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## THE CHALLENGE TO ECONOMISTS OF MULTILATERAL TRADE NEGOTIATIONS ON AGRICULTURAL PROTECTION<sup>†</sup>

The Uruguay Round for the first time placed agriculture high on the agenda for multilateral trade negotiations (MTNs). The previous seven MTN rounds under the auspices of the General Agreement on Tariffs and Trade (GATT) had failed to focus on agriculture, in large part because the domestic policies affecting agricultural trade were deemed too politically sensitive. The inclusion of the issue of the rules for trade in temperate farm products in the Uruguay Round, which began in 1986, represented a new challenge for both policymakers and analysts.

How much has been learned about both the economics and the political economy of agricultural policy as a result of agriculture's inclusion in the Uruguay Round negotiations? What have been the contributions by economists in recent years to that improved understanding? How has this analysis been applied in the process of trade negotiations? Have the issues changed over the course of the discussions? How have economists responded to the changes in emphasis? Have analytical techniques responded to the policy challenge, or are advances in analysis driven by other forces? What are the priority areas for future research that could help reduce the disarray in world food markets?

This paper does not attempt a comprehensive answer to these questions. Instead, it focuses on three significant issues and the analyses that these issues have generated. The first is that of measuring the extent of distortions to incentives in world food markets, identifying their patterns across countries and over time, and using this information in negotiations; the second is the exploration of the effects of those distortions, particularly on prices, produc-

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tion, trade, income distribution, and efficiency of resource use in both developed and developing countries; and the third is an explanation of the adoption by governments of producer-biased policies and their reluctance to reform those distortionary policies. Even though there is considerable overlap and interaction among these three areas, for convenience they will be treated sequentially. The paper then considers some key topics for further research, including the need to understand the dynamics of policy change, the changing role of the agricultural sector in world trade, and the reaction of agricultural policies to new agenda items including the environment.

### THE EXTENT AND PATTERN OF AGRICULTURAL DISTORTIONS

The emergence of domestic agricultural policies as an issue of significance in trade negotiations contributed to the demand for quantitative information on existing policies and their effects. Detailed information on national policies on a comparable basis was not generally available. Countries published and exchanged verbal descriptions of their policies, as in the periodic Organization for Economic Cooperation and Development (OECD) reviews of agricultural programs, but rarely went below the official explanation of their impact. For economists wishing to model these policies and their international effects, the lack of data inhibited such studies or made their results unreliable. For countries seeking to negotiate on the trade impact of such policies, the lack of quantitative indicators was restrictive.

#### *The Development of Quantitative Protection Measures*

The simplest possible indicator of the extent of distortion to a national commodity market of an open economy is the domestic-to-border price ratio or nominal protection coefficient (NPC). Some NPC estimates for limited time periods were available for Western Europe (Gulbrandsen and Lindbeck, 1973) and East Asia (Anderson, 1983), and several other studies provided general indications of the extent of agricultural distortions (Johnson, 1973; McCalla, 1969; Schultz, 1978; Tracy, 1982). Yet as of the early 1980s estimates of even this index were not available for the main traded farm products on a comparable basis across the major countries of the world.

For comparing protection levels for the agricultural sector across countries and for global quantitative modeling of the trade and welfare effects of that protection, it was necessary to have as a minimum a set of NPCs estimated with the same methodology, for the same time period, for the main traded farm products, and for the major trading economies. The first collection of such data was commissioned by the World Bank as a background paper for its *World Development Report* of 1986.<sup>1</sup>

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<sup>1</sup> This set of NPCs is given in Annex B in Tyers and Anderson (1986). The NPC

International organizations were aware of this lack of quantitative policy information. In 1972, the FAO, under a program for "International Agricultural Adjustment," began to compute indicators of the level of protection for a small number of developed countries (FAO, 1973, 1975). The measures chosen were the Producer Subsidy Equivalent (PSE) and the companion Consumer Subsidy Equivalent (CSE). These indicators had been used in Australia in 1965 as a way of indicating the value to producers of tariff protection (Corden, 1971, p. 8). Adapted by the FAO, they became a way to incorporate all agricultural policies that had an effect on purchased input or output prices, by combining them into one "subsidy equivalent"—i.e., the subsidy that would have the same effect. The FAO published estimates of PSEs for selected industrial countries from 1977 to 1985 as a part of its biennial report on international agricultural policy changes (FAO, 1977, 1979, 1981, 1983, 1985).

The FAO work was followed up later in the 1980s by the OECD, which began calculating producer and consumer subsidy equivalents of agricultural support policies for its member countries. This was in response to the mandate, given by the OECD ministers to its Secretariat in 1982, to study the impact of domestic agricultural policies on international trade. The OECD PSEs (and CSEs) were first made available in 1987 and have subsequently been updated annually and extended to include more countries.<sup>2</sup>

A summary of the levels of PSEs over the 1980s, as measured by the OECD, is provided in Table 1.<sup>3</sup> These estimates confirmed that agricultural protectionism is widespread among industrial countries and that the degree of protection accelerated in the 1980s to unprecedented levels. By 1987 about one-half of the producer receipts (not net income) came from transfers from farm programs. Among countries, Japan stands out as having the highest level of transfer over this period, but the magnitude of protection in Canada and the United States—usually assumed to have relatively mild agricultural policies—is striking. The commodity composition of this protection was not altogether unexpected. Rice, sugar, and dairy production were known to benefit from high levels of protection. But the extent of protection for beef and oilseeds is

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estimates were based on the methodology used by Anderson (1983); details appear in Appendix 1 of Anderson, Hayami, and others (1986).

<sup>2</sup> The initial estimates, for the major OECD countries, were published in OECD (1987). More recent updated estimates are reported in OECD (1988, 1989, 1990, 1991, and 1992). The complete set of PSEs and CSEs is available from the OECD on a floppy disk.

<sup>3</sup> The U.S. Department of Agriculture has also calculated a set of PSEs and CSEs, based on a similar method to that of the OECD. The initial results were published in Mabbs-Zeno et al. (1988) and were updated in Webb, Lopez, and Penn (1990). A comparison between the USDA and OECD calculations and methods is given in Josling and Tangermann (1990).

noteworthy. It is also significant that PSE levels did not drop in the period of firm prices in 1988/89 to the levels of the early 1980s. Protection seems to ratchet up with each shock in world prices.

