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THE ECONOMICS OF  
GRAIN PRODUCER CARTELS

by

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## Executive Summary

The objective of this study is to measure economic payoffs from a grain cartel. Two basic approaches to extract economic rents are considered: (i) Mandatory supply controls to restrict production and raise grain price, and (2) export price discrimination using export taxes or subsidies.

The economic impacts of different producer cartel scenarios were estimated using a long-term, nine-region world trade simulation model incorporating the assumptions of neoclassical trade theory. The SWOPSIM program was used to write the model equations. Economic Research Service trade data for 1989 were used to initialize the model. Results reflect long-run changes from 1989 conditions and are at 1989 general price levels.

The model simultaneously estimated outcomes in markets for nine commodities: beef, pork, poultry meat, wheat, corn, coarse grains (other than corn), oilseeds (soybeans, rapeseed, and sunflower seed), oilmeal, and sugar. Cross-effects among commodities and input-output relationships between field crop and livestock production are accounted for by substitution and complementary coefficients in behavioral equations. Countries and groups of countries included in the model are Australia, Canada, the European Community (EC), European Free Trade Association (EFTA), the United States (US), Japan, and the rest of the world (ROW).

The simulation results report the consequences of restricting only US grain production (wheat, corn, and other coarse grains) from 5 to 20% below the 1989 production level. Grain supply restrictions were presumed to be mandatory, hence taxpayers incurred no additional outlays over those in 1989. World price increases were modest for wheat, but greater for corn and other coarse grains in part because of differences in market share among grains. US consumers of grain and grain products buy less at higher prices and are worse off, as is the country as a whole. Consumer surplus falls nearly \$2 billion when grain supply is reduced 20%.

Higher grain prices and lower costs more than compensate producers for less output, despite lower receipts attending an elastic demand. According to simulation results, cartel-like action restricting US supplies by 15% would most benefit American grain producers.

Consumers in the US and the world lose more than producers gain from cartel action restricting production and lowering US exports of grain. Other competing exporters enjoy net benefits from higher world prices. However, because the rest of the world is a net consumer, net economic welfare of other countries is reduced. Also, overall world income is reduced by a cartel.

As additional global production comes under the control of the cartel, more producer surplus can be extracted from consumers. Results were simulated for grain producers in four developed countries or regions (Australia, Canada, EC, and US) forming a cartel and simultaneously restricting production from 5 to 20%. As expected, world prices rise more with the comprehensive grain cartel than with the US acting alone. The more comprehensive international cartel helps producers extract greater rents from consumers.

It is notable that none of the supply restriction schemes would benefit the US as a nation. Rest-of-the-world and total world welfare losses mount when supply restrictions are tightened from 5 to 20% of market output. When the US alone tightly restricts grain production, it loses more than ROW. When the US, Canada, Australia, and the EC jointly restrict production, ROW incurs greater welfare losses than the US.

Turning next to support subsidies without supply controls, we estimated that net benefits to producers are greatest with export subsidies, expanding exports by 30% and with an attendant increase in domestic prices. The cartel can subsidize exports with collections from producers, leaving its members with some net gain. Results are even more favorable for producers if taxpayers pay the export subsidy as under the current Export Enhancement Program (EEP). However, because national welfare is reduced, a government truly representative of the nation's economic welfare would not rationally choose to subsidize exports.

Overall US welfare is modestly increased when domestic price is lowered with an export tariff and exports decline. In contrast, the rest of the world as a net importer benefits from plans increasing US exports and lowering the world price of grains. But, any form of market distortion lowers overall global welfare.

Total numbers are smaller but patterns are similar when only US corn producers attempt the optimal subsidy or tariff strategy. A US corn-only producer cartel would choose an export subsidy because the producers' benefits are positive even if they pay the export subsidy.

Outcomes were simulated in which percentage increases in US exports were matched by equal percentage increases in exports of other major competitors (Canada, the European Community, and Australia). Retaliation causes the average cost of subsidizing US exports to nearly double to achieve any given percentage increase in exports. Retaliation by competing exporters removes much of the attractiveness of US export subsidies. If producers pay for export subsidies, their net gains are sharply eroded with retaliation. Welfare losses to the US as a nation and to the world enlarge with retaliation to subsidies. Thus the US and the world have a stake in successful multilateral negotiation reducing subsidies and attendant retaliation.

It is conceivable that an effort by producers to form a cartel would so alienate the public that Congress would terminate current commodity programs, including export assistance on grain. Net benefits to producers from cartel activity never approached the \$7 billion in rents they collect from current programs. It seems unlikely that a producer group would risk gains of this size for the prospect of cartel rents a sixth the size or less from international markets.

Gains to US producers are less for a wheat cartel than for either the feed grain cartel or for the wheat-feed grain cartel included herein. The unfavorable outcomes originate from the export demand for US wheat made highly elastic by opportunities to substitute feed grain for wheat in production and consumption especially in the long run. That is, a high wheat price and controlled production of wheat encourages importers to produce wheat, cut back feed grain production, and import low-cost feed grains.

