Mandatory Production Control and High Price Supports Impact on Global Agricultural Markets**

by

Karen Liu and Jerry Sharples*

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** The results in this paper are tentative subject to ERS review of protection measures used and their incorporation into a model to simulation purposes. Our internal review process concerning the results--especially the welfare measures used--has just begun, and this paper is an important part of that process. We are concentrating on directions of change and broad order of magnitudes.

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Abstract

The impacts of mandatory production control of major crops on U.S. agricultural exports and on the global agricultural markets are analyzed by using a world agricultural trade model. The model results indicate that there would be drastic reduction in U.S. agricultural exports. Major grain exporters would greatly benefit from the U.S. production control policy. Consumers generally would be worse off at global level.

Keywords: Production, control, trade, producer surplus, consumer surplus, welfare

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INTRODUCTION

For many years there have been advocates for mandatory control of production of major crops in the United States. The very large Treasury cost of current farm programs and the very large crop surpluses in recent years have led to renewed interest in mandatory controls. For example, the Harkin-Gephardt bill, introduced in the Senate in February, 1987, proposes mandatory production controls if approved by a producer referendum. There have been many other similar proposals since the mid-1950's.

Proposals for mandatory production controls typically have sought to support prices at least 50 to 100 percent above what the uncontrolled market would generate. Thus major production restrictions would be needed in order to clear the domestic and export market without generating unwanted surpluses.

Recent research reports (FAPRI and Nat. Center for Food and Agr. Policy) examine the domestic impact of mandatory production control. They show the burden of farm income support shifting from the taxpayer to the consumer as food costs rise and direct payments decrease. The outcome varies considerably, however, depending on what is assumed about the world market.

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If U.S. exports are subsidized in order to maintain historic market shares, the Treasury cost is very large. On the other hand, if exports are not subsidized, U.S. export volume greatly decreases and U.S. production must be reduced even more. This latter option is further explored in this paper.

This paper focuses on the the world market for agricultural commodities. We assume that the United States (a) wishes to support basic commodity prices at twice their historic level but (b) chooses not to subsidize exports. The market will be cleared by controlling production--whether production control is "mandatory" is not the issue here. Our purposes are to estimate the impact of this policy on U.S. agricultural exports and the associated impact on the rest of the world. This report summarizes results from a world agricultural trade model that includes the major trading countries and the major agricultural commodities.

THE MODEL

The model is a static, partial equilibrium, net trade, synthetic representation of world agricultural trade in 1984. It includes ten country/regions (United States, Canada, European Community, Japan, Australia, the centrally planned countries (CPE), Brazil, Argentina, Thailand, and Rest of World) and 19 commodities or commodity groups (beef, pork, mutton and lamb, poultry meat, eggs, milk, butter, cheese, other dairy products, wheat, corn, other coarse grains, rice, soybeans, soymeal, soyoil, other oilseeds, other meal, and other oils).

The model contains constant price elasticity functions for domestic supply and demand for each commodity in each country. The own- and cross-price

elasticities represent an intermediate run (3- to 5-year) adjustment period. World markets clear at one world price for each commodity. The price elasticities of supply and demand may be obtained by request from the authors.

Price transmission elasticities link domestic prices and world prices. They generally are assigned the value of 1.0, i.e., the complete transmission of world price changes to domestic prices. But in order to more realistically reflect some countries' policies, values other than 1.0 are assumed. For the CPE the transmission elasticities are all set to zero, indicating that domestic prices do not change in response to changes in world price. A zero elasticity is also assigned to U.S. butter and cheese; Canadian poultry meat, eggs, and all dairy products; Japanese beef, pork, butter, cheese, wheat, and rice; and Australian poultry meat, eggs, and all dairy products. A price transmission of 0.2 is assumed for all commodities in the Rest of World region.

The model is a modified version of a world trade model used by ERS for analyzing trade liberalization issues. It is assembled and solved using ERS's SWOPSIM algorithm as described in Roningen. SWOPSIM uses the latest spreadsheet software to build static equilibrium trade models on the microcomputer.

For this analysis, two solutions of the model are obtained. The "base solution" is designed to reproduce actual 1984 quantities produced, consumed and traded by each country/region, and to reproduce world prices. We assume that the base year (1984) is in intermediate run equilibrium given all domestic and trade policies that existed at the time.

