



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

# Individual and Multilateral Trade Liberalization

*Douglas L. Maxwell*

**Abstract:** This paper uses a general equilibrium model with nine agricultural sectors to project a reference scenario, five unilateral agricultural liberalizations by Oceania, Canada, the EC, Japan, and the USA, and a multilateral trade liberalization by all of the preceding countries together. The effects on prices and production are examined along with the interaction effects of a multilateral liberalization.

## Introduction

In late spring 1987, the USA proposed a multilateral phasing out of agricultural protection over a period of 10 years. This proposal was based partly on the theory that a decrease in agricultural protection would reduce production and raise world prices. The multilateral reduction would thus cause less dislocation in the agricultural sectors of the liberalizing countries because producer prices would not need to fall all the way to current world prices but only to the higher postliberalization world price level. Such a multilateral reduction is simulated here. The possible interaction effects between countries and commodities in a multilateral liberalization are also investigated. Some extra space is devoted to the effects on the USA in order to ascertain the effects of the US proposal on US crop and livestock farmers.

A revised version of the IIASA model system was used to make seven projections: a reference projection with no change in policies, an OECD liberalization projection with complete agricultural liberalization in the more important OECD countries, and five unilateral agricultural liberalizations of these OECD countries. A comparison of the reference and OECD liberalization scenarios is presented first. It shows that real gross world agricultural product would rise 0.22 percent, with an overall increase in traded agricultural prices of 7 percent and price increases in each of the 9 agricultural (composite) traded commodities in the IIASA system. US agricultural exports would rise 16 percent in value. The five unilateral projections are then examined to determine the impact of each of the individual countries on the overall result and the strength of the interaction effects of a multilateral liberalization.

## Overview of the IIASA System

The version of the IIASA world agricultural modelling system used here contains 34 models of countries, country groups, or regions, with a fixed international commodity list of nine agricultural commodities and one nonagricultural commodity; 20 full models of countries or country groups; and a set of 14 simple regional models based on exogenous trends and elasticities. This whole system is referred to as the basic linked system.

Each full model estimates production, inputs, stocks, and consumption consistent with that country's policy variables, especially tariffs, quotas, and price controls. These internal commodities are then aggregated into the ten internationally traded commodities, which are wheat, rice, coarse grains (other cereals), beef and sheep, dairy products, other animal products, protein feeds, other foods, nonfood agriculture, and a nonagricultural composite.

The full country models available in the present basic linked system are Argentina, Australia, Austria, Brazil, Canada, CMEA (USSR and Eastern Europe), Egypt, EC-10, India, Indonesia, Japan, Kenya, Mexico, New Zealand, Nigeria, Pakistan, Thailand, Turkey, and the USA.

## Reference and OECD Liberalization Projections

### Assumptions of the OECD Liberalization Projection

The IIASA system was run to the year 2000, with all agricultural protection measures, including US commodity programmes, removed for a set of six OECD countries over the 1984-93 period. These OECD countries are Australia, Canada, the EC-10, Japan, New Zealand, and the USA. For convenience, this set of countries and economic communities will be called the OECD-6.

For the USA, both the border measures and the federal government commodity policies were phased out over the transition period.<sup>2</sup> Although some tariffs were in effect, the most important border measures were the import quotas on beef, mutton, and dairy products. Sugar quotas are not in the model since sugar is combined in other foods. No dairy programmes are in the present US model; the import quota is the only measure protecting domestic prices from the world market.

The Canadian model has a ceiling on dairy production that keeps production just slightly less than Canadian consumption. In the OECD liberalization projection, the ceiling was doubled over the 1984-93 period, with the result that it stopped acting as a constraint.

The endogenous border protection is eliminated over the 1984-93 period for all agricultural commodities for Australia, Canada, EC, and Japan. In New Zealand, constant tariff equivalents were eliminated.

### Overview of Results

This summary discusses the long-run results in the 1995-2000 period, after the system has settled down. The results of the liberalization runs are compared with a reference run in which no policy changes are made. The long-run result of full trade liberalization in the OECD-6 was to raise world prices for all nine agricultural commodity groups but especially for grains, dairy products, and protein feeds (Table 1). Ruminant (beef/sheep) prices rose more than prices for other animals, other foods, and nonfood agriculture.