Table 1.—Producer Subsidy Equivalents for Agricultural Products,  
OECD Countries, 1979 to 1990  
(Percent of receipts)

	1979-86	1987	1988	1989	1990
Australia	12	11	9	10	11
Canada	32	49	42	37	41
Economic Community	37	49	46	41	48
Japan	66	76	74	71	68
New Zealand	25	14	7	5	5
United States	28	41	34	29	30
Average of above countries	37	50	46	41	44
Average, by commodity					
Wheat	31	61	46	30	47
Coarse grains	28	56	43	35	39
Rice	74	90	85	82	83
Oilseeds	15	33	27	27	31
Sugar	49	73	62	47	53
Milk	60	70	62	60	68
Beef	41	44	49	44	43
Crops, average	36	62	51	43	49
Livestock, average	37	43	43	40	42

Source: Organization for Economic Cooperation and Development, *Monitoring and Outlook of Agricultural Policies, Markets, and Trade*, Paris, May 1992.

The PSE estimates capture the impacts of input policies as well as output policies, but relate support to actual gross receipts. Protection estimates, both nominal and adjusted nominal (i.e., with input price adjustments), compare actual prices to the policy-free ("world") prices. These estimates would therefore be numerically greater. Moreover, the growth in agricultural protection has been even faster when measured in terms of the "effective rate" of assistance to value added (net of intermediate inputs) rather than to the value of output.<sup>4</sup>

Agricultural protection in industrial countries has grown both absolutely and relative to manufacturing protection. Tariffs and many non-tariff barriers

<sup>4</sup> The effective rate of protection or assistance is the nominal rate (adjusted

to trade in manufactures have been declining in these countries throughout most of the post-World War II period (Tyers and Anderson, 1992, ch. 2). In the exceptional cases of Australia and New Zealand (which largely stood apart from the earlier multilaterally agreed reductions in manufacturing tariffs), government policies have historically discriminated against agriculture. In Australia, while the effective rate of assistance to agriculture has fluctuated around a level of just over 10 percent since the early 1970s, the effective rate of assistance to manufacturing has fallen from more than 35 percent to less than 15 percent and is expected to be down to 5 percent by the latter 1990s (Industry Commission, 1992). In New Zealand, the effective rates of assistance in 1980 were 12 percent for agriculture and around 40 percent for manufacturing. But by 1988 the manufacturing rate had been brought down to less than 25 percent while agriculture's rate (after rising steeply in the early 1980s and falling steeply thereafter) was 15 percent (GATT, 1990).

In less developed countries, by contrast, agricultural prices tend to be below international levels. This has been amply illustrated by a series of studies of the political economy of agricultural policies in developing countries, which included a detailed account of the protective impact of both agricultural and nonagricultural policies on agricultural prices. This work is summarized in Kreuger, Schiff, and Valdes (1988) and reported in full in Kreuger, Schiff, and Valdes (1992). A recent publication (Wiebelt et al., 1992) has reviewed these estimates and added some detailed cross-country analysis by commodity. The results broadly confirm the pattern of discrimination against agriculture, in particular against commodity exports. This bias against agriculture is especially noticeable when domestic and world prices are compared at equilibrium or shadow exchange rates rather than at often overvalued official exchange rates. Wiebelt and his coauthors found that apparent subsidies of 14 percent for wheat, over a wide range of countries and years, translated into a tax of 18 percent at equilibrium exchange rates (Table 2). This effect also was noticeable for rice, and particularly for coffee, where the implicit tax reached over 50 percent.

When the indirect effects on agricultural incentives of those countries' industrial protection policies are taken into account, the disincentives for farm production in poor countries are even greater (Table 3). The Kreuger et al. study found implicit taxes of 20-30 percent, even offsetting the subsidies offered to import crops, as a result of both exchange rate and commercial policy distortions. Food prices for urban consumers in less developed countries are typically below international levels and sometimes below domestic producer prices (Byerlee and Sain, 1986), although supplies to such low-priced markets are often rationed to reduce the foreign exchange cost of cheap food

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for input policies) divided by the value-added share of output measured at free-trade prices (Corden, 1971); the latter share has been declining much more rapidly for agriculture than for other sectors (Johnson, 1973, p.70; Anderson, 1987).

policies. Only recently have unilateral economic reform programs in a number of developing and formerly centrally planned economies begun to redress these intersectoral distortions.<sup>5</sup>

Table 2.—Agricultural Protection for Selected Commodities,  
Selected Developing Countries, 1969 to 1985  
(Percent by which domestic prices exceed world prices)

Commodity	Gross <sup>a</sup>	Net <sup>b</sup>
Wheat	14	-18
Rice	1	-26
Coffee	-27	-53

Source: Manfred Wiebelt et al., *Discrimination Against Agriculture in Developing Countries?*, Kieler Studien 243, J.C.B. Mohr (Paul Siebeck), Tübingen, 1992.

<sup>a</sup> Gross = at current exchange rates.

<sup>b</sup> Net = net of exchange rate distortion.

Table 3.—Agricultural Protection for Export and Import Crops,  
Eighteen Developing Countries, 1969 to 1985  
(Percent by which domestic prices exceed world prices)

Period	Export crops			Import crops		
	Direct	Indirect	Total	Direct	Indirect	Total
1965-70	6	-21	-15	10	-24	-14
1971-79	6	-31	-47	4	-20	-16
1980-85	-9	-30	-39	21	-32	-11

Source: Anne O. Krueger, Maurice Schiff, and Alberto Valdes, "Measuring the Impact of Sector-Specific and Economy-Wide Policies on Agricultural Incentives in LDCs," *World Bank Economic Review*, Vol. 2, No. 3, September 1988.

<sup>5</sup> A review of nearly twenty such developing country experiences is contained in Michaely, Papageorgiou, and Choksi (1991).

*Using These Indicators in Trade Negotiations*

Estimates of the extent of protection can provide trade negotiators with indicators to use in the process of liberalization. The new information coming from the OECD raised the possibility of using a subsidy equivalent as a negotiating device. Such a suggestion was made in the GATT negotiations in 1987 by the United States, the Cairns Group, the European Community, by the Nordic countries. A technical group was set up by the negotiators to explore the way in which such an aggregate measure of support (AMS) could be used to compare support to agriculture across countries and over time. In principle, such measures could be used in any of four ways: to provide a legally bound set of upper limits on support during the reform period; to assess credit for policy reforms begun after some base period such as the beginning of the Uruguay Round; to monitor countries' progress following an agreement for gradual liberalization; and to trigger some corrective or consultative action if a country is slower than agreed in reducing its support (IATRC, 1990).

