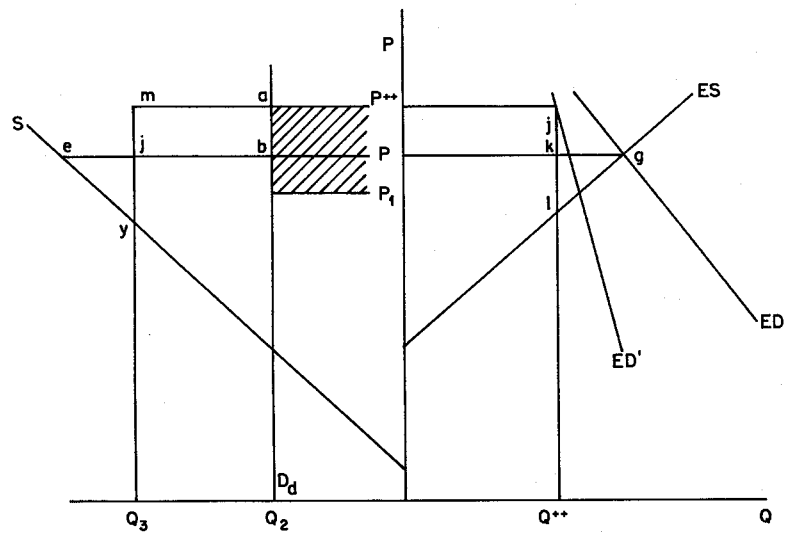

Figure 4. Producer monopoly

even with a food tax, as pointed out, there still can remain both a sizable treasury cost and a net welfare cost from the use of EEP and the like. As illustrated, a policy is needed that taxes importers while at the same time it holds food prices down in the United States. Currently, food prices are held low by providing cheap grain to both domestic users and importers.

In early 1988 fears of inflation once again echoed through the United States and, interestingly, the rising prices of agricultural products due to the 1988 drought were mentioned as areas of inflation concerns. This was especially true for soybeans, as prices in May and June skyrocketed. Food security, price stability, and inflation weigh heavily in policy formulation. Thus, to the extent that rising food prices add to inflation, the costs of the U.S. farm policy are not as great as modeled in the theoretical section. There may be some tradeoff between low and stable food prices and the higher taxes needed for financing deficiency payments in order to provide for these objectives.

Case IV. Producer Monopoly

Consider figure 4 where both production controls and targets prices are once again in place. A target price of P^{**} is coupled with output restrictions which correspond to output Q_3 and Q^{**} of exports. This policy acts as a true food tax on both domestic and foreign consumers since prices are above the free-trade level P. U.S. producers gain relative to free trade by $P^{**}mjP - ejy$. In the export market, there is a net gain from exports of $P^{**}jkP - klg$. Thus, the net gain to producers essentially comes from price rises in all markets. The net gain in the export market goes to U.S. producers along with the gain in the domestic market from higher prices. Note in this model there are no government transfers to producers; the policy response to trade distortions is to raise prices where both domestic and foreign consumers pay higher prices. This model generally runs counter to real-world situations where the tendency is to lower prices in reaction to distortions.

Note that producers can gain relative to free trade even given that they are pricing on the trade distorted demand curve ED'. Also, relative to the position where price was P_1 due to trade distortions, U.S. consumers lose by the crosshatched area because of tight production controls. However, it is worth noting that P^{**} may be difficult to achieve unless the domestic country's share in the world market is large. If not, other exporters would also have to cooperate in output reduction strategies. Otherwise, there is a free-rider problem.

In the above, an alternative would be to impose an export tax. An example of a specific tax would be one where the U.S. price remained at P, and the export price at P^{**} where $P^{**}abP$ would be made up by government

transfers from taxes. Unfortunately, however, explicit export taxes are unconstitutional in the United States.

The trade-offs between producers and consumers under producer versus government controls have been discussed in detail by Carter, Gallini, and Schmitz. The general conclusion is that, while the distributional effects in the exporting country depend on the type of arrangement (for example, whether in the interest of producers or society generally), importers are taxed rather than subsidized through exporter cooperation arrangements.

Example: The Wheat Economy

The various policy options outlined above are now discussed with reference to the world wheat economy, where the United States is a major player. Extensions have to be made to the models to deal with the complex reality. The United States is both a major producer and exporter. It is the largest exporter, followed by Canada, the European Community (EC), Australia, and Argentina. Major wheat buyers are Japan, the Soviet Union, and China.

