



**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.*

# Developing Country Interests in Agricultural Trade Reform

**Rod Tyers**

*Department of Economics, The University of Adelaide, G.P.O. Box 498, Adelaide, S.A. 5001  
(Australia)*

(Accepted 10 January 1989)

---

## Abstract

Tyers, R., 1989. Developing country interests in agricultural trade reform. *Agric. Econ.*, 3: 169–186.

This paper examines whether developing countries, as a group, would be better off in the absence of agricultural protection in the industrial North and, if so, whether they should support reforms negotiated between the major players in the Uruguay Round. Results from the Tyers–Anderson GLS model of world food markets suggest that the net effect of industrial country agricultural protection is beneficial to developing countries, though by only a small margin, even if its removal were to stimulate accelerated technical change in developing countries. The same is found to be true of partial reforms which are more palatable politically, such as quotas to reduce oversupply in the EC. Of course, many developing countries, including those which are members of the Cairns Group, are badly hurt by protection in the North. Unfortunately, however, they and the other members of that group stand to gain comparatively little from the reduction of oversupply in the EC through quotas.

---

## 1. Introduction

The collapse in food commodity prices since the early 1980s (Fig. 1) has been exacerbated by the insulation of domestic markets in countries whose consumers and tax-payers can be prevailed upon or deceived into bearing the burden of assistance to farmers. The result has been a rapid increase in agricultural protection in the comparatively rich industrialised countries. In many developing countries, however, the political strength rests with consumers, whose subsidies have been made cheaper by low import prices, while farm prices have remained low. Increased agricultural protection in the industrial North has therefore facilitated the redistribution of income away from farmers in these countries.

But most developing countries are net importers of staple food products and

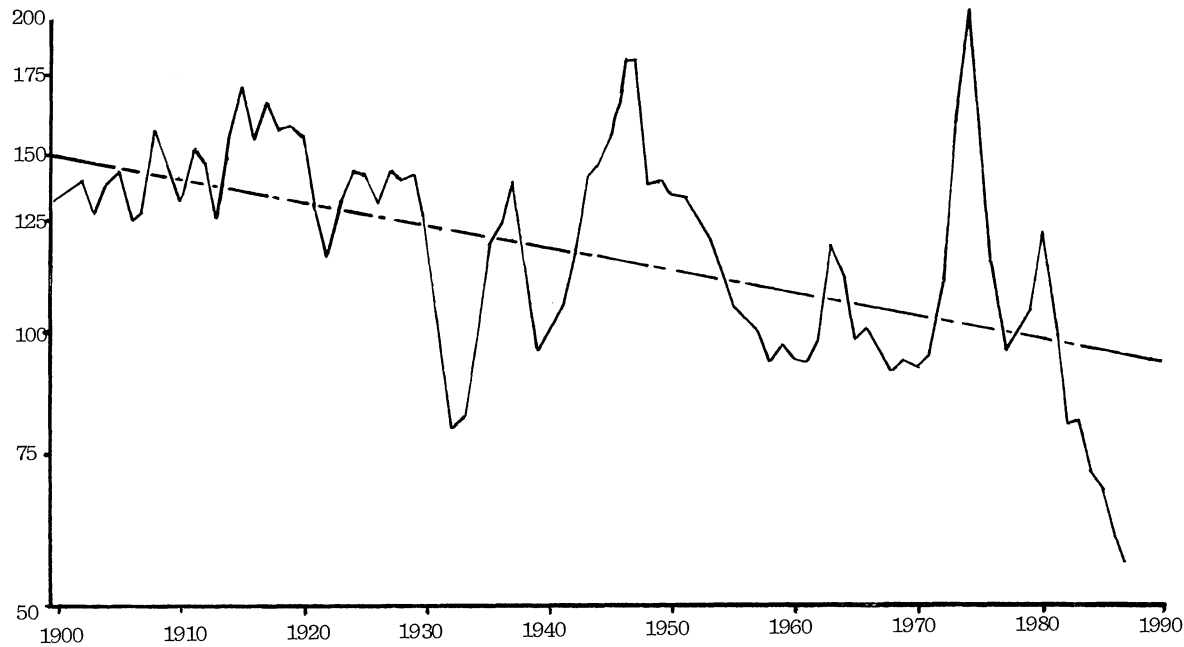


Fig. 1. Real international food prices, 1900 to 1987 (1977-79  $\cong$  100). An index of export prices in US dollars for cereals, meats, dairy products and sugar, deflated by the U.S. producer price index (primarily of industrial product prices), with weights based on the importance of each product in global exports in 1977-79.

Source: Tyers and Anderson (forthcoming), based mainly on price series from the World Bank's Economic Analysis and Projections Department.

might be expected to enjoy net welfare gains from low international prices. This is indeed the result obtained in a number of studies which have estimated net welfare impacts using partial equilibrium models, including two based on the Tyers–Anderson GLS model (see Koester, 1982; Koester and Schmitz, 1982; Mathews, 1985a; Tyers and Anderson, 1986; Anderson and Tyers, 1988). Nevertheless, the direction of this result has been the subject of criticism on a number of grounds.