# The Economics of Grain Producer Cartels

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The nation and agriculture producers continue to search for means to capture more of the potential gains from trade. Various farm group periodically call for some form of grain cartel featuring supply control, subsidies, or tariffs to gain from trade.

The objective of this study is to measure economic payoffs from a grain cartel. This study differs from previous studies by including more recent data from a larger number of countries and commodities in an international trade model using long-term behavioral coefficients.

By emphasizing impacts on consumers and the public at large as well as producers, this study presents a more comprehensive but less attractive outcome of a cartel compared to many previous studies. Market distortions reducing economic welfare of consumers and the public at large diminish the attractiveness of a cartel, even with the assumptions made here of a perfectly organized cartel operated by perfectly disciplined members at no cost for administration (see Donsimoni *et al.*; Osborne).

## Background

Under a 1933 wheat agreement, the United States, Australia, Canada, and Argentina attempted a cartel arrangement that committed member countries to cut acreage 15% to boost wheat prices (see Tweeten 1989, p. 325). Only Australia honored the agreement. After Argentina exceeded its export quota, the agreement collapsed in 1934.

Subsequent international wheat agreements made modest attempts to stabilize prices but a more serious effort was mounted with the International Grains Arrangement (IGA) -- a product of the Kennedy Round of multilateral trade negotiations (Tweeten 1992, p. 214). Wheat exporting countries agreed not to sell below a world price of \$1.73 per bushel of wheat, Gulf port basis. The arrangement seemed feasible when it was negotiated during the 1966 wheat shortage. Only the United States attempted to honor the agreement in the subsequent excess supply situation. It held wheat off the export market for six months. Other countries in the IGA continued to sell and the arrangement collapsed in 1967. Since that year, no serious attempt has been made to revive its supply management and price features. However, the National Farmers Union, the National Farmers Organization, and American Agriculture Movement continue to press for supply controls to raise grain prices in domestic and international markets (see Ray and Plaxico).

## Scope and Framework

Two basic approaches to extract economic rents are considered: (1) Mandatory supply controls to restrict production and raise grain price, and (2) export price discrimination using export taxes or subsidies.

Figure 1 shows a world market where a producer cartel of all exporting countries controls the world supply ES. To maximize economic rent with one price, the cartel facing domestic plus foreign demand (ED) restricts supplies to Q, where supply (ES) equals marginal revenue (MR). The world price

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$P_w$  is the same in domestic and export markets. This option could be operationalized with mandatory supply control as used for American wheat prior to 1964.

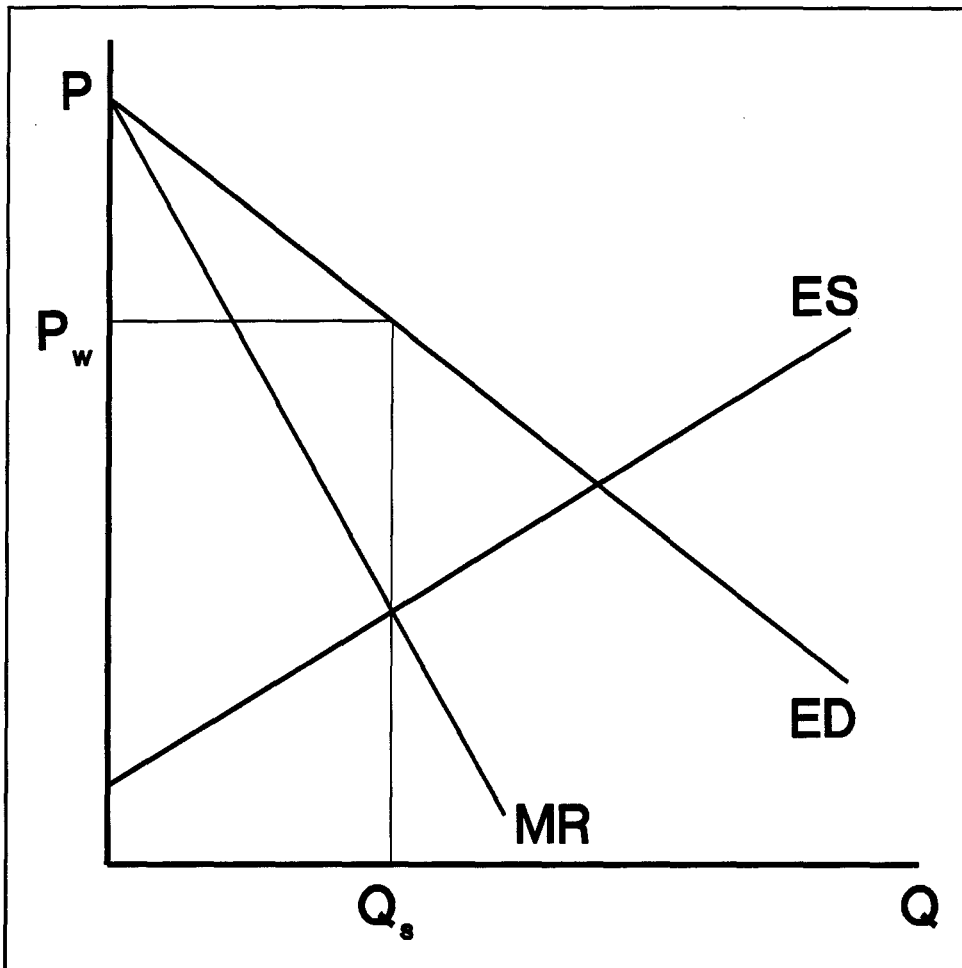


Figure 1. World Grain Market.