Overall, both world agricultural prices and production increased. All the agricultural price changes were increases, and some of them (grains, dairy products, and protein feeds) were quite large. During the 1995-2000 period, overall agricultural prices (relative to nonagricultural) are 7 percent higher in the liberalization projection than in the reference projection. On the other hand, production showed only slight changes, with an overall global increase of 0.22 percent in real world gross agricultural product. Slight declines occurred in the global production of wheat, ruminants,

other foods, and nonfood agriculture. The global production decreases in wheat, ruminant, and other food (including sugar) production were smaller than the EC decreases. Production outside the EC actually increased. In the case of nonfood agriculture, the EC and USA accounted for the bulk of the global production decrease.

Table 1—Change in World Results Due to OECD-6 Liberalization (1995-2000 Average)

	Price Change*		Production Change
	Percent	Percent	1,000 tons
Wheat	12.1	-0.19	-1,143
Rice (milled)	20.2	0.97	3,481
Coarse grains	8.5	0.73	7,953
Beef/sheep (carcass weight)	6.6	-0.05	-36
Dairy products (fresh milk equivalent)	19.7	0.69	4,399
Other animal products (protein equivalent)	0.9	0.61	159
Protein feeds (protein equivalent)	15.6	1.16	708
Other food	4.1	-0.08	
Nonfood agriculture	1.7	-1.04	
Nonagriculture	0.0	0.09	

\*Relative to nonagriculture.

Source: Runs of the IIASA/FAP system (August 1987 ERS version).

## Effects on Gross Domestic Product

For 1995-2000, the gross world product (including nonagriculture) in the OECD liberalization projection was 0.099 percent larger than the reference projection, with world agricultural product about 0.22 percent larger (Table 2). Of the countries that liberalized, all gained in total GDP, but sharply mixed results obtained in agricultural GDP. On the

Table 2—Percent Change in Gross Domestic Product Due to OECD Liberalization Relative to the Reference Run (1995-2000 Average)

	Agricultural		Agricultural	
	GDP	GDP	GDP	GDP
World	0.099	0.22		
Argentina	0.026	3.11	Indonesia	-0.019
Australia	0.008	-2.81	Japan	0.203
Austria	-0.068	0.79	Kenya	0.554
Brazil	-0.292	0.91	Mexico	-0.916
Canada	0.137	2.76	New Zealand	0.235
China	0.000	0.00	Nigeria	0.463
CMEA	-0.096	-0.16	Pakistan	0.065
EC-10	0.312	-7.28	Thailand	0.083
Egypt	-0.309	1.57	Turkey	-0.087
India	0.106	0.12	USA	0.146

Source: Runs of the IIASA/FAP system (August 1987 ERS version).

other hand, except for the centrally planned countries, all the nonliberalizing countries showed an increase in agricultural GDP but had mixed results on total GDP. Except for the centrally planned economies and Indonesia and India, all nonliberalizing countries experienced an increase in agricultural GDP of more than 0.75 percent over the 1995-2000 period. China showed no change at all, while in the CMEA not only total GDP but also agricultural GDP declined as resources (including more fertilizer application) were shifted to the grain, ruminant, and dairy sectors from both nonagriculture and other agriculture.

## Grain Price Relationships

The world price of wheat rose more than the world price of coarse grains. The protection for wheat was higher than the coarse grains in the EC model. This caused a shift in EC acreage to coarse grains as protection was eliminated, so that the EC produced somewhat more coarse grains and much less wheat.

The world price of rice rose due to a large increase in the use of rice in Japan. Rice use for feed (which includes rice bran) increased, which probably means that the increase in Japanese rice consumption is overstated.

## Effects of the OECD-6 Liberalization on the USA

The effect of trade liberalization by the OECD-6 is to increase both prices and export values by the USA (Table 3). The effects differ sharply by commodity, with the export volume of grains, protein feeds, and other foods increasing, imports of beef and sheep decreasing, imports of other animals up slightly, and imports of dairy products up sharply. Nonfood agriculture is not affected much. The net result of the free importation of dairy products combined with the increase in the world price is that domestic dairy producer prices fall approximately 20 percent. This domestic price drop increases consumption significantly.

The reference or base value of US agricultural exports varies a great deal by

Table 3—Change in US Exports and World Prices Due to OECD Liberalization Relative to the Reference Run (1995-2000 Average)

	Change in	
	Export Volume	Price
	1,000 tons	Percent change
Wheat	6,561	12.13
Rice	289	20.21
Coarse grains	12,724	8.52
Beef/sheep	414	6.58
Dairy products	-5,897	19.65
Other animals	-49	0.91
Protein feeds	463	15.64
Other foods	9*	4.13
Nonfood agriculture	-14*	1.71

\*Millions of 1970 dollars.