One purpose of this paper is to extend the analysis using the Tyers–Anderson model to address one comparatively prominent criticism in recent writings: that the removal of protection in industrial countries would see more rapid technical change in developing country agriculture than has been observed. As a consequence, the developing world would become a net exporter of staple food products and it would therefore be a net beneficiary from industrial country reform (Bureau of Agricultural Economics, 1985; World Bank, 1986, pp. 130–131). A second purpose is to compare the welfare effects of a hypothetical liberalisation in industrial countries with those of a more feasible reform. As an example of such a reform, I have chosen the imposition of production quotas in the EC to a level sufficient to eliminate the oversupply of farm products the exports of which are now subsidised. Such quotas are likely to cause the reallocation of domestic resources toward import-competing (but still highly protected) farm products. They might therefore be expected to benefit food-exporting countries less than an across-the-board liberalisation.

The next section of the paper briefly reviews the background to the recent food market collapse. Section 3 then outlines the Tyers–Anderson GLS model and describes the simulation experiments carried out. The resulting estimates of the effects of industrial country reforms on international prices and trade are then discussed in Section 4, while in Section 5 the welfare implications of these reforms are presented. Section 6 then provides a summary of the conclusions drawn from the analysis.

## **2. Recent food market collapse**

In the two decades since the early 1960s, there have been a number of important changes in the pattern of global food production and trade. Despite the violent gyrations in commodity prices evident from Fig. 1, a number of these changes have been gradual. In the industrialised countries of Western Europe and Japan, for example, incomes have risen to levels at which food demand grows only slowly. The agricultural policies of these countries ensure, however, that farmers are comparatively insulated from world food markets. For this reason the growth rate of food production has not declined by as much as the corresponding rate for food consumption. The result is expanding surpluses, most notably in Western Europe.

In the centrally-planned countries of Eastern Europe and in developing

countries there has been a greater expansion in the level of demand for food. In many of these countries, despite prices which are depressed by protection in Western Europe and Japan, production has expanded and kept pace with demand. But in others the heavy taxation of agriculture through border distortions has retarded production growth. These groups of countries have therefore become net importers of food. As evidence of this, Table 1 lists the changes in rates of self-sufficiency in grains, livestock products and sugar (GLS) over this period. While Asia and Latin America have remained roughly self-sufficient in these commodities, the growing surplus in the industrial countries is offset by deficits in Africa, the Middle East and centrally-planned Europe.

These general trends have been overlain by a sequence of economic events which have brought about the sudden shifts in relative commodity prices indicated by Fig. 1. The most important among these is the petroleum boom of the early 1970s. This resulted in a very large redistribution of wealth and income toward a few countries in Africa, the Middle East, Southeast Asia and Latin America, where the responsiveness of food consumption to income growth remained high. This event coincided with a significant change of policy in centrally-planned Eastern Europe. Where domestic supply shortfalls had previ-

TABLE 1

Food (GLS) self-sufficiency (%)<sup>a</sup>

	1961-64	1980-83
Bangladesh	97	95
India	97	100
Pakistan	91	106
Korea, Rep.	91	69
China, Mainland	98	97
Taiwan	118	87
Indonesia	93	95
Philippines	109	101
Thailand	124	142
<u>Other Asia</u>	<u>98</u>	<u>92</u>
All developing Asia	98	98
Egypt and Sub-Saharan Africa	99	86
Other North Africa and Middle East <sup>b</sup>	89	68
<u>Latin America</u>	<u>117</u>	<u>116</u>
All developing countries	102	96
All industrial market economies	99	110
Centrally-planned Europe	99	91

<sup>a</sup>The aggregate percentages for the seven commodity groups are valued at average prices in international markets in 1980-82.

<sup>b</sup>Includes high-income, oil-exporting countries of the Middle East.

Source: Tyers and Anderson (forthcoming).

ously been managed by rationing, supply was now to be stabilised by changes in the level of imports (Johnson, 1975).

These major changes had a number of consequences which led to important secondary effects on food markets. Higher petroleum prices increased the cost of food production, in part by raising the cost of artificial fertiliser the output of which was limited at that time by a stagnant capital stock (Mitchell, 1987). In the Western industrialised economies, the mid 1970s became a period of high inflation, increasing speculative demand for commodities. The recycling of petrodollars forced real interest rates into negativity, thereby reducing pressure on many developing countries to restrain imports. Thus, even in non-oil-exporting developing countries, imports of food began to expand. Both the primary and secondary effects of these two major events led to a substantial expansion in food import demand while in the early 1970s their effects on fertiliser prices tended to retard food production. The result was an unprecedented surge in relative food prices.

Farmers in the industrialised countries responded to the high product prices and low interest rates by investing heavily in new, more energy-efficient farm capital, achieving substantially increased output by the end of the decade. The EC became a net food exporter. Then, in the early eighties, a new government had been installed in Washington prepared to borrow heavily to build up the American defence forces. Interest rates rose dramatically and inflation slowed. Developing countries had again to actively restrain imports. Speculative demand for commodities collapsed. American farmers were suddenly squeezed as their debt service costs rose and their farm product prices were driven down by US dollar appreciation. The response to this was the Food Security Act of 1985, which transformed United States policy from one which stabilised world cereal prices through the holding of public stocks to one of pure agricultural protection through deficiency payments.

