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Alberto Valdés
Joachim Zietz

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1776 Massachusetts Avenue, N.W.
Washington, D.C. 20036 U.S.A.

Export Subsidies and Minimum Access Guarantees in Agricultural Trade: A Developing Country Perspective

ALBERTO VALDÉS

International Food Policy Research Institute, Washington, DC

and

JOACHIM ZIETZ

Kiel Institute of World Economics, West Germany

Summary. — The paper presents a framework for and results from a quantitative analysis of two proposals to GATT, made as part of an effort at containing or rolling back the spread of non-tariff barriers in agriculture. The first proposes export subsidies, which would be financed by the producers themselves, requiring no government outlay. The second calls for a minimum access for importers. This analysis examines the magnitude of the effects on trade flows, world prices, the impact on the production, consumption, and trade of the OECD countries and on foreign exchange earnings of less developed countries (LDCs), of minimum access as applied to sugar trade — one of the most protected products in OECD countries and one with great potential for LDC exporters. Results are then compared with an analysis of more comprehensive trade liberalization in the sugar market, i.e., complete removal of trade barriers in all OECD countries.

1. INTRODUCTION

Developing countries typically have open economies in which agriculture is of substantial if not dominant importance. The conditions faced by less developed countries (LDCs) in world markets largely determine the options open to them in formulating their own development strategies. Conditions prevailing in international commodity markets (including agricultural products) together with conditions influencing financial and exchange rate markets, and foreign assistance, delineate the external economic conditions that determine the prospects of LDCs for the next 10 years.

This paper examines two related issues of fundamental importance to developing countries. First, it explores the likely effect of a general liberalization of trade in agricultural products and, second, the potential benefits to LDCs from the more modest effort to bring the agricultural trade regime of developed countries more in line

with the ideas and principles of the General Agreement on Tariffs and Trade (GATT). In particular, the findings of the more prominent recent studies on the potential benefits to LDC exporters and importers of trade liberalization in agricultural products are summarized and compared. Against this background, the paper offers a preliminary quantitative analysis of two recent proposals by GATT's Committee on International Trade in Agriculture. The proposals are part of an effort to contain or roll back the spread of non-tariff barriers in agriculture. The proposed trade rules are likely to play an important role in any future trade talks within the GATT framework and hence an understanding of some of their implications is warranted. The first proposal deals with export subsidies; it would have producers bear the cost of export subsidies rather than governments, which usually pay for them out of general tax revenue. The second proposal calls for a minimum access for importers for cases in which import restrictions other than tariffs are

maintained. To allow a comparison of the orders of magnitude of the effects of trade liberalization and limited trade adjustments as proposed by GATT, a world market model is developed that builds on some earlier trade liberalization work of the authors (Zietz and Valdés, 1986a; 1986b; Valdés and Zietz, 1980).

2. TRADE LIBERALIZATION IN INDUSTRIAL COUNTRIES: POTENTIAL EFFECTS ON DEVELOPING COUNTRIES

The trade restrictions imposed by developed countries include tariffs and non-tariff barriers (NTBs) and they vary considerably in severity among countries and commodities. They generally tend to lower world prices by artificially reducing domestic consumption and raising domestic production in the developed countries. As a consequence, the volume of exports from both LDCs and other developed countries is reduced. Price and volume effects of such restrictions together translate into a foreign exchange and welfare loss to LDCs, compared to what a free trade situation would bring. There are, however, some benefits to LDCs as importers, resulting from the lower price of imports.

There exist a number of studies which have tried to assess quantitatively this loss and to identify those countries and commodities which would be most affected by a move toward trade liberalization. Unfortunately, the nature of the modeling effort usually employed in such studies makes it impossible to check the results against some recognized standard. What is left then is the less straightforward task of assessing on a case by case basis the reasonableness of the underlying assumptions regarding model structure and input data as well as of trying to compare the results of different studies. The fact that studies usually differ in commodity definitions, commodity coverage, base years, the calculation of protection levels, and at times even in their general focus, makes this an unusually trying exercise.¹ Rather than provide a detailed comparison of the studies that have been conducted so far, we limit ourselves to a synthesis of the evidence that has accumulated.

Studies of agricultural trade liberalization with endogenous world prices, as initiated by Valdés and Zietz (1980), have traditionally focused on the effect of a substantial reduction or even complete removal of the barriers to trade in developed countries. More recently, the basic methodology has also been adapted to focus on the effects of liberalization in only a subset of countries, such as the European Economic Com-