The larger the proportion of world production and exports controlled, the more inelastic the export demand and hence the greater the opportunity for collecting economic rent. As shown in Table 1, the US does not control a majority of production in any of the major grains, although over 40% of world corn was produced in the US in 1989. Even US grain producers teamed with export competitors Australia, Canada, and the EC would not supply a majority of grains globally.

An alternative not requiring supply control would be for producers to collect rents from an optimal tariff or subsidy with price discrimination among markets. Producers facing an inelastic export demand and free market equilibrium price  $P_w^o$  in Figure 2 could impose tariff  $P'_w - P_d$ . Tariff revenue  $c + e$  collected on the difference between the new world price  $P'_w$  and the domestic price  $P_d$  would need to offset producer losses  $(a + b + c + d)$ . This would require the value in area  $e$  to exceed the value in area  $a + b + d$ . If the demand were so elastic that area  $e$  does not exist, a producer cartel would not use a tariff to extract economic rent. A government cartel could collect rent  $c + e$  which would be a positive value  $c$  collected from producers even if demand were so elastic that  $e$  is zero.

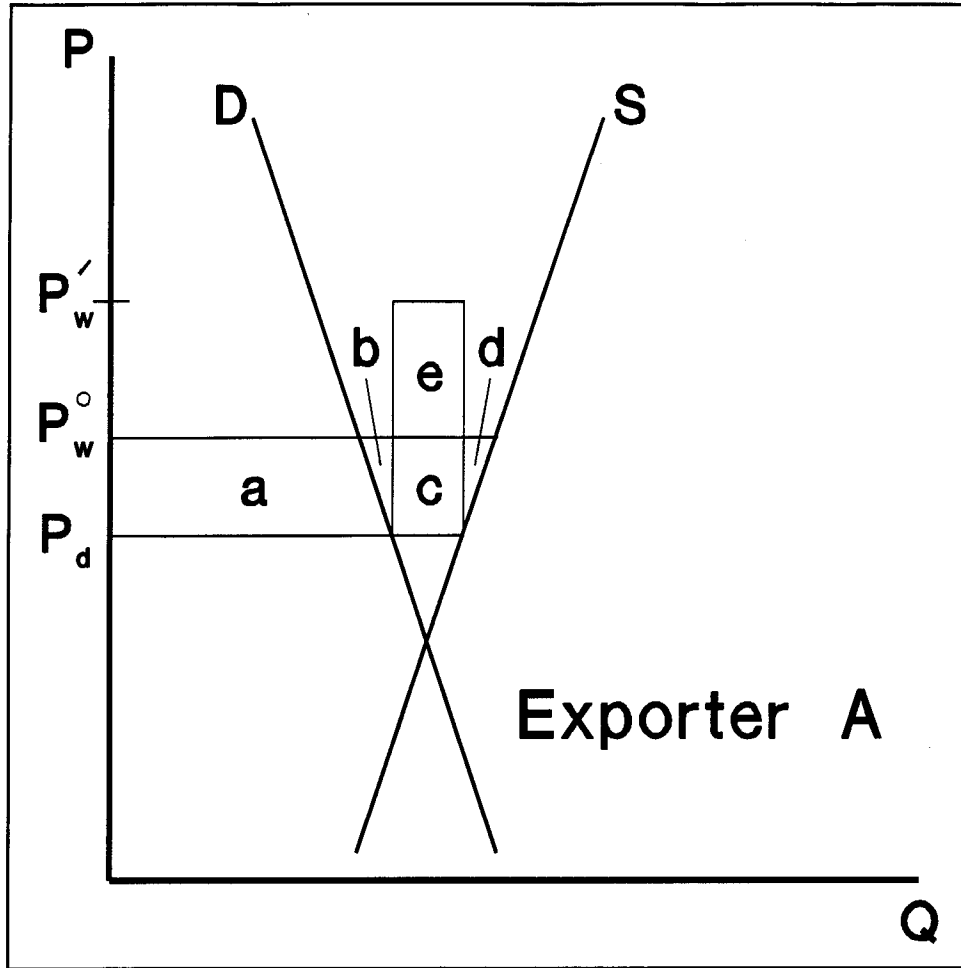


Figure 2. Collect Tariff with Lowered Domestic Price.