These important changes in United States policy coincided, unfortunately, with significant events in China and the Soviet Union. In China, a major liberalisation of agricultural policies in the late 1970s brought forth near-self-sufficiency in cereals in the 1980s. In the Soviet Union, bumper cereal crops were achieved which reduced net imports in 1985 by at least 20 million tonnes.<sup>1</sup> The resulting decline in world net cereal import demand by the mid-1980s is quantified in Table 2. Its greatest contributor is Western Europe, where insulating policies have seen the level of agricultural protection rise substantially as international food markets have collapsed.<sup>2</sup>

<sup>1</sup> tonne = 1000 kg.

<sup>2</sup> Model simulations, presented in Section 4, provide projections of the levels of protection of GLS producers in industrial and developing countries from a base period of 1980-82 to 1988. The insulation of markets during the international price collapse is thus projected to have raised 1988 nominal protection coefficients in industrial countries by about half and those in developing countries by a quarter.

TABLE 2

Trends in net imports of wheat and coarse grains (million tonnes)

	1960-63	1980-83	1984-86 <sup>a</sup>
Western Europe	26	10	-8
Centrally-planned Europe	-1	44	43
Japan	5	24	27
China	5	15	7
Other developing countries	17	58	67
Total	51	150	136

<sup>a</sup>Based on data for end 1986. Numbers for 1985 are preliminary and those for 1986 are estimates. Source: Economic Research Service, U.S. Department of Agriculture, Washington, DC.

It is this protectionist response by the major industrial market economies which has greatly exacerbated the backlash which could only have been expected following the boom of the 1970s and the changed macroeconomic policies of the United States. The approaches adopted in this paper to the estimation of its extent and its effects on developing countries are discussed in the following section.

### 3. Simulation experiments

To measure the international effects of distortions in several different food commodity markets, a global multi-commodity model is required. In this study the Tyers-Anderson GLS model is used. It is described in detail elsewhere (Tyers, 1985; Tyers and Anderson, 1986; Anderson and Tyers, 1987; Tyers and Anderson, forthcoming), so only a brief summary of its important characteristics is necessary here. It is a dynamic simulation model of world markets for seven commodity groups: rice, wheat, coarse grains, meats of cattle and sheep, meats of pigs and poultry, dairy products, and sugar. It is not a general equilibrium model in that markets for other tradable goods; services, factors of production, and non-tradables are excluded. Currency exchange rates therefore enter as exogenous variables. This drawback is offset, however by a number of useful features:

- (1) It is global in coverage and disaggregated into 30 countries and regions.
- (2) It incorporates the cross-effects in both production and consumption between the interdependent markets for the seven food products included. This includes input-output relationships linking livestock production with derived feedgrain demand.

- (3) It has a dynamic mode, in which the effects of policy or structural changes in a particular year can be simulated for every subsequent year, as well as a static equilibrium mode which simulates the effects of those changes after any desired degree of adjustment.
- (4) Stock-holding behaviour is endogenous, based on an empirical analysis of stock-level responses to price and quantity changes in each country.
- (5) And, most importantly, policy is endogenous to the extent that price transmission equations are used to incorporate the two key features of each country's food-price policies. These are the protection component, which raises the trend level of domestic food prices above that at the border, and the insulation component, which limits the effects on domestic market prices of disturbances in domestic supply or border prices.

The model is used first to derive a reference projection from the base period, 1980–82, to 1995, for which it is assumed that each country's policy regime (in particular, the degree to which domestic markets are insulated) will remain unchanged. Included in this simulation are the global shocks in the period 1982–85 due to the changes in real interest and exchange rates, land set-asides in the United States and production fluctuations in the Soviet Union. Thereafter the exogenous macroeconomic variables are based on forecasts by Wharton Econometric Forecasting Associates (1986), and the provisions of the United States Food Security Act of 1985 are approximated based on the work of Johnson et al. (1986).

Against this reference projection are compared two others in which policy regimes are not assumed to remain constant. These are first, the liberalisation between 1988 and 1995 of all government intervention in industrial countries and, second, the retention of all policy regimes except that of the EC, where production quotas are tightened on products which remain in surplus in the 1990s.

To address the criticism of earlier analyses of this type that too little account is taken of the effects of protection on rates of technical change, the industrial country liberalisation scenario is completed in two versions. These differ in their assumptions about long-run elasticities of supply response. To explain this difference it is necessary to enlarge somewhat on the representation of production behaviour in the model.

For each of the seven commodity groups, if relative prices were to remain at their base period values, production would grow along a fixed-rate trend. Deviations from this trend occur due to changes in relative prices, the magnitudes of which depend upon short and long-run elasticities of supply response according to a Nerlovian lagged adjustment formulation. In this model, the effects of induced innovation on output should be captured in the estimates of long-run supply elasticities. The fixed-rate price-independent trend should re-



flect only that level of technical change which would be stimulated by the prospect of cost reduction in the presence of stable product prices.