Putting the AMS principle into practice in the trade negotiations was bound to be controversial. Should an AMS be measured separately for individual commodities, for subsets of commodities, or for all farm products as a group? If an AMS is to cover all commodities, this leaves considerable scope for larger-than-average reductions for some commodities but increased support for others; the latter, referred to as "rebalancing," may harm certain trading partners (Andrews et al., 1990). Which policy measures should be included in the calculation (e.g., should government charges to overcome environmental externalities, and expenditure on basic research, education and infrastructure for rural areas be included)? The more policy measures that are excluded from the AMS calculation, the more scope there is for substituting policies to escape the discipline of a commitment to reduce the measured AMS. Should livestock PSEs include or exclude the effect of cereals policies on feed costs? Should a downward adjustment be made to the AMS of "large" countries on the grounds that, in the absence of their support policies, international food prices would be higher? If so, what would be the basis for determining a fair adjustment?<sup>6</sup>

Substantive questions also arose about the use of an AMS as a proxy for the extent of trade distortions. The AMS only captures the production subsidy aspects of support policies; hence, the need arose to calculate separate consumer measures such as the CSE.<sup>7</sup> But the mix of policies included in the cal-

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<sup>6</sup> See Tangermann and Josling (1987) for a further discussion of the adaptation of the PSE to a negotiating device.

<sup>7</sup> The original FAO paper suggested calculating tariff equivalents for trade negotiation (FAO, 1973). The idea of using just the PSEs seems to have originated from the GATT proposals of 1987, by the United States, the Cairns Group, and the Nordic Countries, and taken up later by the Economic Community.



cultation also matters, because two different sets of policies could have the same PSE and yet different output effects (Hertel, 1989). This issue led to the identification of two subspecies of PSE—the *iso-income PSE*, which measures the subsidy equivalent to a set of policies in terms of income, and the *iso-output PSE* which measured the subsidy equivalent to a set of policies in terms of output (Bray, Josling, and Cherlow, 1992).<sup>8</sup>

This clarification of the difference between output and income PSEs also addressed the question as to how one could give credit for quantitative restrictions on production in negotiations. This issue is relevant for a number of countries and commodities. For example, the United States has acreage set-aside provisions in its price-support programs. Other countries also have quotas on production or on market sales by farmers, and Japan encourages farmers to divert land away from rice production. These supply control measures ensure a smaller exportable surplus than would otherwise occur given high producer prices. It has been argued that, if countries restrict supplies, some credit needs to be given for this decoupled component of the transfer to producers (Mahe and Guyomard, 1990; McClatchy, 1990). If calculating a true iso-output PSE is problematic, one alternative is to use a value-based AMS so that countries get credit for reducing either the support price or the quantity supported (McClatchy and Warley, 1991). Credit for supply control is, therefore, an *ad hoc* way of moving from an iso-income to an iso-output PSE.

Yet another set of AMS measurement issues concern which international price, exchange rate, and marketing costs to use to compare domestic and border prices. Should the current international price, some historic average reference price (say, for 1986-88), or a moving average of past prices be used as a base? The European Community has argued in the GATT Round for use of an historic reference price; reducing the gap between the current domestic price and that fixed reference price would insulate the domestic market from fluctuations in the international price and currency values. But if the international price in domestic currency terms trends upwards, and is sufficiently above that reference price during the period of reform, it is possible that a reforming country's domestic price level could fall below the international price. Conversely, if international prices trend the other way, the wedge between domestic and border prices could increase during the supposed reform period. The prospect of the actual international price during the reform period exceeding an historical reference price is greater the greater the reform in protectionist countries as a group and the smaller the reduction in the effective taxation of agriculture or exogenous farm productivity growth in developing and centrally planned economies.

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<sup>8</sup> Conceptually, one can define an *iso-trade* PSE which incorporated the consumption effect as well as the production effect. This would measure the producer subsidy which would give the same trade effect as the set of actual policies, but this becomes very similar to a tariff equivalent, a more easily grasped concept.

At present, trade negotiators are discussing the use of the AMS concept only for commitments on the level of overall support. The AMS agreements are seen as supplementary to separate commitments relating to import barriers (to be tariffed and then phased down) and export subsidies (to be gradually reduced). But the fact that they could find any place in an international agreement implies that their magnitudes must be calculated periodically. This will serve to keep the quantitative estimates of protection in the public domain, if not always at the forefront of public consciousness.

### EFFECTS OF AGRICULTURAL DISTORTIONS

Once systematic estimates across countries of the extent of distortions in world food markets became available by the mid-1980s, it was possible for researchers to model the effects of trade liberalization in those markets with greater precision. Available models were updated and made more sophisticated, and new models were built. Modifications include more country and commodity breakdown, the addition of input and primary factor markets, the inclusion of stockholding and other dynamic behavior, the incorporation of stochastic elements on the supply side, the use of price transmission equations and other mechanisms to represent the endogenous nature of price and trade policies, the expansion of the policy instrument set to include quantity restrictions on acreage and output, and the inclusion of nonagricultural sectors to capture the general equilibrium effects of policies.<sup>9</sup>

The result has been an explosion of quantitative estimates of the impact of agricultural policies on markets and welfare and of the significance of trade liberalization in those markets. Initially, empirical estimates from different models of some of the effects of current policies were not always close in size and sometimes even differed in sign (see the reviews by Gardner, 1989, and Hertel, 1990). Attempts to reconcile those differences have led, however, to much more consensus on various effects of policies and, where doubts remain, to consensus on which parameters need to be estimated more carefully. Two examples, considered below, serve to illustrate the consensus on the most significant aspects of agricultural policy liberalization—the effect of policy reform

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<sup>9</sup> Among the most commonly cited partial equilibrium models of world food markets are Valdes and Zeitz (1980), Tyers (1985), Tyers and Anderson (1986, 1992), Roningen (1986), OECD (1987), UNCTAD (1990) and the models used by CARD (1991). Global general equilibrium models applied to agricultural protection issues include Burniaux and Waelbroeck (1985), Parikh et al. (1988), Burniaux et al. (1988, 1990), Harrison, Rutström, and Wigle (1989) and Loo and Tower (1989, 1990). Several general equilibrium models of national economies have been developed specifically to examine the intersectoral effects of agricultural reforms at home and abroad (Stoeckel, Vincent, and Cuthbertson, 1989; Horridge, Pearce, and Walker, 1990; and Kilkenny, 1991).

on the industrial countries themselves and the impact on developing countries of the expected world price changes.