Table 1. Percent of World Grain Production, 1989.

|               | Wheat | Corn | Coarse Grain |
|---------------|-------|------|--------------|
| US            | 10.4  | 41.2 | 8.9          |
| Canada        | 4.5   | 1.2  | 5.0          |
| Australia     | 2.3   | 0.1  | 1.8          |
| EC            | 14.9  | 5.4  | 16.1         |
| All 4 Regions | 32.2  | 47.9 | 31.9         |

If export demand is elastic, producers might utilize an export subsidy rather than a tariff to extract a cartel rent. Beginning with world equilibrium price  $P_w^o$  in Figure 3, producers could provide an export subsidy  $P_d - P_w^o$  per unit or  $b + c + d + e + f$  in total. If the world price decline ( $P_w^o$  to  $P'_w$ ) were small enough, this subsidy might be less than producers' gain of  $a + b + c$  so that the net gain to producers  $a - d - e - f$  would be positive.

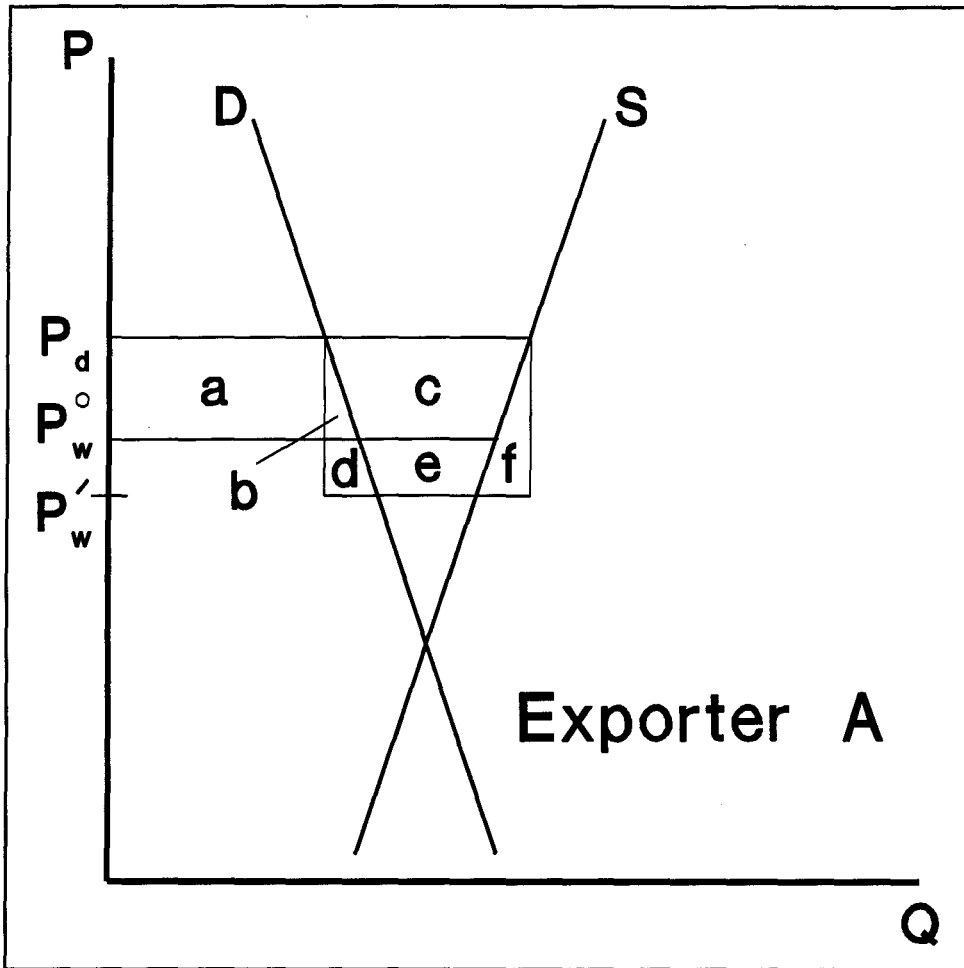


Figure 3. Raise Domestic Price and Pay Export Subsidy.

Long-term behavioral coefficients can be used to make some preliminary estimates of cartel arrangements. The optimal cartel strategy depends heavily on export demand elasticities which in turn depend on domestic supply and demand elasticities and on world price transmission elasticities. The more inelastic the export demand, the more success a cartel is likely to have in restricting output to raise income.

With export demand elasticities for any one country depending on domestic supply and demand elasticities and price transmission elasticities in all other countries, the US export demand elasticity  $E_x$  for quantity  $X$  of a commodity can be calculated using the equation:

$$E_x = \sum_{i=1}^n [E_{di} E_{pdi}(Q_{di}/X) - E_{si} E_{psi}(Q_{si}/X)] \quad (1)$$

where  $E_{di}$  and  $E_{si}$  are price elasticities of domestic demand and supply respectively in foreign country  $i$ ,  $Q_{di}$  and  $Q_{si}$  are demand and supply quantities respectively, and  $E_{pdi}$  and  $E_{psi}$  are price transmission elasticities for demand and supply price respectively (Tweeten 1992, p. 33; Dixit and Gardiner). The

long-term domestic demand and supply elasticities were derived from estimates by Tyers and Anderson and the IIASA model (see Seeley). Price transmission elasticities are from Sullivan (Table 2).