munity (EEC). Examples of the latter type of work are Koester (1982), Roberts (1982), or Matthews (1985). Generally, much of this work is devoted to the potential gains of the liberalizing developed countries as opposed to those of LDCs. The predicted effects on LDCs are mostly quite similar to those of OECD trade liberalization, discussed below, although of a smaller magnitude. An interesting twist to the trade liberalization literature has been added by Anderson and Tyers (1986) and the authors of the IASA model (Parikh and Tims, 1986). Both try to quantify the likely effects of a global trade liberalization scenario, including liberalization of LDCs' agricultural trade. Again, the conclusions are similar to those of OECD trade liberalization with the difference that some of the welfare losses to LDCs that derive from liberalization in cereals do not occur. Also, Anderson and Tyers (1986) predict a substantial decrease rather than an increase in foreign exchange earnings. A likely cause of this result seems to be that the protection rate of LDCs is overestimated by not appropriately accounting for the fact that positive nominal protection in many LDCs is nothing more than a partial compensation for a significant discrimination against agricultural tradables resulting from exchange rate misalignment, and a consequence of the (high) industrial protection and macroeconomic policies.² This exchange rate argument, we believe, does not apply to most developed countries, although exceptions do occur, such as the exchange rate appreciation in the US during 1984-85.

Despite these recent extensions of the trade liberalization literature we will concentrate on a discussion of the results obtained from OECD trade liberalization. Overall, it seems that trade liberalization by OECD countries is more likely than any of the other alternatives that have been investigated.

All studies analyzing OECD trade liberalization in agriculture commonly predict an increase in the world price if some or all barriers to trade are removed. The extent of this price increase varies among commodities. It is highest for the most protected commodities such as sugar, beef, and dairy products. For sugar, prices are predicted to increase between 5% (Anderson and Tyers, 1986) and 13 to 17% (Zietz and Valdés, 1986b). For beef, both Anderson and Tyers (1986) and Zietz and Valdés (1986b) settle for a world price increase of about 16%. For dairy products, Anderson and Tyers (1986) put the increase at 27%. These world price increases accord well with the overall result reached by the linked system of national agricultural policy models developed at IASA (Parikh and Tims,

1986). Using 10 commodity classifications, including three cereals, beef and dairy products, the IIASA model predicts a long-run world price increase of about 9%. This figure translates into a foreign exchange gain for LDCs of about US \$7 billion for all commodities taken together. Compared to those predicted by Zietz and Valdés (1986b) and Anderson and Tyers (1986), these overall foreign exchange gains seem on the low side, because for sugar and beef taken alone, both groups of researchers arrive at a figure of about US \$8 billion evaluated at 1980 prices. And according to Anderson and Tyers (1986), trade liberalization in dairy products would generate an additional US \$7.8 billion in foreign exchange for LDCs. Our view that IIASA's estimate of \$7 billion is likely an underestimate, is further supported by the fact that none of the more recent studies analyzes the potential benefits to LDCs of trade liberalization in tropical as opposed to temperate-zone products. As Valdés and Zietz (1980) have shown, however, LDCs are likely to realize substantial gains in foreign exchange if trade barriers on such products as tobacco, roasted coffee, or coffee extracts, cocoa derivatives or oils and seeds were lowered or removed. Indeed, the authors have demonstrated that the likely gains on these products would also more than compensate for the losses LDCs could expect from the price increases in cereals, which many of them currently import. Seen from this perspective, the conclusion of the IIASA model and Anderson and Tyers that, overall, LDCs could expect a welfare loss from OECD trade liberalization seems unwarranted. Their position is based on limited commodity coverage which tends to give too much weight to the cereals group.

Three other points further qualify the common interpretation that OECD trade liberalization for cereals will be welfare reducing for LDCs.³ The first qualification relates to the fact that exchange rates tend to be overvalued in many developing countries. As Chenery (1953) has shown, under such circumstances changes which generate foreign exchange yield more welfare than changes of similar magnitude in domestic currency equivalents. Thus, ignoring the problem of currency overvaluation is likely to lead to an underestimate of the true welfare gain to LDCs. In this light, it would seem preferable to focus the discussion on foreign exchange gains rather than on questionable welfare figures.

A second point in defense of trade liberalization for cereals is the increased price stability that is likely to be obtained. Two recent studies, one by Schiff (1985) on wheat and one by Anderson and Tyers (1986) on several temperate-zone

products, arrive at the conclusion that trade liberalization by OECD countries would contribute significantly to world price stability. If lower price instability is a highly valued policy good, as the discussion of commodity price stabilization and buffer stocks seems to indicate, then the gains derived from improved price stability would have to be included in an overall evaluation of trade liberalization.

The third qualification of the negative welfare effects on LDCs of liberalization in cereals derives from the difficulty in adequately modeling all the long-term gains to LDCs of a freer world market. Open markets and higher prices are likely to increase substantially the rate of return on investments in agriculture, as opposed to industry, in LDCs. This is particularly true, if LDCs manage to adjust their foreign exchange regimes appropriately to coincide with trade liberalization in OECD countries. Conversely, for developed countries, trade liberalization in agriculture would imply a substantial shift of resources out of agriculture into the service sector and industry. On the world market, this shift of resources should decrease the prices in these sectors relative to those of agricultural products and thus give LDCs an added incentive to develop agriculture. Since under these conditions LDCs and developed countries would produce more in line with their respective comparative advantages, world income should increase and benefit both groups of countries.