*Domestic Benefits of Reform in the Farm Policies of Industrial Countries*

Early estimates of the net welfare costs and the costs to consumers and taxpayers in OECD countries of their farm-support programs became available in the mid-1980s and attracted headlines in the popular media.<sup>10</sup> More novel were estimates of the efficiency of these policies in meeting their own objectives and the extent of the externalities that they caused to other countries. Table 4 gives one such set of estimates. More recent studies have confirmed that the cost of those programs during the 1980s doubled and that their inefficiency in transferring welfare from consumers/taxpayers to farmers increased substantially with only a small fraction of going to poor farmers (Tyers and Anderson, 1992, ch. 6).

Table 4.—Side Effects of Price Support Transfers,  
Selected Countries, 1986-87  
(Percent of transfer to producers)

	Economic loss on transfer <sup>a</sup>	Loss of income by farmers abroad <sup>b</sup>	Offset by policies in other countries <sup>c</sup>
United States	35	66	43
Canada	65	103	73
Economic Community	45	80	38
Japan	38	46	7
Australia and New Zealand	13	125	538
Others	22	55	28

Source: Calculations based on Vernon O. Roningen and Praveen M. Dixit, *How Level is the Playing Field? An Economic Analysis of Agricultural Policy Reforms in Industrial Market Economies*, ERS Foreign Agricultural Economic Report No. 239, U.S. Department of Agriculture, Washington, D.C., December 1989.

<sup>a</sup> Percentage by which consumer and taxpayer costs exceed transfer to producers.

<sup>b</sup> Percentage of transfer to producer in home country which represents

<sup>10</sup> The most notable early example was the World Bank's *World Development Report 1986*, released in July 1986, followed by the OECD's milestone report released in May 1987, based on the PSE calculations mentioned above.

loss to producers in other (listed) countries.

<sup>c</sup> Percentage loss in transfer to producers in home country as a result of the policies in other (listed) countries.

Such results seem only to have hardened the resolve of farm lobby groups to argue that reducing price-support programs would destroy the farm sector, cause widespread unemployment and poverty in rural areas, and destabilize domestic food markets. In Japan and Korea, the issue of allowing rice imports was attached to food security concerns. As a consequence, policy analysts began to focus more attention on the effects of reform on farm production, food self-sufficiency, employment, and price instability.

*Effects of Removing Distortions in Industrial Countries  
on Developing Countries*

In the early years of the Uruguay Round, there was a commonly held presumption that developing countries as a group would lose from the reduction in agricultural support policies of industrial countries. Being net importers of temperate foods, the prices of their food imports and hence their food import bill would rise. Empirical partial-equilibrium studies published in the 1980s supported that view (Tyers and Anderson, 1986; OECD, 1987; Parikh et al., 1988; Roningen and Dixit, 1989; Tyers, 1989). However, when the orthodoxy was challenged by results from general equilibrium models (e.g., Burniaux et al., 1988; Loo and Tower, 1989), more attention began to be directed to the question.<sup>11</sup> Within a year, the weight of opinion had swung toward the view that most other developing countries as well would benefit from a liberalization of trade in temperate food products.

If, following the increase in the price of food, the country switches from being a net importer to being a net exporter of food, the country could then gain from higher export prices. A less direct source of possible gain is if the price rise induces more high-payoff agricultural research. The net welfare gain from faster farm productivity growth could more than offset the loss from the worsening international terms of trade. A third possibility is that a developing country has policies in place that lower the domestic price of food sufficiently to cause it to be a net importer of food despite the country having a comparative advantage in agriculture. If the international price rise is transmitted to the domestic market, the country's welfare can improve as resources are attracted from their inefficient use in protected nonfood sectors. This

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<sup>11</sup> In 1989 alone, several international institutions organized conferences to address that question. See, for example, the proceedings of the conferences organized by the OECD/World Bank (Goldin and Knudsen, 1990), the International Food Policy Research Institute (Islam and Valdes, 1990), as well as the study commissioned by UNCTAD (1990) following a conference it sponsored.

result can hold even if the country remains a net importer of food in the presence of its own distortionary policies.<sup>12</sup> A fourth possibility exists for a distorted economy that would be a food importer, even in the absence of its own distortions. When agricultural protection abroad is reduced, this food-importing country could react by reducing its own distortions. Then, the welfare gain from its own reform could more than offset the welfare loss from the deteriorating terms of trade.

Whether particular developing countries benefit or lose from the agricultural support policies of industrial countries remains an empirical question. One recent attempt to reconcile the difference in results from earlier models uses a partial equilibrium model but includes estimates of the depressing effect on the relative price of food in developing countries that result from nonfood policies in those countries (Anderson and Tyers, 1993). Adjustments for those indirect distortions were based on quantitative studies such as the earlier-cited one supervised by Krueger, Schiff, and Valdes (1988, 1992).

The results (shown in Table 5) suggest that developing countries in aggregate lose \$17 billion per year in 1985 US dollars from OECD farm-support policies and that nearly all large individual developing countries and subgroups of smaller developing countries lose. Apart from the relatively well off newly industrialized and oil-exporting economies of Northeast Asia and the Middle East/North Africa, the only exceptions are Bangladesh and Egypt, all heavily dependent on food imports. The cost of these policies to developing country farmers is even larger, nearly \$33 billion per year. Since they are generally poorer than their urban cousins who gain from lower food prices, these policies have a strongly regressive effect on income distribution within developing countries. Both of these effects tend to be amplified by the policies of developing countries themselves. For developing countries as a group, the net effect of their own policies are even more wasteful and redistribute welfare from farmers to nonfarm households within developing countries even more than do the policies of industrial countries.

There are some important differences between regions in these effects, however. The international price-raising effects of developing-country policies almost exactly offset the estimated one-fifth reduction in international food prices that has resulted from the agricultural policies of industrial countries (see Table 1 of Anderson and Tyers, 1993). Indeed, from these results it would seem that Latin America would gain less if distortions to food markets were eliminated from developing as well as industrial countries rather than from just industrial countries, despite the additional benefits that would result from liberalizing the region's own anti-agricultural policies.