Table 3 reports the calculated US export demand elasticities for grains implicit in the trade model employed in subsequent analysis. Results indicate that US producers face an elastic export demand in the long run. The high (absolute value) elasticities indicate that the ability of a US producer cartel to extract rents from the world markets by supply control or an export tariff is limited, at least in the long run. Of course, the overall impacts of alternatives are impossible to determine without a more comprehensive quantitative assessment in a model accommodating major world grain markets.

The economic impacts of different producer cartel scenarios were estimated using a nine-region world trade simulation model incorporating the assumptions of neoclassical trade theory (Roningen *et al.*, March 1991; September 1991.). The SWOPSIM program was used to write the model equations. The previously described long-term coefficients are used in the model's behavioral equations. Economic Research Service trade data for 1989 were used to initialize the model. Results reflect long-run changes from 1989 conditions and are at 1989 general price levels.

The model simultaneously estimates outcomes in markets for nine commodities: beef, pork, poultry meat, wheat, corn, coarse grains (other than corn), oilseeds (soybeans, rapeseed, and sunflower seed), oilmeal, and sugar. Cross-effects among commodities and input-output relationships between field crop and livestock production are accounted for by substitution and complementary coefficients in behavioral equations.

Countries and groups of countries included in the model are Australia, Canada, the European Community (EC), European Free Trade Association (EFTA), the United States (US), Japan, and the rest of the world (ROW).

**Table 2. World Price Transmission Elasticities for Agricultural Commodities.**

| Country   | Average Transmission Elasticity |
|-----------|---------------------------------|
| Australia | 0.90                            |
| Canada    | 0.80                            |
| EC        | 0.25                            |
| Japan     | 0.70                            |
| EFTA      | 0.70                            |
| US        | 0.80                            |
| ROW       | 0.65                            |

Source: See Sullivan

**Table 3. US Export Demand Elasticities from Equation 1.**

| Commodity    | Long Term | Medium Term |
|--------------|-----------|-------------|
| Wheat        | -9.7      | -5.9        |
| Corn         | -6.2      | -3.3        |
| Coarse Grain | -7.8      | -4.8        |



## Simulation Results

We first address implications of a cartel strategy of mandatory supply control before considering price discrimination strategies of export subsidies and tariffs. Outcomes are predicted for the US acting alone and for the US acting in concert with other major developed country exporters. Estimates are made for a cartel of all grain producers and for corn producers alone.

A perfectly cooperative USDA (e.g. taxpayers) is assumed, which allows all cartel measures to be superimposed on top of existing 1989 commodity support measures. Supply reductions in this study are in addition to the approximate 5% reduction (accounting for slippage) from the 10% set aside in 1989.

Grain farmers are assumed to behave according to the market price while being rewarded at the target price. The calculated producer welfare change in these simulations does not differentiate between producer and taxpayer gains and losses.

*Supply Control.* The simulation results reported in Table 4 are the consequences of restricting US grain production (wheat, corn, and other coarse grains) from 5% to a high of 20% below the 1989 production level. US commodity programs for non-grains were not changed from 1989 levels. Grain supply restrictions were presumed to be mandatory, hence taxpayers incurred no additional outlays over those in 1989. The Conservation Reserve Program was assumed to continue at its 1989 level. World price increases were modest for wheat, but greater for corn and other coarse grains in part because of differences in market share among grains. US consumers of grain and grain products buy less at higher prices and are worse off, as is the country as a whole. Consumer surplus falls nearly \$2 billion when grain supply is reduced 20%.

Higher grain prices and lower costs more than compensate producers for less output, despite lower receipts attending an elastic demand. According to simulation results, cartel-like action restricting US supplies by 15% would most benefit American grain producers. If acreage controls rather than marketing quotas were used to reduce supplies, much more than 15% of acres would need to be diverted due to program slippage.

Consumers in the US and the world lose more than producers gain from cartel action restricting production and lowering US exports of grain. Other competing exporters enjoy net benefits from higher world prices. However, because the rest of the world is a net consumer, net economic welfare of other countries is reduced. Also, overall world income is reduced by a cartel.

Results from a simulation restricting production for US corn alone are reported in Table 5. The impacts are very similar to those in Table 4 because corn is such a large component of US grain production. Welfare losses in the rest of the world (ROW) are greater when all US grain production is restricted (Table 4) than when only corn is restricted (Table 5).

Benefits to corn producers peak with supply restricted about 15% (Table 5). This outcome is similar to that for all grains shown in Table 4. Of the developed country competitors, only Australia exports corn and would benefit from the higher world prices apparent in Table 5.

As additional global production comes under the control of the cartel, more surplus can be extracted from consumers. Table 6 reports results of a simulation where grain producers in four developed countries or regions (Australia, Canada, EC, and US) form a cartel and simultaneously restrict production from 5 to 20%. Obviously, a given percentage cut in output is a much greater absolute reduction in tonnage in the more comprehensive cartel. As expected, world prices rise more with the comprehensive grain cartel (Table 6) than with the US acting alone (Table 4). The more comprehensive international cartel helps producers extract greater rents from consumers. Hence, consumer losses are greater in the comprehensive grain cartel shown in Table 6.