The 1985 farm bill was largely a reaction to EC subsidies which, in part and over time, resulted in the EC becoming a major exporter where at one time the EC was a major importer. In the 1985 farm bill, the loan rate was lowered. For producers to qualify for high target prices, tighter acreage set-asides were required. Prior to the 1985 farm bill, the United States was holding the largest absolute amount of stocks of any producer, and its wheat export market share had dropped to below 35%.

In lowering the loan rate, there was an immediate transfer of income to the major importers. The U.S. export prices dropped, and competitors such as Canada and the EC responded by lowering export prices to meet the competition. In addition, in Canada, for example, there was policy response by the federal government in the form of deficiency payments to producers to offset partially the drop in price due to the lower loan rate. In the EC the government made up the difference between export and internal prices through increased restitution payments. All of this resulted in lower cost imports for regions such as the Soviet Union and China. The same was true for Japan. For Japan, because of its internal pricing arrangement, the biggest gainer was the Japanese Food Agency, which buys wheat at the world price for resale internally at a much higher price. In total, the major grain importers, as the earlier models show, benefit from lower external prices and, as a result, are not likely to lower tariff and nontariff barriers in response to U.S. farm policy.[4]

In addition to the drop in the loan rate, in the 1985 farm bill the EEP was introduced, whereby the United States could sell grain to certain importers even at prices below the loan rate. Although Japan, for example, does not qualify, importers such as the Soviet Union do. Major exporters responded to the EEP by also meeting the increased competition through lower prices. As the theory suggests, this resulted in an increase in the treasury costs and an increase in the net cost of U.S. farm programs.

The above data can be discussed with reference to figure 5. In free-trade equilibrium at price P_1, the EC was a major importer along with Japan and others. This is represented by the excess demand curve ED; the excess supply curve is ES, consisting of the United States, Canada, Australia, and Argentina. With increased protectionism by the EC and others (e.g., price support of P_s for the EC), the excess demand curve shifted to ED'. Correspondingly, the EC became a net wheat exporter as supply shifted to S'. However, at a world price P, the EC has to use an export subsidy in the form of restitution payments of the crosshatched area. It was essentially the growth in production in the EC and its size of export subsidy to which the United States responded in the 1985 farm bill.

Consider now the effects, for example, of the EEP. This and other programs are shown in table 1. An EEP-type program causes (*a*) prices to drop in Canada, which hurt producers; (*b*) prices to drop in the EC, which imposes added costs to the treasury through increased restitution payments; (*c*) prices to remain unchanged in Japan; and (*d*) import prices to fall, yielding gains to China and the Soviet Union.

The drop in the U.S. loan rate has the same

[4] Often, arguments are presented that cheap food imports for less developed countries stifle economic development because of low prices for internal producers. Such arguments are questionable, however, on the grounds that internal prices can be raised by collecting a border tax on food imports and using the tax revenue for development purposes. These countries could essentially set up a Japanese-type food agency to collect the added revenue from the importation of food at lower world prices. Internal prices do not have to be affected by the level of external prices.

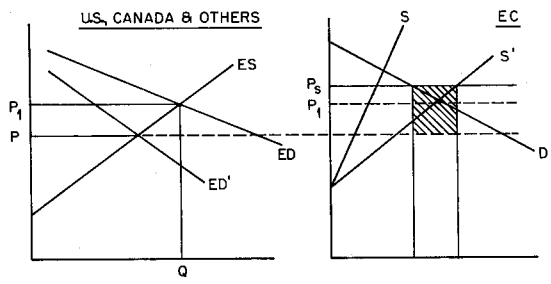

Figure 5. The United States and EC as competitors

directional effect for Canada and the EC but is beneficial to Japan along with the other importers listed.

Quantity restrictions can have a positive effect on both Canada and the EC. For example, for the EC such action would result in a drop in restitution payments. They have a detrimental effect on Japan and other importers because they now have to pay higher prices.

Free trade has a positive price effect for Canada but a negative effect for the EC and others (Carter, McCalla, and Schmitz). Thus, it is clear why the EC does not support free trade under the General Agreement on Tariffs and Trade (GATT).