These parameters are particularly difficult to estimate in time series analysis, however. It is likely that liberalisation in Western Europe and Japan would lead to a sustained decline in their farm prices of unprecedented magnitude, combined with greater uncertainty about future price levels. One response of their farms to this might well be a deceleration in the rate of technical change beyond that represented in the available elasticity estimates. Similarly, the opening of markets in these countries to imports might be expected to stimulate investment in agriculture abroad, including in developing countries.

To examine this possibility an additional simulation of the industrial country liberalisation case was completed. This time it was assumed that the previously price-independent component of production growth in all countries is larger by 1% per year for each 10% by which farm prices increase. Since the adjustment is assumed to take place between 1990 and 1995, the change is roughly the equivalent of an increase in all long-run supply elasticities by 0.5.

The fourth scenario, that of tightened EC production quotas, arises out of a search for reforms which are likely to be more politically palatable than across-the-board liberalisation (Tyers, 1986). This option has the advantage that it greatly reduces export restitution costs (the major drain on the EC budget) while causing only minimal reductions in the welfare of politically powerful EC farmers. It is designed as follows. Without changing domestic farm prices, quotas are imposed which reduce production just sufficiently to eliminate export surpluses. Exceptions to this rule are the quotas on wheat and sugar production. Results from the model suggest that the EC would continue to export these products even if it removed all its intervention in GLS markets unilaterally (Tyers, 1986). The quotas on wheat and sugar production are therefore imposed such that the net exports of these products do not exceed those which would prevail under unilateral liberalisation.

### **3. Effects of industrial country reforms**

The effects of industrial country reforms on the projected 1995 international prices and quantities produced, consumed and traded are summarised in Table 3. For the prices an index is used which has as weights world trade volumes in the base period. The quantities are represented by aggregate GLS self-sufficiency ratios (ratios of GLS production to consumption, measured in value terms at border prices).

In all three reform scenarios international prices would rise substantially, by 13% in the case of the tightening of EC quotas and by 30% with the removal of all intervention by industrial country governments. As expected, self-sufficiency in industrial countries declines in all cases, while that of developing countries increases. With total liberalisation in industrial countries the im-

TABLE 3

Projected long-run price and quantity effects of industrial country reforms, 1995<sup>a</sup>

	Reference (fixed policy regimes)	Industrial country liberalisation		EC-12 quotas
		Reference technical change	Adjusted technical change <sup>b</sup>	
Index of international food (GLS) prices (1980–82 = 100) <sup>c</sup>	54	71	69	61
Average self-sufficiency ratio (%) <sup>d</sup>				
EC-12	106	87	77	97
Japan	48	18	14	48
All industrial market economies	104	90	84	102
Bangladesh	63	71	73	65
India	94	101	105	96
Pakistan	81	95	99	84
Korea, Rep.	64	69	68	64
China, Mainland	96	100	102	96
Taiwan	82	87	89	83
Indonesia	91	97	97	92
Philippines	110	113	115	112
Thailand	147	156	159	150
Other Asia	72	76	77	72
All developing economies	93	103	106	94

<sup>a</sup>These results are based on a solution of the equilibrium version of the GLS model in which exogenous variables such as population, GDP, real exchange rates, and the price-independent component of production are set at their 1995 values. It therefore simulates the effects of industrial country liberalisation after full adjustment by all agents as of 1995.

<sup>b</sup>Technical change (the growth rate of the price-independent component of production) is increased by 1% per year for each 10% by which producer prices increase. Supply adjustment is assumed to take place over 5 years. This change is therefore roughly equivalent to increasing all long-run supply elasticities by 0.5.

<sup>c</sup>International prices are weighted by the volumes of international trade in GLS commodities as of 1980–82.

<sup>d</sup>This is the ratio of the value of production, measured at border prices, and the similarly measured value of consumption.

Source: simulations of the GLS model described in the text.

provement in the self-sufficiency of developing countries as a group is substantial. They move from a net deficit of 7% to a surplus of 3%, or, with accelerated technical change, 6%. This change is most pronounced in India, China and

Indonesia, where about half the rise in international prices is projected to be transmitted to domestic producers by 1995.

An important result in the total liberalisation scenarios is the very large decline in the self-sufficiency ratio of Japan. Such a change is quite unlikely to achieve acceptance there. But, while the more feasible tightening of production quotas in the EC does eliminate its costly food surplus, it has only a slight effect on the level of self-sufficiency of developing countries as a group. In this scenario the change in the net trade of the EC is more modest than in the total liberalisation scenario and it is almost offset by the expansion of net exports by Australia, New Zealand and Canada.