From a narrow American perspective, one might hope that economic rent extracted from ROW would raise the producer surplus enough to offset consumer losses, leaving the US better off. That is not the case, however. American welfare losses increase with more stringent supply control in Tables 4, 5, and 6. US losses are not much less when acting in concert with other grain exporters (Table 6) than when acting alone (Table 4). It is notable that none of the supply restriction schemes in Tables 4, 5, or 6 would benefit the US as a nation. Rest-of-the-world and total world welfare losses mount when supply restrictions are tightened from 5 to 20% of market output. When the US alone tightly restricts grain production, it loses more than ROW.

**Table 4. Impacts of Restricting US Grain Production.**

| US Grain<br>Supply<br>Reduction | Welfare Impacts |           |        |              |                |           | Increase in World<br>Price |  |
|---------------------------------|-----------------|-----------|--------|--------------|----------------|-----------|----------------------------|--|
|                                 | US              |           |        | ROW<br>Total | World<br>Total | Wheat     | Corn &<br>Coarse<br>Grain  |  |
|                                 | Producers       | Consumers | Total  |              |                |           |                            |  |
| (Percent)                       | (\$ Million)    |           |        |              |                | (Percent) |                            |  |
| 5                               | 395             | -439      | -44    | -313         | -357           | 1         | 3                          |  |
| 10                              | 616             | -882      | -266   | -592         | -858           | 2         | 6                          |  |
| 15                              | 663             | -1,330    | -667   | -837         | -1,504         | 3         | 9                          |  |
| 20                              | 534             | -1,782    | -1,248 | -1,047       | -2,295         | 4         | 13                         |  |

**Table 5. Impacts of Restricting US Corn Production.**

| US Corn<br>Supply Reduction | Welfare Impacts |           |        |              |                |           | Increase in<br>World Price |
|-----------------------------|-----------------|-----------|--------|--------------|----------------|-----------|----------------------------|
|                             | US              |           |        | ROW<br>Total | World<br>Total | Corn      |                            |
|                             | Producers       | Consumers | Total  |              |                |           |                            |
| (Percent)                   | (\$ Million)    |           |        |              |                | (Percent) |                            |
| 5                           | 375             | -460      | -85    | -226         | -311           | 5         |                            |
| 10                          | 624             | -928      | -303   | -427         | -730           | 9         |                            |
| 15                          | 746             | -1,404    | -657   | -602         | -1,259         | 14        |                            |
| 20                          | 738             | -1,887    | -1,149 | -750         | -1,899         | 19        |                            |

When the US, Canada, Australia, and the EC jointly restrict production, ROW incurs greater welfare losses than the US.

*Price Discrimination.* Mandatory production controls assumed in the foregoing scenarios potentially can benefit producers without discrimination between foreign and domestic markets. But controls are difficult to administer and are unsuccessful in raising US national income. An alternative is to forsake controls but to use export tariffs and subsidies to discriminate pricing between domestic and foreign markets.

Price discrimination scenarios conforming to the strategy presented in Figures 2 and 3 were simulated with results presented in Table 7. Domestic grain prices for wheat, corn, and other coarse grains were adjusted proportionally to bring changes in US exports as indicated in the first column of Table 7.

**Table 6. Restricting Grain Production - US, Canada, Australia, and EC.**

| Grain Supply<br>Reduction for Each<br>Cartel Member | Welfare Impacts |           |        |              |                | Increase in World<br>Price |                           |
|---|-----------------|-----------|--------|--------------|----------------|----------------------------|---------------------------|
|   | US              |           |        | ROW<br>Total | World<br>Total | Wheat                      | Corn &<br>Coarse<br>Grain |
|   | Producers       | Consumers | Total  |              |                |                            |                           |
| (Percent)   | (\$ Million)    |           |        |              |                | (Percent)                  |                           |
| 5   | 632             | -633      | -5     | -249         | -254           | 3                          | 5                         |
| 10  | 1,084           | -1,272    | -187   | -565         | -753           | 7                          | 10                        |
| 15  | 1,339           | -1,918    | -578   | -947         | -1,526         | 10                         | 15                        |
| 20  | 1,399           | -2,570    | -1,171 | -1,394       | -2,565         | 14                         | 20                        |

Using export subsidies to fix the domestic price above the world price decreases domestic consumption but increases production and exports. Using export tariffs to fix the domestic price below the world price has the opposite effect. The border subsidies listed in the top three rows of Table 7 (4th column) corresponds to area b+c+d+e+f in Figure 3. The border levies (tariffs) listed in the lower three rows correspond to area c+e in Figure 2. Producer and consumer welfare impacts in Table 7 are changes from actual 1989 values.