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<sup>12</sup> The analytics of this argument are presented in Anderson and Tyers (1993). A similar analysis is presented in Tyers and Falvey (1989) to show why a country that exports a commodity with the help of an export subsidy can be made worse off by an international price rise.

Table 5.—Effects of Distortions in World Food Markets on Economic Welfare in Developing and Industrial Countries, 1990  
(1985 US\$ billion per year)

	Effects of industrial countries policies on:		Combined effect of industrial and developing countries' policies on:	
	Net economic welfare <sup>a</sup>	Farmers' welfare	Net economic welfare <sup>a</sup>	Farmers' welfare
Asia	- 4.6	-17.8	- 23.7	- 32.9
Latin America	-12.7	- 9.0	- 7.6	- 27.6
Africa <sup>b</sup>	0.7	- 4.7	- 2.1	- 9.4
Total, developing countries	-16.6	-31.5	- 33.4	- 69.9
Total, industrial countries	-46.5	78.0	- 73.3	160.9
Total, world <sup>c</sup>	-62.2	44.4	-106.4	87.5

Source: Adapted from Kym Anderson and Rodney Tyers, "More on Welfare Gains to Developing Countries from Liberalizing World Food Trade," *Journal of Agricultural Economics*, Vol. 44, No. 2, May 1993.

<sup>a</sup> Net welfare includes the effects on food consumers, taxpayers, and food stockholders as well as food producers. Effects on expenditures to administer and to lobby for and against food policies, not included above, would add to the net welfare costs of present policies. These results assume farm productivity growth is somewhat responsive to prices.

<sup>b</sup> Includes Middle East.

<sup>c</sup> The world total includes effects on Eastern Europe and the USSR (although they are minor because their assumed low price transmission elasticities ensure they adjust little to policy changes elsewhere).

#### REASONS FOR THE PRESENT PATTERN OF DISTORTION

Stigler (1975, p. xi) has cautioned that, "until we understand why our society adopts its policies, we will be poorly equipped to give useful advice on how to change those policies." Much effort has been devoted by economists during the past decade to understand why governments have adopted distortionary price and trade policies (Hillman, 1989; Magee, Brock, and Young, 1989); why those policies have tended to tax agriculture relative to manufacturing in poor countries and subsidize farming in rich countries (Anderson and Hayami, 1986; Winters, 1987; Anderson, 1993; Tyers and Anderson, 1992, ch.3); and why particular farm policy instruments have tended to be used (Rausser, 1982).

The main thrust of this political economy literature is that government support for a sector tends to be inversely related to the importance of that sector in the economy. Assistance to a producer group can be provided at a lower cost per capita to the rest of society the smaller that group, and free-rider problems of collective lobbying action are also lower the smaller the group. Hence, as the agricultural sector shrinks in importance in the course of an economy's growth (for reasons explained in Johnson, 1973, and Anderson, 1987), one typically observes a gradual change from taxing to subsidizing agriculture relative to other sectors.

This does not mean that the growth and spread of agricultural protection is irreversible, however. Hillman (1982) and Long and Vousden (1991) show that government assistance to a declining industry is likely only to slow rather than to stop that decline. Moreover, Cassing and Hillman (1986) demonstrate that when an industry shrinks sufficiently, the aggregate political contribution its producers are able to make in return for continued government support can become less than the political cost of opposition to that policy; at that point, protection is withdrawn. That has happened in some manufacturing industries (Swedish shipbuilding, American footwear), but not so far to highly protected agricultures (apart from New Zealand). Perhaps the farm sector's contribution has to become less than the current 2 or 3 percent of gross domestic product and 4 or 5 percent of employment before this threshold point is reached in domestic political markets.

For the first time, there is a major opportunity, via the GATT Round, to bring international pressure to bear on domestic political markets to agricultural protection policies (Anderson, 1992b). By tying liberalization of nonfarm trade by food-exporting countries to agricultural protection costs in other countries (particularly in Western Europe and Northeast Asia), the incentives for nonfarm interests in the latter countries to oppose agricultural protection have been raised significantly. The Round offers a real possibility that the long-term growth in agricultural protectionism in industrial countries can be reversed earlier than it would be without the international pressure.

It would be unwise to conclude that the output from agricultural economists in these areas has directly influenced the development of agricultural policies. But the lot of policy economists is largely to address relevant issues and to hope that the analysis finds its way into administrative and political decisions. The work discussed above did find its way into the rhetoric of agricultural policy and may have contributed to changing the climate of opinion among policymakers.

#### AREAS FOR FURTHER RESEARCH

The research results show clearly that the global welfare cost of the agricultural protection of industrial countries rose dramatically during the 1980s and is continuing at a high level. It demonstrated the inefficiency of current policies in transferring welfare from consumers/taxpayers to farmers (espe-

cially poor ones). This agenda from the 1980s still remains relevant. The Uruguay Round has yet to reach a conclusion. Little permanent change is evident in the problems facing world markets for temperate zone products. It is becoming clear that the reforms in developing and centrally planned economies may add further downward pressure on international food prices in the 1990s, adding urgency (from the viewpoint of food exporters) to the need to reverse protection growth. Advanced and newly industrialized economies will eventually need to reduce their agricultural supports, in return for liberalization of manufacturing and services trade in poor countries with a comparative advantage in farm products.

At the same time as the international negotiations try to solve the problems of excessive protection and distorted world markets, new demands are being put on agricultural trade policy. Trade policy is not necessarily appropriate for meeting these demands. When the numerous policy instruments available to serve particular objectives are ranked in terms of their efficiency, trade and other price-raising policy instruments are not, in general, the most appropriate or least-cost means of achieving those objectives. If raising low farm incomes is the goal, direct income support to targeted poor farmers is the most efficient intervention. If rural unemployment is the problem, policymakers need to ensure that farmers are eligible for the general safety net provisions of social policy. If food import dependence raises fears of food security, then a country might examine storage or import supply diversification strategies. If consumer food safety appears at risk with imported food, then the appropriate response might be to develop labeling and testing regulations rather than banning imports. But trade policy will undoubtedly be implicated in this new policy agenda, and the implications will require careful analysis.

What new economic research areas might assist a more satisfactory outcome from future MTNs involving agriculture? Three areas in particular are promising—dynamic analysis of the effects over time of trade policy changes, examination of the effects on agriculture of different international trade scenarios for the 1990s, and evaluation of new policy concerns such as the interactions between reform of agricultural trade and the environment.