The levels of protection of food producers projected under each scenario are summarised in Table 4. The first column lists average nominal protection coefficients in the base period. The second two columns show how these coefficients change in the interval through 1995 under the reference assumption, namely that all trade policy regimes remain unchanged. Note that changes in levels of protection depend on both projected trends in international prices and the degree to which domestic markets are insulated. Since international prices are projected to bottom out in 1987 and 1988 and then to rise somewhat in the 1990s, average nominal protection coefficients tend to rise in the late 1980s and to recede slightly by 1995. The degree of insulation is highest in

TABLE 4

Average nominal protection coefficients for food (GLS) products<sup>a</sup>

	Estimated 1980-82	Projected 1988	Projected 1995		
			Reference (fixed policy regimes)	Industrial country liberalisation	EC-12 production quotas
EC-12	1.55	2.25	2.10	1.0	1.55
EFTA-5	1.90	3.15	3.35	1.0	3.14
Japan	2.35	3.80	3.65	1.0	3.59
United States	1.20	1.50	1.25	1.0	1.21
Canada	1.19	1.40	1.30	1.0	1.29
Australia	1.05	1.12	1.07	1.0	1.06
All industrial market economies	1.40	2.02	1.84	1.0	1.56
All developing countries	1.03	1.32	1.27	1.10	1.22

<sup>a</sup>Averages are taken across GLS commodity groups using production valued at border prices as weights.

Source: The estimated coefficients are based on comparisons of domestic with border prices detailed in Tyers and Anderson (forthcoming). The projections are from reference simulations of the food trade model, assuming all policy regimes remain unchanged through 1995.

Western Europe and Japan and therefore the increases in protection are greatest in these economies.

Total liberalisation in industrial market economies reduces their average nominal protection coefficients to unity by 1995 (column 4 of Table 4). Since international prices are higher in 1995 under this scenario, average protection coefficients for developing countries are lower in that year. In the case of the tightening of EC production quotas, the principal effect is the reduction by half of the average degree to which its domestic GLS markets are distorted. Again, international prices are higher in this scenario than in the reference case and therefore average protection levels are somewhat lower in other countries. Changes such as these have important implications for aggregate economic welfare, which is influenced not only by shifts in the terms of trade, but also by the degree to which domestic markets are distorted. These implications are explored further in Section 5.

## 5. Implication of industrial country reforms

The net welfare effects of total liberalisation by industrial market economies can be crudely represented graphically, as in Fig. 2. If the industrial countries impose an average export subsidy of size  $ab$  per unit, the international market equilibrium is at point  $b$ . The cost of this subsidy to tax-payers is measured by area  $abd$ . Assuming the average distortion in the developing country bloc is zero, the global economic cost of intervention by industrial countries is then measured by area  $abc$ . This is the amount by which global economic welfare would be improved with total liberalisation by industrial countries. But the developing country group would not necessarily gain. As Fig. 2 is drawn, even though the developing country group is a net exporter after liberalisation, its economic surplus would decline by a sum equal to area  $ebd$  minus area  $cfe$ . Even if accelerated technical change should subsequently lower the excess supply curve of this group, say to a new international market equilibrium at  $j$ , a net welfare gain by the group is not assured. The achievement of such a gain would require that area  $hjk$  exceed area  $ebd$  by at least the social cost of the new technology.

In what follows these changes in economic welfare are measured more formally, from GLS model results. The analytical formulations used are based on the Hicksian equivalent variation in income and take full account of the interactions between the seven commodity groups included in the study. Details are provided in Tyers and Anderson (forthcoming).<sup>3</sup> Before presenting the more formal estimates of welfare impacts, however, it is useful to introduce implicit

<sup>3</sup> Relevant chapters from Tyers and Anderson (forthcoming) are available on request from the authors.

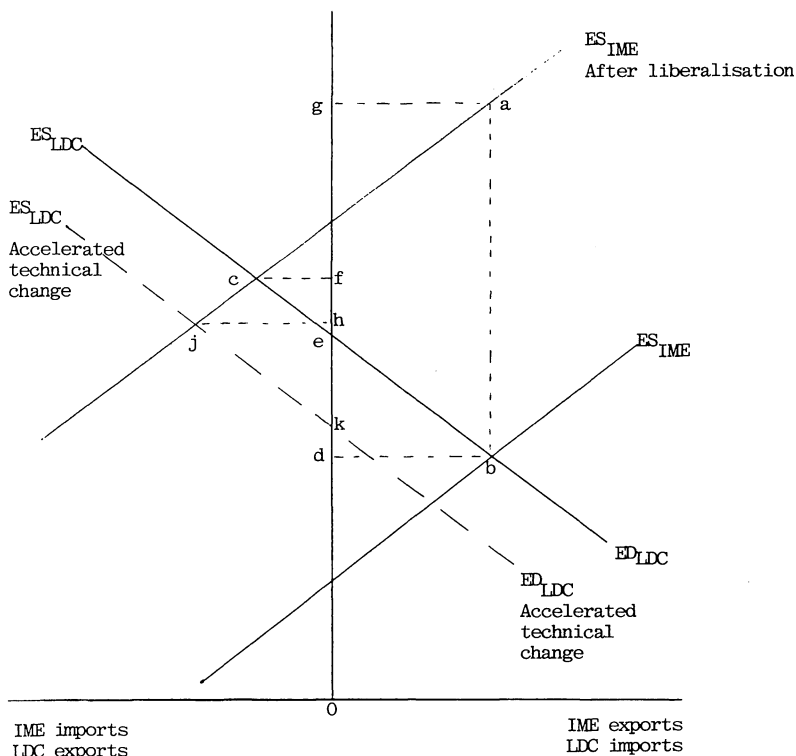


Fig. 2. Equilibrium before and after IME liberalisation.

welfare weights as complementary measures for the assessment of the political feasibility of policy changes.