A grain cartel of producers financing export subsidies (see negative numbers in bottom three rows) will earn economic rents if subsidies paid to export grain are less than the extra producer surplus accruing to producers from the higher domestic price, or if tariffs (see positive values in bottom three rows) collected by producers on exports are more than the losses to producers from the lower domestic price. Given the elastic export demand, producers gain from export subsidies and lose from export tariffs. The simulation model shows that export subsidy payments are less than the added producer surplus when domestic prices are raised and exports increased by export subsidies. The net gain to producers declines proportionally as export subsidies increase.

Net benefits to producers are greatest with export subsidies, expanding exports by 30% and with an attendant increase in domestic prices (top row of Table 7). The cartel can subsidize exports with collections from producers, leaving its members with some net gain. Results are even more favorable for producers if taxpayers pay the export subsidy as under the current Export Enhancement Program (EEP). However, because national welfare is reduced, a government truly representative of the nation's economic welfare would not rationally choose to subsidize exports.

Overall US welfare is modestly increased when domestic price is lowered with an export tariff and exports decline (bottom rows of Table 7). In contrast, the rest of the world as a net importer benefits from plans increasing US exports and lowering the world price of grains. As noted in the World Total column of Table 7, any form of market distortion lowers overall global welfare.

Compared to Table 7, total numbers are smaller but patterns are similar when only US corn producers attempt the optimal subsidy or tariff strategy (Table 8). A US corn-only producer cartel also would choose an export subsidy because the producers' benefits are positive even if they pay the export subsidy (top three rows in Table 8).

None of the above results consider retaliation by competitors. The US and most other developed countries currently subsidize grain exports. Each country justifies its subsidy as retaliation for predatory trade policies of competitors. A US grain producer cartel subsidizing exports to collect economic rents and lowering world prices in the process (see top three rows, Tables 7 and 8) would hurt competing exporters who might retaliate in kind.

**Table 7. Impact of US Export Subsidies and Tariffs on Grains.**

| Increase<br>in US<br>Export<br>Quantity | Welfare Impacts |           |                    |        |              |                | Increase in World<br>Price |                           |
|---|-----------------|-----------|--------------------|--------|--------------|----------------|----------------------------|---------------------------|
|   | US              |           |                    |        | ROW<br>Total | World<br>Total | Wheat                      | Corn &<br>Coarse<br>Grain |
|   | Producers       | Consumers | Border<br>Payments | Total  |              |                |                            |                           |
| (Percent)                               | (\$ Million)    |           |                    |        |              |                | (Percent)                  |                           |
| 30                                      | 4,279           | -2,355    | -3,128             | -1,204 | 671          | -533           | -3                         | -6                        |
| 20                                      | 2,898           | -1,643    | -2,018             | -754   | 458          | -296           | -2                         | -5                        |
| 10                                      | 1,377           | -793      | -893               | -309   | 213          | -96            | -1                         | -2                        |
| -10                                     | -1,338          | 808       | 741                | 212    | -220         | -8             | 1                          | 2                         |
| -20                                     | -2,729          | 1,700     | 1,359              | 330    | -415         | -85            | 3                          | 5                         |
| -30                                     | -3,916          | 2,494     | 1,729              | 308    | -582         | -274           | 4                          | 6                         |

Outcomes were simulated in which percentage increases in US exports were matched by equal percentage increases in exports of other major competitors (Canada, the European Community, and Australia). Because domestic prices are controlled by border measures, the results reported in Table 9 indicated no major impacts on US producers and consumers compared to no retaliation. But exports rise and world grain prices fall substantially as subsidies are more widely expanded to retaliate against action of competitors. Retaliation causes the average cost of subsidizing US exports to nearly double to achieve any given percentage increase in exports. Retaliation by competing exporters removes much of the attractiveness of US export subsidies. If producers pay for export subsidies, their net gains are sharply eroded with retaliation. Welfare losses to the US as a nation and to the world enlarge with retaliation to subsidies. Thus the US and the world have a stake in successful multilateral negotiation reducing subsidies and attendant retaliation.

Even if US grain producers form a cartel successful in accumulating net gains for its members, doing so might alienate US voters because consumers are hurt in every feasible scenario. It is conceivable that an effort by producers to form a cartel would so alienate the public that Congress would terminate current commodity programs, including export assistance on grain. The result of eliminating 1989 US government program support for grains was simulated and the results are reported in Table 10. Net benefits to producers from cartel activity never approaches the \$7 billion in rents they collect from current programs. It seems unlikely that a producer group would risk gains of this size for the prospect of cartel rents a sixth the size or less from international markets.

Identical cartel arrangements to those presented in this paper were simulated using intermediate-run rather than long-run behavioral coefficients. Producer, consumer, and taxpayer welfare as well as world price impacts generally were greater in the intermediate-run simulations than in the long-run simulations. However, the overall conclusions for the intermediate run were identical to those for the long run reported above.