Source: Runs of the IIASA/FAP system (August 1987 ERS version).

commodity (Table 4). Grains, protein feeds, and other foods (which include fats and oils) together total more than all of net agricultural exports, with livestock products being a net drain on the agricultural balance of trade. The liberalization increases the agricultural balance of trade by 16.1 percent, but the disparity between the crop and livestock sectors is increased, with crop exports expanding but livestock imports increasing except for beef and sheep.

Table 4—Value of US Exports as a Percentage of Total Agricultural Exports in the Reference Projection (1995–2000 Average)

	OECD-6		
	Reference	Liberalization	Change
Wheat	26.86	33.02	6.16
Rice (milled)	5.92	7.46	1.54
Coarse grains	33.86	41.30	7.44
Beef/sheep (carcass weight)	-8.96	-7.33	1.64
Dairy products (fresh milk equivalent)	-0.85	-5.49	-4.63
Other animals (protein equivalent)	-1.93	-3.40	-1.47
Protein feeds (protein equivalent)	24.25	28.89	4.64
Other foods	20.82	21.74	0.92
Nonfood agriculture	0.04	-0.05	-0.09
Total agriculture	100.00	116.13	16.13

Source: Runs of the IIASA/FAP system (August 1987 ERS version).

## Effects of the Unilateral Liberalizations

This section first examines the effects of the five different unilateral liberalizations<sup>3</sup> on the world prices of traded commodities, then on the quantities exported or imported by the USA, and finally on the change in export or import values by commodity in relation to the overall agricultural balance of trade of the USA.

The effects of a multilateral trade liberalization on world prices can, to a large extent, be decomposed into the sum of individual country liberalizations (Table 5). Few significant interactions occurred among the different unilateral liberalizations. The most significant interaction occurred with dairy products, with a 26.7-percent total increase obtained by summing the five different individual liberaliza-

Table 5—World Prices for Six Different Liberalization Scenarios Compared to the Reference Run (1995–2000 Average)

	OECD-6	Canada	EC-10	Japan	Oceania	USA
	----- Percent -----					
Wheat	12.15	3.09	6.26	1.19	1.96	0.17
Rice	20.21	0.37	2.36	15.97	0.35	0.62
Coarse grains	8.52	2.50	2.61	1.68	1.94	-0.13
Beef/sheep	6.58	0.38	4.20	0.16	-0.27	2.07
Dairy products	19.65	1.08	15.02	2.34	-1.24	9.46
Other animals	0.91	0.55	3.35	-3.59	1.05	0.00
Protein feeds	15.64	0.29	1.46	10.26	0.71	1.33
Other foods	4.13	0.11	2.42	0.86	0.32	0.64
Nonfood agriculture	1.71	0.18	1.45	1.27	-0.71	-0.45

Source: Runs of the IIASA/FAP system (August 1987 ERS version).

tions, but only a 19.6-percent increase in the OECD-6 liberalization. This seems to be due to the fact that in a liberalization that includes both the USA and the EC, the increase in world prices due to the addition of the EC to the set of liberalizing countries causes consumption in the USA to fall partway back to the reference projection levels. The second largest interaction is not large—the individual protein meal price changes sum up to 15.6 percent, but the OECD-6 liberalization shows a price increase of only 14 percent.

Next, the impact of the five different unilateral liberalizations on the physical export volume of the USA is examined (Table 6). For dairy products, protein feeds, and other foods, US domestic policies make more difference than foreign policies. Dairy policies obviously involve the quota on imports of dairy products, while the protein feeds and other foods (which include fats and oils) seem to involve a shift from oilseeds to coarse grain

Table 6—Change in US Exports for Six Different Liberalization Scenarios Compared to the Reference Run (1995–2000 Average)

	OECD-6	Canada	EC	Japan	Oceania	USA
----- 1,000 tons -----						
Wheat	6,561	1,125	3,113	378	544	1,296
Rice	288	2	25	218	2	38
Coarse grains	12,724	3,896	-2,368	9,887	3,070	2,625
Beef/sheep	414	57	624	231	-106	-33
Dairy products	-5,897	-1	-24	1	3	-8,181
Other animals	-48	-2	37	-91	8	11
Protein feeds	463	-192	-90	1,058	-55	-255
----- \$1,000,000 (1970) dollars -----						
Other foods	9	-32	187	194	10	-287
Nonfood agriculture	-14	-1	0	0	-1	-15

Source: Runs of the IIASA/FAP system (August 1987 ERS version).

production. For each commodity, either the EC or Japan is the primary foreign influence on US farm exports. In each case, this influence is negative except for other animals and other foods. In the case of other animals, Japan would import more grains and protein feeds than it would produce domestically. Except for dairy products, the sum of the five individual liberalizations is approximately the same

as the OECD-6 liberalization. In the case of dairy products, the addition of EC liberalization to US liberalization would raise world prices and reduce the impact on US production and consumption of an elimination of dairy quotas and programmes.