The concept of implicit welfare weights was introduced in the work on taxation by Christiansen and Jensen (1978) and Ahmad and Stern (1984). Its first application to agricultural trade was by Sarris and Freebairn (1983). It was further used to examine the political feasibility of alternative reforms in the EC by Tyers (1986). In his paper the welfare impacts of protection in the EC are disaggregated into effects on producers of each commodity group, consumers and tax-payers. If the economic welfare of each of these groups were equally weighted by the political process, export-subsiding protection would not be welfare-improving in the EC. This is no longer the case, however, if the weights are unequal. For any particular pattern of protection, then, there is a set of welfare weights which ensure that this pattern maximises weighted aggregate welfare.<sup>4</sup> These are the implicit welfare weights.

Estimates of the weights implicit in the protection policies of the industrial

<sup>4</sup> If the model is formulated linearly, there is but one unique set of implicit welfare weights.

TABLE 5

Welfare weights implicit in estimated food price distortions

	Consumers	Tax-payers	Producers of		
			Grains	Livestock products	Sugar
EC-12	0.75	0.94	1.08	1.18	1.05
EFTA-5	0.74	0.92	1.15	1.17	1.02
Japan	0.59	0.91	1.04	1.25	1.21
United States	0.81	0.93	1.03	1.24	1.00
Canada	0.82	0.96	1.03	1.14	1.06
Australia	0.92	0.97	1.01	1.10	1.00

Source: The weights are based on estimated price distortions and recorded levels of production and consumption in each country as described in the text.

market economies are listed in Table 5. In all cases producer groups carry the greatest weight and consumers the least. Livestock producers, and particularly the dairy industry, are generally most highly protected and therefore carry the greatest implicit weight. To the extent that these weights reflect the capacity of livestock producers to influence the policy process, proposed reforms which reduce the welfare of this group are likely to meet fierce resistance. It is appropriate, therefore, to also examine reforms which improve global economic efficiency but which impair only minimally the welfare of influential groups. The tightening of production quotas in the EC is one such reform.

Returning to the case of total liberalisation by all industrial market economies, estimated welfare impacts based on GLS model projections to 1995 are presented in Table 6. These results show clearly that farmers in industrial countries would be the most substantial losers from such a liberalisation and consumers in those countries the most substantial gainers. Elsewhere in the world the opposite is true. Since international prices would be higher in the event of such a liberalisation, farmers would tend to gain and consumers would tend to lose, though by smaller amounts.

The unweighted net welfare effect of this policy change in industrial countries is a gain of US\$14 billion.<sup>5</sup> When the implicit welfare weights of Table 5 are applied, however, a substantial net loss results. In the case of developing countries, for the reasons spelled out in the discussion of Fig. 2 their switch to a net food surplus is insufficient to make liberalisation by industrial countries welfare-improving. This depends, of course, on the magnitude of the acceleration in technical change which would occur in developing countries. But this result suggests that this acceleration would need to achieve substantially more

<sup>5</sup> billion (US) = 10<sup>9</sup>.

TABLE 6

Projected annual welfare impacts of industrial country liberalisation, 1995<sup>a</sup> (1985 US\$ billion)

	Effects on the welfare of			Net welfare effect <sup>b</sup>	Weighted welfare effect <sup>c</sup>
	Farmers	Consumers	Tax-payers		
All industrial market economies	-82	83	13	14	-19
Developing Asia	24	-20	-10	-6	-7
Latin America	14	-8	7	13	11
Egypt, Sub-Saharan Africa	5	-6	-4	-5	-8
Other North Africa, Middle East	4	-5	-5	-5	-5
All developing economies	47	-39	-12	-3	-9
Cairns Group	15	-7	6	14	11

<sup>a</sup>The results shown are for the case in which the rate of technical change adjusts to changes in domestic prices. They are similar to those based on the assumption that no such adjustment takes place, except that the net loss (unweighted) of developing countries as a group increases from US\$3 billion to US\$14 billion.

<sup>b</sup>The net welfare effect is the sum of the effects on farmers, consumers and tax-payers. To this is added a (usually small) allowance for changes in the net cost of stock-holding.

<sup>c</sup>The weighted welfare effect is the weighted sum of the effects on consumers, tax-payers and the seven commodity-specific (GLS) producer groups. The weights are as summarised in Table 5.

Source: Simulations based on the GLS model described in the text.

on average than a 1% per year increase in output growth for every 10% increase in farm prices.