#### *More Dynamic Analysis of the Effects of Trade Liberalization*

Comparative static analysis has been helpful in understanding the impact of trade liberalization, but such studies have at least three important limitations. One is that they do not show the path of adjustment to the post-reform equilibrium. Dynamic model results of partial and gradual reforms can help to reduce fears that such reforms would cause large reductions and increased fluctuations in production and welfare. Second, the use of a dynamic model reduces the risk of under- or over-estimating the effects of policy reforms by choosing an unrepresentative base year. This risk is especially great in food markets because international prices fluctuate much more than domestic



prices. Hence, the domestic-to-border price wedge can vary substantially from year to year even in the absence of any policy changes. In the Uruguay Round negotiations, GATT contracting parties have argued for different starting years for proposed reforms, to take advantage of this variability. Third, dynamic models allow more precise reference scenarios to be developed. For example, one could explore how results pertaining to agricultural protection cuts would differ if agricultural output in former communist countries were to grow more or less rapidly during the 1990s.

It is generally better to forecast the levels of farm income and food price stability after a period of gradual and partial reform, as compared with the present, rather than to compare two model scenarios for a particular year assuming adjustment is instantaneous and reform is complete. This requires use of a dynamic forecasting model to simulate a phased partial reform program over, say, a ten-year period. As an example of the importance of taking the time dimension into account, Anderson and Tyers (1992) consider the effect of such a partial phased reform on OECD farm production. Apart from grains in Japan and EFTA and sugar in Canada, production of virtually every farm commodity is projected to expand in the industrial countries during the 1990s—despite the optimistic assumption of a halving in agricultural protection.<sup>13</sup> A multilateral liberalization raises international food prices more than if just one country liberalizes unilaterally. With lower domestic prices of feed grains, *ceteris paribus*, livestock enterprises become more profitable. And productivity growth is assumed to continue at its historical rate. Although farm output in the more protected commodity sectors of Western Europe and Japan would be lower by the year 2000 with reform, overall production would continue to expand even with a 50 percent reduction in farm support. To project liberalization as spelling the demise of large parts of agriculture in Japan or Europe is clearly a gross exaggeration.

The study also finds that European Community and Japanese food self-sufficiency would decline only modestly during the 1990s. For Japan, the most sensitive item is rice. Its self-sufficiency is projected to fall from over 100 to about 80 percent if the current rice land diversion is maintained. Because that program took about one-fifth of Japan's rice land out of rice production, by abolishing that program Japan could remain self-sufficient in rice despite the substantial fall in the domestic price.

The effects on rural employment of reductions in agricultural protection have been less closely studied (but see Hertel, 1991, and Levy and van Wijnbergen, 1992). But it is likely that such reforms would accelerate the movement of labor out of agriculture. The average age of farmers in Western Europe and Japan is relatively high and rising and (in full-time equivalent units) less than 5 percent of the workforce is employed in agriculture.

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<sup>13</sup> This empirical result is supported by another recent study based on a new combination of models developed at Iowa State University (see CARD, 1991).

Therefore, the likelihood is that most of the extra displacement due to a phased reform would take the form of some farmers retiring a little earlier during that decade of adjustment to lower prices.

The same analysis of time-dependent reform can be used to look at the issue of price stability in the light of trade liberalization. If industrial countries completely tariffed their agricultural imports in the process of partial liberalization, fluctuations in domestic food prices in Western Europe and Japan would increase. However, fluctuations in the United States would be no greater, and those in the relatively more open food economies of Canada and Australia would be less. Moreover, the extent of instability in international food prices would be reduced by almost half, according to the stochastic simulation results reported in Anderson and Tyers (1992) and reproduced in Table 6. Hence, the increase in price instability in Western Europe and Japan would not be large compared with current international price instability. Also, the rest of the world would benefit from a reduction in international price fluctuations. If this change were to stimulate developing and centrally planned economies to reduce the stabilization component of their own policies, the extent of fluctuations in international food policies could be more than halved again (Tyers and Anderson, 1992, Table 6). Accordingly, domestic price instability is likely to increase much less for Western Europe and Japan than is often claimed. But to be more precise and more certain requires further studies with a range of different models, including applied general equilibrium models.

#### *Changes in the Trading System and Their Impact on Agricultural Trade Reforms*

Dramatic changes in world trade structure have come about as a result of a set of loosely related developments in the late 1980s. These developments include the end of the Cold War, the adoption by many countries of more market-oriented trade systems, the changed view of the role of governments in developed countries, the increased willingness of countries to group regionally to encourage trade and investment, and the increasing concern about environmental costs and the sustainability of economic growth.

From these changes has emerged a different international trade structure from that of the post-war period. Until recently, commercial relations among countries reflected to a large extent the Cold War balance of power. The end of the Cold War has opened up a new set of economic relationships among some countries and weakened the linkages among others. Trade between the developed market economies and those of Central and Eastern Europe, once heavily restricted to avoid the transfer of technology, is now encouraged. By contrast, trade among the developed market economies has come under increasing strain, especially in agricultural trade relations.

Table 6.—Effects on International and Domestic Food Price Fluctuations of Tariffication and a Partial Reduction in Agricultural Protection in Industrial Countries \*

	Coefficient of variation (percent) of:			
	Producer prices		Consumer prices	
	Reference scenario	Reform scenario	Reference scenario	Reform scenario
International price index	32	18	32	18
Domestic price index in:				
EC-12	3	11	2	8
EFTA	2	12	1	8
Japan	2	14	2	12
United States	16	17	9	9
Canada	20	17	7	9
Australia	17	12	10	19

Source: Kym Anderson and Rodney Tyers, "Effects of Gradual Food Policy Reforms in the 1990s," *European Review of Agricultural Economics*, Vol. 19, No. 1, January 1992.

\* Indices of producer and consumer food prices are calculated separately (at the unprocessed level) for seven groups of traded food staples, and aggregated across those groups using domestic value of production or consumption as weights. It is the difference between those weights across countries that is responsible for differences in the above coefficients even in the reform scenario. The reform scenario assumes tariffication of non-tariff import barriers and a 50 percent reduction in agricultural protection in industrial countries in the 1990s. The estimates are for the situation in the year 2000.

What part does agricultural trade play in this new trade environment? Should agriculture be considered as a special case in designing trade rules, or should it be treated just like other products? Uniform treatment of all sectors is probably not feasible; the politics of trade and domestic policy vary too much by sector. And even if one did wish to move to uniform trade rules for all trade, it may be necessary to take account of agriculture's different starting point.