The impacts of changes in price and export or import volume combine to produce the effect of liberalization on the value of US agricultural exports and imports by commodity and overall. The effect of the five unilateral liberalizations sums to approximately the same amount as the OECD-6 liberalization for every commodity, with the largest discrepancy for dairy products, where the five liberalizations sum up to a negative impact equal to 5.91 percent of the overall reference balance of agricultural trade, contrasted with a negative 4.64 percent in the OECD-6 multilateral liberalization. The EC and Japan liberalizations each have a favourable effect on the US agricultural balance of trade of about half the total from OECD liberalization. Liberalizations by Canada and Oceania only serve to almost offset the negative influence of the US liberalization.

## Conclusion

The change to free trade in the developed market economies would definitely help their overall economies as the OECD countries shifted production towards their comparative advantage, both among the agricultural commodities and between agriculture and nonagriculture. The effects on the various agricultural sectors in the different OECD countries, however, would vary sharply. In the LDCs, however, the overall effect would depend mainly on whether the country in question was a food exporter or importer. In almost all cases, production in the agricultural sector would increase due to higher world prices for agricultural commodities.

In the USA, the agricultural sector would gain as a whole, but dairy producers would lose significantly. The loss by dairy producers would be partly offset by the rise in world dairy prices that would result from liberalization by the EC and an increase in consumption in the USA. Even so, imports would be up sharply and domestic prices would be lower. These projections thus indicate that liberalization would create important losers as well as gainers in the USA. Since the opening up of the US dairy sectors would be one of the principal inducements for any EC participation in a multilateral agricultural trade liberalization, and since the dairy sector seems to have the most significant interactions, this subject will undoubtedly be revisited.

## Notes

<sup>1</sup>Economic Research Service, US Department of Agriculture.

<sup>2</sup>In the liberalization studies done at IIASA, US crop commodity policies were left intact.

<sup>3</sup>Australia and New Zealand are treated together as Oceania.

---

## DISCUSSION OPENING—S. Kjeldsen-Kragh (Royal Agricultural University, Copenhagen)

The quantitative estimates of the impact of agricultural trade liberalization vary substantially depending on the model used. We should therefore look at the importance of the different assumptions behind the different models.

The IIASA model is a general equilibrium model where the agricultural sector is linked with the rest of the economy. What are the transmission mechanisms between the two sectors, and how important are those links?

An understanding of those links could cast some light on the results in Table 2. The impacts of the trade liberalization on the GDP in total and in the agricultural sector have opposite signs in some countries but not in other countries.

Table 2 shows that the agricultural sector in Australia will suffer from a multilateral trade liberalization among the OECD countries.

When some important countries liberalize their agricultural trade, world market prices will change. One has to make some assumptions about how the world market changes are transmitted to the internal markets in the countries that are not liberalizing.

Table 1 shows that a multilateral trade liberalization will in most cases give a production increase. The consumer price level in the developed countries will decrease and Maxwell assumes that the consumer price level in developing countries will increase. The price elasticities should then be higher in the developed countries than in the developing countries; or what other reasons lie behind the production increase?

Are the expenditures associated with the US set-aside programme incorporated in the model? Is the set-aside programme abandoned when trade is liberalized?

Quite often, nominal rates of protection are used as an indicator of the level of protection. These calculations exaggerate the level of protection because cereals and protein feeds are used as inputs in the livestock sector. Instead, one should use the effective rate of protection.

The simulation runs are for the period 1995-2000, meaning that a long-run adjustment has been taken into consideration. The parameters in the model are not unaffected by the price changes. The productivity gains in the long run are not independent of the price policy.

The results from the simulation model also depend on macroeconomic policies in the developed and the developing countries. The foreign exchange rate is a decisive factor influencing the world price level and the trade pattern.

*[Refer to the general discussion following Krissoff and Ballenger's paper on page 72.]*