As the earlier models and table 1 show, while EEP and the like cause harmful effects to the EC, Canada, Australia, etc., they are beneficial to importers. It is apparent from the exporters' perspective (excluding the EC) that free trade is optimal in aggregate (Schmitz 1988). Output management, however, is preferred by the EC to free trade; and, as is shown earlier, producers in Canada, the United States, etc., may also prefer this arrangement (especially if freer trade is impossible).[5] Under free trade, grain prices to EC producers would fall. Under acreage set-asides, the price need not fall. As a result, the loss to the EC from an acreage set-aside program would generally be less than a free-trade outcome where both price and production fall.

Realizing Increased Gains from Trade

The previous discussion has highlighted the key point: The importance of international agricultural trade to a nation depends on the gains from trade that are derived. These can be large, small, or even nonexistent, depending on the size of government transfers required to carry out both production and trading activities. The purpose here is not to debate the empirical evidence on this subject. Unfortunately, little work on this topic has been done. However, on the wheat trade, the works by Schmitz, Sigurdson, and Doering; and Babcock, Carter, and Schmitz suggest that the trade gains net of government transfers can be small, indeed, for the United States. The concluding comments suggest how these gains can be increased.

Table 1. Border Price Effects from Policy Changes by Country

Type of Policy	Region: Canada	European Community	Japan	China and Soviet Union
Export enhancement program (United States)	−	−	0	−
Loan rate (United States)	−	−	−	−
Quantity restrictions (all countries)	+	+	+	+
Free trade	+	−	−	+

The models suggest one option: Europe, Canada, and others could join forces and curtail production as has been attempted by the United States essentially since 1983. What has been the reality? The major grain exporting countries have not explicitly done so. The opposite seems to be happening. In May 1988 (partly in response to noncooperation by others), the United States announced that in 1989 it would reduce the wheat set-aside from 25% to 10% for farmers who wished to participate in the farm program. (The irony is that, in an inelastic price market, what is not needed is more incentives for production unless, of course, droughts comparable to 1988 reappear in short-term intervals.) This will have to be paid for by taxpayers through deficiency payments, where the gainers are the importers. The EEP is used to encourage export sales because of excess stocks, while relaxed set-aside requirements are used to encourage production, which in turn will require more EEP money to sell the added production. These programs reinforce each other. They appear to

[5] If one expands the model by Bredahl, Schmitz, and Hillman on import-export cooperation, it becomes apparent that, when governments negotiate for the general good, a free-trade solution would be arrived at. Clearly, if producer interests dominate, an import-export producer cooperation arrangement could be achieved but at the expense of consumers.

be aimed at market share criteria and costly competition among exporters rather than on economic criteria based on costs and benefits including gains from trade criteria.

There are many dimensions at work that shape U.S. farm policy which make free trade or export cooperation difficult. Consider the role played by input suppliers, grain dealers, handlers, and the like. The so-called agribusiness sector supports the planting of large acreages and promotes large export sales accompanied by price instability and subsidies. For example, the decrease in set-aside requirements mentioned earlier increases the demand for inputs, while the use of EEP and the reduction in the loan rate increases the volume of grain handled by multinationals. Thus, the U.S. policy of high target prices, low loan rates, and minimal set-aside requirements may not be in the general interest of the United States even when the food price dimension is taken into account, but it serves the interests of agriculture broadly defined. This will be especially true if U.S. policy continues with high target prices relative to export prices and limited production controls. Agricultural production will become truly uncoupled from consumption. The net cost to many, including the United States, will increase. The transfers from governments to agriculture will also result in resource misallocation. In this case the volume of trade may well be large, but the gains from trade will be offset by the cost to the treasury to keep agriculture and all the vested interests afloat (Schmitz 1983; Sarris and Schmitz).

The theoretical models suggest export cooperation, not costly competition where it is accompanied by huge treasury costs—a model of competition which is vastly different from *laissez faire* textbook analysis. Of course, the problem remains of how to cooperate effectively because of such issues as the free-rider problem. Questions have arisen in the past such as why should the United States cut production while other major exporters increase output? On the other hand, there are those who contend that U.S. policy, even with its acreage set-aside provisions, has not caused a reduction in output.

Essentially, GATT is a forum for export cooperation through multilateral reductions of both tariff and nontariff barriers. However, as these and various other models show (e.g., Schmitz 1988), the potential payoff from GATT may be limited not because the gains would be insignificant but because special interest groups may not want free trade to happen. The alternative solution to free trade is clearly production controls by all including the EC. However, if the EC refuses any form of cooperation, then the United States (along with Canada and others) has to assess the payoffs from cooperation where the EC is given free-rider status. The 1988 North American drought can also be analyzed in this context.

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