The second solution--called the production control (PC) solution--is obtained by imposing supply shifts on selected commodities in the United States. A comparison of the two solutions gives indications of how a mandatory production control program for U.S. agriculture would reshape world agricultural trade. Conventional measures of producer and consumer welfare are also computed as a part of each solution so that welfare shifts among countries may be examined.

THE PRODUCTION CONTROL SOLUTION

We assume that the United States puts a production control program in place, under market conditions that existed in 1984, that is designed to increase domestic grain and soybean prices but does not allow for export subsidies. The price goal of the program is assumed to be a doubling of producer prices for the controlled crops--wheat, corn, other coarse grains, rice and soybeans. In the model, U.S. production of the controlled crops are restricted such that either (a) the producer price doubles relative to the base solution, or (b) exports are eliminated. In the production control solution, the producer prices for wheat, corn and soybeans are in fact doubled and the United States remains a net exporter of those crops. Exports of rice and other coarse grains, however, are driven to zero at producer prices well below the target. We assume the United States will not import these grains.

The production control (PC) solution increased world prices of all commodities in the model (table 1). The largest price increases, relative to the base solution, were for wheat, corn, and soybeans--crops with production most severely cut by the United States. Note that a 100 percent increase in

Table 1. Change in selected world prices due to reduced U.S. crop production

Commodity	Percent change
Wheat	66
Corn	75
Soybeans	26
Rice	13
Beef	5
Pork	9
Poultry	15
Dairy products	6

Table 2 Change in grain trade due to reduced U.S. crop production

Region	Change in net trade
	mil. tons
Grain exporters:	
United States	-55.7
European Comm.	-1.2
Other	28.1
Total	-28.8
Grain importers:	
CPE	0
Japan	-4.7
Others	-24.1
Total	-28.8

*"Grain" includes wheat, corn, other coarse grains, and rice.

Table 3 Change in trade of soybeans and products due to reduced U.S. crop production*

Region	Change in net trade
Product exporters:	mil. tons
United States	-5.4
Brazil & Arg.	.6
Total	-4.8
Product importers:	-4.8

*Includes soybeans, soyoil, and soymeal.

the producer price of wheat translates into an 66 percent increase in the world wheat price. The world rice price only increased 13 percent because the loss of U.S. exports was a very small portion of world total demand. World prices of meat and other livestock products increased about 5 to 15 percent because of the supply adjustments in countries that were not completely protected from the higher world feed prices.

As a result of the higher U.S. price supports in the PC solution, U.S. exports of the 5 controlled commodities decreased 58 percent. The arc price elasticities of the implied export demand curves facing the United States can be obtained by comparing results of the two solutions. They are wheat, -1.0; corn, -0.7 and soybeans, -0.1. These reflect full adjustment to all commodity price changes--not just adjustment to own price change.

The reduction in U.S. grain exports would have a major impact on trade by other countries. A comparison of the two solutions shows that under 1984 world market conditions, U.S. grain exports would decrease by two thirds (55.7 million tons). About one fourth of that decrease would be offset by increased grain exports by other grain exporting countries (table 2). The remainder would show up as reduced imports around the world. The centrally planned countries are assumed to not respond to world price changes. As a result, they show no change in grain imports. Japan, however, shows a small decrease in imports as a result of higher world grain prices.

The European Community (EC) results show a decrease in grain exports even though world prices increase (table 2). The reason is that EC's grain prices are assumed to be protected from world price changes by their Common

Agricultural Policy (CAP), but livestock prices are not. Thus the EC increases production and exports of livestock products in response to the higher world product prices. More livestock production requires more feed. Since domestic feed production does not change (domestic feed prices are held constant by CAP), more feed is imported.

The United States decreases exports of soybeans, soybean meal and soybean oil by 25 percent (5.4 million tons) as a result of the assumed doubling of domestic price supports (table 3). Brazil and Argentina increase exports of those commodities 0.6 million tons and importing countries decrease imports 4.8 million tons.

The livestock sectors are also affected by the higher world grain prices. The PC solution shows the United States decreasing production of beef, pork, mutton and lamb, and poultry as a result of the higher feed costs. Domestic meat consumption also decreases, but by a smaller amount. As a result, meat imports double. The "rest of the world" region also increases meat imports. This increase in global quantity imported is supplied mainly by the EC (described above) with some additional exports provided by Argentina.