**Table 8. US Export Subsidies and Tariffs on Corn Which Change Export Levels (US Corn Producer Cartel).**

| Increase in US<br>Corn Export<br>Quantity | Welfare Impacts |           |                    |        |      |              | Increase in World<br>Price<br>Corn |                |
|---|-----------------|-----------|--------------------|--------|------|--------------|------------------------------------|----------------|
|   | US              |           |                    |        |      | ROW<br>Total |                                    | World<br>Total |
|   | Producers       | Consumers | Border<br>Payments | Total  |      |              |                                    |                |
| (Percent)                                 | (\$ Million)    |           |                    |        |      | (Percent)    |                                    |                |
| 30  | 2,274           | -1,546    | -1,991             | -1,262 | 674  | -588         | -12                                |                |
| 20  | 1,636           | -1,131    | -1,342             | -837   | 473  | -364         | -9                                 |                |
| 10  | 806             | -571      | -597               | -361   | 224  | -137         | -5                                 |                |
| -10                                       | -783            | 584       | 437                | 238    | -249 | -11          | 5                                  |                |
| -20                                       | -1,543          | 1,185     | 701                | 342    | -365 | -23          | 10                                 |                |
| -30                                       | -2,099          | 1,648     | 773                | 323    | -469 | -146         | 15                                 |                |

**Table 9. US Export Subsidies and Tariffs on Grains With Like Retaliation in Subsidy and Tariff from Grain Exporters - Canada, EC, and Australia.**

| Increase in<br>Exports by All<br>Four Regions | Welfare Impacts |           |                    |        |     |              | Increase in World Price |       |                        |
|---|-----------------|-----------|--------------------|--------|-----|--------------|-------------------------|-------|------------------------|
|   | US              |           |                    |        |     | ROW<br>Total | World<br>Total          | Wheat | Corn & Coarse<br>Grain |
|   | Producers       | Consumers | Border<br>Payments | Total  |     |              |                         |       |                        |
| (Percent)                                     | (\$ Million)    |           |                    |        |     | (Percent)    |                         |       |                        |
| 30  | 4,378           | -2,466    | -3,931             | -2,018 | 262 | -1,756       | -9                      | -9    |                        |
| 20  | 2,970           | -1,714    | -2,537             | -1,281 | 284 | -997         | -6                      | -7    |                        |
| 10  | 1,395           | -825      | -1,117             | -574   | 183 | -364         | -3                      | -3    |                        |

**Table 10. Welfare Impact of US Unilateral Grain Subsidy Liberalization, \$ Million.**

| <b>Producers</b> | <b>Consumers</b> | <b>Taxpayers</b> | <b>Total US</b> |
|------------------|------------------|------------------|-----------------|
| -7,236           | 176              | 8,546            | 1,486           |

### Conclusions

Various cartel arrangements offer possibilities to raise economic rent to grain producers. However, gains to producers from export market rents are small relative to gains from commodity programs. Faced with a choice between cartel exploitation of export markets versus current commodity programs, producers have reason to favor current programs to raise their incomes.

Restrictions on grain production and marketing raise producers' income while reducing the economic well-being of US consumers and the public at large. Most of the export cartel gains come to US corn producers who account for over 40% of the world supply. *Ceteris paribus*, greater market share raises cartel rents. An international cartel, where growers from several large exporting countries band together to restrict supply, accumulates greater rents than when any one exporter alone restricts supply. But the more effective the scheme is in raising rents to grain producers, the larger become the global distortions and net welfare losses to consumers and the world economy.

Subsidies increasing US grain exports to extract cartel rents encounter problems when competing exporters retaliate. Even in cases where a cartel of producers seems to have potential for generating rents, shortcomings such as the administrative burden and complexity of implementation need to be considered. Subsidies would require control of all grain shipments into the US. Export subsidies expanding market share are a violation of General Agreement on Tariffs and Trade provisions and run counter to current trends toward liberalizing trade apparent in farm policy reforms of the EC, Australia, New Zealand, Sweden, and selected other countries.

No account of cartel administrative costs was made in this study. The export subsidy scheme would be expensive to administer because of the necessary border controls. The simulation results unrealistically assume perfect cooperation among all cartel members. Cheating on production quotas or selling outside the cartel would reduce net benefits to producers.

In conclusion, our analysis shows that at least modest national welfare gains are possible from US grain export tariffs. Such tariffs would be applauded by our export competition but are domestically unacceptable for two reasons. The first is that American grain producers are made worse off. The second is that an export tax may be unconstitutional. In all other scenarios considered, the US economy loses from cartel action to subsidize exports or control production. In all scenarios considered, the world as a whole loses income from cartel intervention in markets. The modest net gains to producers from subsidies and supply restrictions balanced against large negatives listed above do not present a bright outlook for grain cartels.

Preliminary analysis indicated that gains to US producers are less for a wheat cartel than for either the feed grain cartel or for the wheat-feed grain cartel included herein. The unfavorable outcomes originate from the export demand for US wheat made highly elastic by opportunities to substitute feed grain for wheat in production and consumption especially in the long run. That is, a high wheat price and controlled production of wheat encourages importers to produce wheat, cut back feed grain production, and import low-cost feed grains. Because results were less favorable for wheat alone than for feed grains alone or for all grains, predicted outcomes of a wheat cartel were not included.

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