The conditions of agricultural trade also mean that a modulated approach may be needed. Agricultural products are among the relatively few "location based" tradable goods, although they are less location-specific than minerals. The process of farming has relatively low economies of scale; sourcing out is rarely possible (except in the case of live cattle moving across the border for fattening); regulatory conditions vary, but not usually by enough to offset natural and climatic factors; and innovation rents are uncommon. Trade among

countries in the main homogeneous ("bulk") agricultural products, such as cereals, milk, and meat, is based in large part on different natural advantages, although with a heavy overlay of distortions arising from agricultural policies.

These bulk products do not generally attract international investment. Increased exports of these commodities is of limited interest to most countries in the Third World. Trade reform is of interest to most developing countries largely because of the disruptive effect that developed country farm policies have had on the level and stability of international food prices. Any move to improve the functioning of such markets is likely to be beneficial, but the chance of inflows of investment to take advantage of scale economies in regional markets is more remote. The former Soviet Bloc, by contrast, has a vital interest in the export market cereals, milk, and meat. These countries could well become the focus of international investment for this purpose if access into developed country markets from those transforming economies were assured.

Trade in differentiated products, including fruits and vegetables, is now becoming much more important to developing countries. Unlike bulk commodities, producers of these commodities can develop comparative advantages by investment from abroad; they can build markets through quality and name recognition; and the overlay of government price support policy is less important in this trade. Government regulations regarding quality and food safety standards are more significant. These new areas of agricultural trade are of increasing interest to both the developing and the formerly centrally planned countries.

The task facing the international community is to integrate more completely both the bulk and the high value-added sectors of agriculture into the new world trade order. This requires that there be an agreed set of rules for trade and for domestic policy. Most of the burden of policy adjustment for the bulk, homogeneous products falls on internal support policy changes by individual governments, encouraged by multilateral negotiations. For the other products, this adjustment also will require the development of new rules, at the multilateral, regional, and/or bilateral levels to deal with investment, copyright law, harmonization of health and food safety regulations, and the setting of standards.

These shifts in trade structure and rules could have profound implications for how policy change is modeled. Most models that are used to examine the effects of agricultural reforms in industrial countries typically construct a base or reference scenario that assumes no change in current policies. These models then focus only on domestically generated political forces affecting policy outcomes. The changes noted above imply that the analysis of domestic policies must account for domestic political markets being influenced significantly not only by international prices but by political pressures from abroad as well (Anderson, 1992b).

Three aspects of this international pressure in particular are worth noting. One is the action of large countries in this new trade structure. Unilateralism

in trade policy, such as that practiced on occasions by the United States, is likely to affect agricultural policies in both Northeast Asia and Western Europe. The United States will likely continue to threaten Japan, Korea, and Taiwan with barriers against imports of their manufactured goods if they do not open more widely their markets for farm products. The policy seems to have had some success: Japan and Korea already have responded by agreeing to replace current beef import quotas with high tariffs and to lower those tariffs gradually in the 1990s. A further \$500 million per year has been made available for the period 1991-95 for US food export subsidies to enable American exporters to undercut Western European exporters. This will have the effect of lowering international food prices, raising export subsidy payments in Europe, and hence increasing opposition by European taxpayers to current farm policies. However, it also lowers the export earnings of the Cairns Group and other traditional food exporters.

The second source of international pressure for reform is the Cairns Group itself. This grouping of 14 lightly subsidizing, agriculture-exporting countries, led by Australia, was formed at the beginning of the Uruguay Round. Its express purposes are to ensure that agriculture remains high on the agenda of the Round and to encourage nonfarm groups in countries with protected agricultural sectors to voice their concerns over the high domestic costs of farm-support policies.<sup>14</sup> Unless the Cairns Group indulges in misjudged brinkmanship, it is likely to have a continued impact as a group in keeping agricultural protection issues on the agenda.

The third important international pressure on agricultural protection policies is coming from unilaterally reforming developing countries, most notably the former communist countries. Insofar as such reforms boost those economies' net exports of temperate farm products, they will further depress international food prices. East European economies are already pressuring Western Europe to provide preferential access to their high-priced food markets and thus to increase the prospects of their exporting their way out of poverty. For Western Europe the risk of not providing such access, for example, through associate membership of the European Community, is increased migration from East to West Europe. But it would not be enough just to provide preferential access for East European food exports. Unless in addition domestic food prices are lowered in Western Europe, such access would simply raise the budgetary cost of disposing of the extra excess supply in third-country markets.<sup>15</sup>

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<sup>14</sup> For more details of the Cairns Group's activities, see Higgott and Cooper (1990). The Group includes Argentina, Australia, Brazil, Canada, Chile, Columbia, Fiji, Hungary, Indonesia, Malaysia, the Philippines, New Zealand, Thailand, and Uruguay.

<sup>15</sup> For a preliminary empirical examination of some of these issues, see Tyers (1993).

If these possibilities were to be taken into account in modeling world food markets, base scenarios for the 1990s would have to incorporate declining rather than increasing agricultural protection for the industrial market economies and higher domestic food prices and larger price transmission elasticities for the reforming developing and centrally planned economies. Then the estimated effects of protection cuts would be smaller, which would have two offsetting effects on the prospects for MTN liberalization. It would reduce the perceived need for including agricultural reform in a Uruguay (or subsequent) Round agreement. But it would make politicians in protected countries less worried about agreeing in such Rounds to reform farm policies because the estimated rural adjustments required may have to be made anyway.

### *Effects of Agricultural Trade Reform on the Environment*

The relative importance of different agricultural policy issues has changed dramatically in the past few years. Traditional concerns prior to the 1970s focused on such variables as the level and stability of farm incomes, labor flows between agriculture and other sectors of the economy, rural employment and regional incomes, food price swings and inflationary pressures, security of food supplies, and the contribution of agriculture to economic growth. In the 1970s and early 1980s, these concerns were joined by the impact of macroeconomic shocks on agriculture and the impact of agricultural policy on the competitiveness of the nonfarm sector. In the mid-1980s, as discussed earlier, attention turned to the impact of one country's policy on another's citizens, and the compatibility of farm policies with the desired system of international trade. More recently, attention has turned to the impact of farming practices on the environment, the protection of food quality and safety, the welfare of farm workers, and the treatment of farm animals.