WELFARE IMPLICATIONS

The welfare impacts of these two alternative solutions on the U.S. and the major grain exporters and importers are in terms of conventional measure of producer and consumer surpluses. Table 4 shows the change in producer and consumer welfare of major commodity groups due to reduced U.S. crop production. A comparison of the PC solution vs. the base solution shows that

Table 4. Change in producer and consumer welfare due to reduced U.S. crop production (billion U.S. dollars)

	PRODUCER WELFARE	CONSUMER WELFARE	TOTAL WELFARE
UNITED STATES			
LIVESTOCK	-8.40	-3.80	-12.20
DAIRY	-.80	-.03	-.80
GRAINS	9.60	-4.20	4.90
OILSEEDS	8.20	-7.60	.60
ALL COMMODITIES	8.60	-16.20	-7.50*
CANADA			
LIVESTOCK	-1.10	-.20	-1.30
DAIRY	-.10	.00	-.10
GRAINS	3.30	-.30	3.00
OILSEEDS	.40	-.30	.10
ALL COMMODITIES	2.60	-.90	1.70
European Community			
LIVESTOCK	1.20	-3.60	-2.40
DAIRY	.30	-1.20	-.90
GRAINS	.00	.00	.00
OILSEEDS	2.80	-2.10	.70
ALL COMMODITIES	4.30	-6.90	-2.70**
JAPAN			
LIVESTOCK	-1.50	-.30	-1.80
DAIRY	-.04	-.02	-.06
GRAINS	-.02	-.30	-.30
OILSEEDS	-.70	-.70	-.03
ALL COMMODITIES	-.90	-1.30	-2.20

* Crop producers lose $4.2 billion of direct payments from the government farm programs, on the other hand, tax payers save $4.2 billion from elimination of government program payments. However the total welfare stays the same.

** Does not include reduced export restitution payments due to higher world prices.

as a result of higher grain and oilseeds prices in the PC solution, U.S. crop producers are better off but livestock and dairy producers are worse off because of higher feed costs. For the transfer payments, U.S. crop producers lose 4.2 billion dollars of direct payments from government farm programs, on other hand, tax payers save 4.2 billion dollars from the elimination of government program payments. For all commodities, the U.S. producers obtain a welfare gain of 8.6 billion dollars but lose 4.2 billion dollars of transfer payments, the net producer welfare gain becomes 4.4 billion dollars. Consumers suffer a surplus loss of 16.2 billion dollars because of higher prices, tax payers save 4.2 billion dollars of direct payments, the resulting net welfare loss is 7.5 billion dollars for the U.S. as a whole.

Canada results are similar to the U.S.; crop producers are better off, but livestock and dairy producers as well as general consumers are worse off. The European Community (EC) results show no change in producer and consumer welfare in the grain sector, because EC's grain prices are assumed to be protected from world price changes by CAP. Producers of other commodities are better off in terms of producer welfare because they can export at higher world prices. Consumers are worse off due to higher prices. For all commodities, total EC producer welfare increases 4.3 billion U.S. dollars, and consumers' welfare suffers a loss of 6.9 billion U.S. dollars. Japan results show that both producers and consumers are worse off.

For the world as a whole, livestock producers are worse off, producers of other commodities are better off, and consumers are worse off.

CONCLUSIONS

The model results indicate that if the United States were to double price support levels and not subsidize exports, as proposed in some mandatory production control proposals, there would be a drastic reduction in U.S. agricultural exports. Further, the United States would import more livestock products. Thus there would be a major negative shift in the U.S. balance of agricultural trade.

If the European Community rigidly maintained its Common Agricultural Policy, as assumed in this study, they might not increase grain exports. In fact the model results suggest that they would slightly decrease grain exports in order to meet expanded domestic feed needs. And higher world grain prices, as a result of the high U.S. price supports, would not offer an incentive for any change in the CAP.

Generally, the agricultural sectors of countries that were sensitive to world market prices would greatly benefit from the U.S. production control policy. Consumers in those countries would be somewhat worse off. Overall, Canada and other agricultural exporters would be better off, and Japan and other net importers would be worse off.

The bottom line is that this U.S. policy would virtually eliminate the world's agricultural surplus problem. The United States, however, would bear most of the cost of global adjustment by losing the positive balance of trade traditionally earned by the agricultural sector. Other exporting countries would get a free ride. The global welfare impacts of this policy indicate

that crop producers are generally better off, livestock producers are worse off (except in EC) and consumers suffer net welfare loss.

The next steps in the analysis are to examine (a) the sensitivity of the results to alternative assumptions about price-responsiveness of other countries' trade, and (b) the impact of other grain exporting countries sharing in the production adjustment.

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