Even then, this does not take account of the comparatively larger weighting in the political systems of developing countries which is accorded to consumer interests. Since the weighted welfare loss by developing countries is larger than its unweighted counterpart, widespread support for such a liberalisation by developing countries as a group would require a still larger acceleration in production. It could, of course, result from compensation in other forms. But this is unlikely to be forthcoming when the weighted welfare impacts are negative in both industrial and developing countries.

One group which would benefit significantly from such a liberalisation is the Cairns Group of 'fair trading' agricultural exporting nations. While the major exporters in this group are Canada and Australia, its membership of 14 comprises mostly developing countries. The net gains made by members of this group are nevertheless insufficient to compensate for net losses by other countries.<sup>6</sup>

Turning, finally, to more feasible reform opportunities. It is evident from

<sup>6</sup> The bargaining power of the Cairns Group might well be enhanced, however, if its members were prepared to alter their generally high levels of manufacturing protection.

TABLE 7

Welfare effects of EC production quotas<sup>a</sup> (1985 US\$ billion)

	Effects on the welfare of			Net welfare effect <sup>b</sup>	Weighted welfare effect <sup>c</sup>
	Farmers	Consumers	Tax-payers		
EC-12	-10.0	-3.8	24.8	11.0	1.4
EFTA-5, Japan	1.2	-0.9	-0.9	-0.6	-0.1
North America, Australasia	2.9	-2.4	1.1	1.6	1.8
All industrial market economies	-5.9	-7.1	25.0	12.0	3.1
Developing Asia	7.9	-8.9	-3.2	-4.2	-2.8
Latin America	2.1	-2.0	0.9	1.0	0.9
Egypt, Sub-Saharan Africa	0.8	-1.6	-0.9	-1.7	-1.4
Other North Africa, Middle East	0.7	-1.3	-1.2	-1.8	-1.5
All developing economies	11.5	-13.8	-4.4	-6.7	-4.8
Cairns Group	4.4	-3.2	-0.2	1.0	1.3

<sup>a</sup>Production quotas are applied in the EC to a level just sufficient to eliminate subsidised exports which are larger in volume than those which would prevail if the EC were to liberalise totally. Thus, the EC continues to export both wheat and sugar but it becomes roughly self-sufficient in the other commodities.

<sup>b</sup>The net welfare effect is the sum of the effects on farmers, consumers and tax-payers. To this is added a (usually small) allowance for changes in the net cost of stock-holding.

<sup>c</sup>The weighted welfare effect is the weighted sum of the effects on consumers, tax-payers and the seven commodity-specific (GLS) producer groups. The weights are as summarised in Table 5.

Source: Simulations based on the GLS model described in the text.

Table 7 that these are likely to include some tightening of production quotas in the EC. This is because weighted net welfare in the EC is not diminished by this change of policy. Gains to tax-payers from a leaner CAP are sufficient to outweigh modest losses by farmers.<sup>7</sup> Developing countries would still be substantial losers from such a reform, however. International prices would rise, particularly for wheat and sugar but mostly for dairy products, which developing countries continue to import.

Such a reform would divert domestic resources in the EC into the production

<sup>7</sup> The discovery of a policy other than the status quo which raises weighted welfare appears at first glance to contradict the definition of the implicit weights – that they are the ones which render the existing policies optimal. The reason is that the weights are instrument-specific. In their derivation, the array of instruments available included only direct price distortions, such as tariffs, variable levies and export subsidies. The addition of different instruments, such as production quotas, therefore has the potential to increase weighted welfare beyond status quo levels. It is, then, legitimate to ask why this extended combination of instruments is not in evidence at levels predicted by the model results. A number of reasons for this are canvassed in Tyers (1986). The issue is peripheral to this paper, however. It is sufficient to consider the weights as rough indices of political strength.



of previously imported products. The result would be a more self-sufficient community with only negligible imports of rice and grains for animal feed. The benefits to the Latin American countries, and to the Cairns Group of agricultural exporters, are therefore markedly lower than those from a hypothetical total liberalisation by industrial countries.

## 6. Conclusions

The results presented in this paper tend to support the conclusion from earlier studies based on partial equilibrium models that developing countries as a group would not be beneficiaries were industrial market economies to liberalise their agricultural trade policies. The argument that accelerated technical change would quickly turn the food deficit of developing countries into a surplus is supported. But this is not sufficient to guarantee a net welfare gain. To achieve such a net gain, the acceleration would need to increase production growth on developing country farms, over and above the supply response which would be anticipated based on historical adjustments to price changes, by substantially more than a 1% per year for every 10% increase in farm prices.

It should be noted, however, that this result addresses only one of a number of criticisms of past studies. Other criticisms include the following:

First, the result is specific to staple foods, which exclude important farm products exported by developing countries, such as edible oils, beverages and rubber (World Bank, 1986, pp. 130–131). While this is true, the principal markets subject to the agricultural trade disputes are those for grains, livestock products and sugar. These markets, all of which are included in the Tyers–Anderson studies, are therefore most likely to be affected by reforms emanating from the current round of negotiations.