Traditionally, farmers were perceived as being environmentally friendly, at least relative to industrialists. But the maintenance of high and stable prices for farm products and rising real wages and land prices in industrial countries have encouraged the development of new farm technologies that increasingly substitute chemicals for labor and land. Applications of chemical fertilizer per hectare in some rich countries are more than ten times those in poorer countries. The air, soil, and water pollution associated with that intense use of farm chemicals, together with problems of disposing of animal manure from intensive livestock production, have led environmentalists to be less sympathetic to farm-support policies, especially when farm land is perceived to have alternative uses as recreational or forest areas. This has led to the urgent need for research into the effects of farm policy reform on the environment. The study of this area is still in its infancy.

Trade policy has also become unwillingly entangled with global environmental problems. Trade negotiations are sometimes seen as reducing the willingness and ability of countries to prevent or offset such global environmental hazards. The GATT is already gearing up for a "green round" of trade negotia-

tions, if and when the current Uruguay Round is completed (Anderson and Blackhurst, 1992; GATT, 1992). The Uruguay Round itself has become the focus of attention by some environmentalists, who associate expanded trade with such developments as the destruction of the tropical rain forests. The complaint is that GATT prohibits export controls on timber and import bans on tropical hardwoods.

A clear classification of problems in this area is needed, to avoid some of the confusion that seems to have been created. Externalities that occur within a country and that have no spillover effects should be separated from those that either spill across borders or affect people in other countries through less direct means. Externalities within a country should be corrected by the appropriate authorities within that country. If these corrective policies are operated through internal regulation (command-and-control), Pigouvian taxes or tradable permits no trade impediment is created. Indeed, trade is distorted if the domestic corrections are *not* made.<sup>16</sup> The analytical issue is whether, in the case of subsidies introduced for desired environmental purposes, the size of the subsidy is excessive relative to the divergence it is intended to correct. Of course, such measurements are likely to be controversial, and in practical terms it may be difficult to negotiate the extent of a subsidy on an environmentally safe production process exceeds that which would maximize the social benefits of that process. But it would still seem inappropriate for economists to state that the phasing out of such domestic subsidies to obtain a socially undesirable ("free") trade pattern is always the best policy. Incorporating reasonable guesses on the size of externalities into trade models would give some indication of how important empirically is this objection.

Cross-border pollution is a special kind of international problem, having nothing directly to do with trade. It is possible that export expansion in border regions could add to air and water pollution, but the same pollution could occur if the expansion were for domestic consumption. Such cross-border externalities present a classic case for binational or multinational environmental coordination. The pollution problems of the Rhine River, which runs through four countries, is a notable example, as are Mediterranean water quality issues and those pertaining to salinity in the lower reaches of the Colorado River. To confuse these issues by addressing them through trade discussions is clearly unhelpful—but perhaps politically inevitable.

Externalities that are linked only indirectly to trade are problematic. One country's consumers might object to the way in which another country produces a product. The product itself might confer no negative consumption externality, but the production process causes offense. (There could also be similar positive externalities.) These international production-process exter-

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<sup>16</sup> This calls into question the present trend toward eliminating *all* national subsidies on the ground that they distort trade.

nalities have led to trade frictions, of which the recent US-Mexico dispute on method of tuna fishing is a good example. One approach to the problem is to tackle it by labeling. This, indeed, happened in the case of tuna, giving the higher-cost dolphin-safe tuna (the same product produced with a different technology) a market niche. With adequate labeling, consumers can express their preferences in the market.

The question remains: to what extent should trade policy be used in such cases? The externality is generated by the production process and therefore should be tackled at the source, but the angst is felt by people outside the jurisdiction in which the production is taking place. This is a clear case of a transnational externality, where optimum national policies do not maximize global welfare. A "global" public bad is being produced along with the private good associated with tuna fishing. International agreement, along with transfer payments if necessary, is the first-best solution. US trade sanctions, therefore, should be seen not as a rational policy response but as a statement of concern and a way of bringing pressure to bear on other countries to modify their domestic policies. The question for the GATT is whether such "embargo" statements are to be allowed.

These arguments suggest that by correct policy targeting, clashes between trade and environmental objectives can often be avoided. There will always be a set of transnational or global issues that cannot be resolved by independent national action. Using trade policy to coerce others into taking environmental action is a diplomatic rather than an economic issue. Rarely will the appropriate economic policy be to intervene at the border. But as demands for environmental policy intervention grow and as global integration proceeds, there will be even more pressure on domestic policies. The new agenda for agricultural policy is in large part a reflection of this concern. Old policies are likely to be less appropriate in a more open trading environment, and new policies must be carefully targeted. If this is done, the potentially positive effects of more open markets can be harnessed without compromising the objectives of health, resource stewardship, and concern for the environment.

How does this relate to the issue of domestic price supports? Environmentalists have been reluctant so far to advocate the abolition of farm supports, for fear that the inducement this would give to expand developing country agriculture would result in more clearing of tropical rain forests. Little evidence has been compiled to support or refute this view. But surveys of available supply response studies suggest that the vast bulk of any expansion in farm output in poorer countries, in response to international food price increases, would come from more intensive use of present agricultural land and very little from expanding the area of arable land and pastures via tropical deforestation (Anderson, 1992a; Lutz, 1992). If further research supported this view, environmentalists could be encouraged to switch from opposing to supporting other nonfarm groups in advocating reductions in agricultural protectionism in industrial countries.



## CONCLUDING THOUGHTS

There is a rich agenda for research on agricultural trade issues beyond the Uruguay Round. Changes in the world trade structure, including the negotiation of regional trade associations, mean that the context of these discussions may change. Modeling improvements need to be focused on the ability to capture dynamic policy developments in the presence of growth and investment trends in agriculture. Quantitative analysis of the impacts of policies will be needed even more, with an emphasis on regional and sectoral impacts, and the incidence of these effects over time. Imaginative rules will need to be developed to control the undesired international side-effects of national policies in regional trade blocs, especially if the Uruguay Round fails to provide such rules for multilateral trade. The challenge of incorporating environmental policy issues is already at hand. How can such policies be compared and controlled to avoid unnecessary costs while at the same time allowing socially desirable choices at the national level? It is not too soon to begin to explore these new areas of research. The profession's efforts during the past decade or so have contributed to the understanding of agricultural protection. It is time to refocus these efforts to the new agenda set in a very different world environment.

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