Second, developing countries also distort their markets for staple foods. If liberalisation by industrial countries were to provide incentives to reduce these distortions, aggregate welfare in developing countries would improve (World Bank, 1986). This is not disputed, but it suggests that distortions in developing countries are designed to offset the effects of protection in the North. In the case of grains, for example, not only do policies in many developing countries fail to offset the distortion of the terms of trade facing farmers due to protection in the North but they actually reinforce it.

Third, partial equilibrium analysis ignores indirect effects through factor and foreign exchange markets. Thus, liberalisation in the industrial North would improve the efficiency with which primary factors are allocated between sectors and therefore increase income, raising the demand in the North for the exports of developing countries (Mathews, 1985b). But it would also result in more competitive manufacturing sectors, particularly in Japan and Western Europe, and hence retard the process which has been most important in the spectacular growth performances of the newly industrialising countries (NICs),

namely the relocation of manufacturing production to developing countries. While these indirect effects may be important, they have as yet not been satisfactorily estimated in global general equilibrium studies.

Finally, the above debate centres on a 'total' liberalisation by industrial market economies, a policy change which will remain hypothetical. Reforms which are more feasible politically, one of which is examined in this paper, are likely to have very much more modest effects on both industrial and developing countries. Quotas restraining the EC's export surplus in some food products will also reduce its imports of others. While they would reduce the domestic economic cost of protection in the EC, and hence increase global economic welfare, the gains to food-exporting developing countries are likely to be small. Net losses from higher international prices continue to accrue to food-importing developing countries and these dominate the results for developing countries as a group.

## Acknowledgement

This paper has benefited from valuable comments from Bruce Marion, Shunyi Shei and others at the Conference on Directions and Strategies of Agricultural Development in the Asia-Pacific Region, held at the Institute of Economics, Academia Sinica, Taipei, in January 1988.

Any errors remain the responsibility of the author.

## References

- Ahmad, E. and Stern, N., 1984. The theory of reform and Indian indirect taxes. *J. Public Econ.*, 25: 259-298.
- Anderson, K. and Tyers, R., 1988. Global effects of liberalising trade in agriculture. *Thames Essay 55*, Trade Policy Research Centre, London.
- Bureau of Agricultural Economics, 1985. Agricultural policies in the European community. Policy Monogr. 2, Bureau of Agricultural Economics, Ministry of Primary Industry, Canberra, A.C.T.
- Christiansen, V. and Jansen, E.S., 1978. Implicit social preferences in the Norwegian system of indirect taxation. *J. Public Econ.*, 10: 217-245.
- Gunasekera, A.D.B.H. and Tyers, R., 1987. Distortions in international food trade and their impact on the ESCAP region. Background paper prepared for the United Nations ESCAP Economic and Social Survey of Asia and the Pacific 1987, Bangkok.
- Johnson, D.G., 1975. World agriculture, commodity policy and price variability. *Am. J. Agric. Econ.*, 57: 823-828.
- Johnson, S.R., Meyers, W.H., Womack, A.W., Young, R.E. and Helmar, M.D., 1986. The Food Security Act of 1985: a ten-year perspective. Staff Rep. 2-86, Food and Agriculture Policy Research Institute, University of Missouri-Columbia and Iowa State University.
- Koester, U., 1982. Policy options for the grain economy of the European community: implications for developing countries. Res. Rep. 25, International Food Policy Research Institute, Washington, DC.

- Koester, U. and Schmitz, P.M., 1982. The EC sugar policy and the developing countries. *Eur. Rev. Agric. Econ.*, 9: 183-204.
- Mathews, A., 1985a. *The Common Agricultural Policy and the Less Developed Countries*. Gill and Macmillan, Dublin.
- Mathews, A., 1985b. The CAP and developing countries: a review of the evidence. In: C. Stevens and J. Verloren van Themaat (Editors), *Pressure Groups, Policies and Development*. Hodder and Stoughton, London.
- Mitchell, D.O., 1987. Factors affecting grains prices: 1970-84. *Economic Planning and Projections Department*, World Bank, Washington, DC.
- Sarris, A.H. and Freebairn, J., 1983. Endogenous price policies and international wheat prices. *Am. J. Agric. Econ.*, 65: 214-224.
- Tyers, R., 1985. International impacts of protection: Model structure and results for EC agricultural policy. *J. Policy Modeling*, 7: 219-251.
- Tyers, R., 1986. Implicit welfare weights and the assessment of negotiable trade reforms. *Work. Pap. Trade Dev.* 86-13, Department of Economics, Research School of Pacific Studies, Australian National University, Canberra, A.C.T.
- Tyers, R. and Anderson, K., 1986. Distortions in world food trade: a quantitative assessment. Background paper for the World Development Report 1986. Oxford University Press for the World Bank, New York.
- Tyers, R. and Anderson, K., forthcoming. *Distortions in world food markets*. Cambridge University Press, Sydney, N.S.W.
- Wharton Econometric Forecasting Associates 1986. *World Economic Outlook*. Philadelphia, PA.
- World Bank, 1986. *World Development Report 1986*. Oxford University Press, New York.