However, even if one accepts the argument that there are large potential gains to OECD trade liberalization, there is still the question of how likely such an occurrence is. We happen to be optimistic in this respect, basically, because the alternatives to a thorough reform of agricultural support policies in developed countries and hence a move toward trade liberalization are not attractive, at least in the long run. Building up ever larger stocks or moving more toward direct production quotas for farmers are options which are too costly or very unpopular. A short-term solution to the mounting problems of agriculture in OECD countries, especially in the case of the EEC, seems to be a further tightening of import controls by governments, i.e., closing "loop-holes," and concurrently subsidizing the export of market surpluses. Clearly, this cannot be a long-term solution as it underestimates both the resistance of those trading partners who are negatively affected, such as the US or Australia in the case of the EEC, and the financial burden placed on domestic taxpayers. Since the latter have become more and more vocal lately, it seems that the conditions to start negotiations on trade liberalization are better now than they have

been for some time. Also, studies which demonstrate the general usefulness of such negotiations are now available; they were not 10 years ago. However, what still seems to be missing and what is likely to be crucial to the successful completion of such negotiations is considerably more detail on the ramifications of the specific reform proposals that are likely to play a role in the negotiations. The second part of this study is a first attempt in this direction.

In this paper we will analyze two recent proposals of the GATT Committee on International Trade in Agriculture, with respect to their potential effect on LDCs. Both of the proposals, producer-financed export subsidies and a guaranteed minimum access for importers, can basically be understood as attempts to end the use of tighter import restrictions and/or subsidized exports by developed countries in order to manage their internal supply problems.

3. FRAMEWORK OF THE QUANTITATIVE ANALYSIS OF THE GATT PROPOSALS

The main focus of the quantitative analysis of the two GATT proposals is a comparison of the impact of alternative changes in the trade regime, including trade liberalization. The analysis is conducted in the framework of a world market equilibrium model along the lines of Valdés and Zietz (1980) and the adjustments introduced in Zietz and Valdés (1986a; 1986b). Two basic categories of countries are distinguished, developed countries directly affected by the GATT proposals, and all other countries. Although the two proposals, like most GATT rules, are intended in principle to apply to all countries, developed and developing, in this study the impact on developed countries only will be considered. This simplification derives from the difficulty of obtaining reliable estimates of protection levels for more than a handful of developing countries, as much as from the unfortunate fact that developing countries have so far remained free of many of the constraints imposed by the GATT rules and will probably continue to do so in the future.⁵

The behavior of those countries directly affected by the GATT proposal for trade reform varies according to the type of proposal. These are detailed below. All other countries are only indirectly affected by the GATT proposal in so far as they react to changes in the world market price which result when the former countries adjust their trade regime. The quantitative impact on the indirectly affected countries depends on the extent to which price changes are trans-

mitted to their domestic producers and consumers. In keeping with the tradition of most studies on trade liberalization, it is assumed that their level of protection remains constant. For fixed exchange rates, this implies that domestic prices change in these countries by the same percentage as the world market price. The response of consumption and production can then be calculated on the basis of their base period levels, the assumed price elasticities of domestic demand and supply, and the change in world market price. The changes in exports and imports follow from the response of domestic demand and production, given the assumption of constant stock levels.⁶ Trade reversal from a net importing to a net exporting position is allowed for each individual country.

(a) *Producer financed export subsidies*

This scheme is assumed to apply only to developed countries that meet two conditions. First, the country or country grouping, i.e., the EEC, is a net exporter initially, and second, the nominal protection coefficient is greater than one. Under these conditions the initial internal price is going to be above the world market price and subsidies are needed to export the domestic market surplus at the going world market price. Subsidies other than those explicitly used to bring down the export price to world market level are not considered. This applies to the large number of other subsidies to agriculture, which can include such diverse measures as subsidized credit or exemption from social security payments. At least some of the many subsidies are likely to have a positive effect on the ability of the agricultural sector to export. How these measures, which can be termed "indirect export subsidies," can be handled within the GATT is not spelled out in the ministerial committee report. Whether they can or should be ignored altogether, however, remains an open question. At least for the purpose of this paper only direct export subsidies are addressed.

If, according to the GATT proposal, export subsidies can only be maintained if they are financed by producers themselves, the net price received by them has to diminish. Exactly how this could come about depends on the particular scheme that would be adopted to collect the means to finance the export subsidy. What is assumed here for illustrative purposes is an *ad valorem* tax on total production. By reducing the net price to producers the tax will lower the level of production. What happens to exports, however, depends on the reaction of both production

and consumption. If, as is assumed, the protection level is kept constant, consumers experience a price change that equals that of the world price, i.e., for an increase in world price, domestic consumption will decrease. Exports diminish in this case as long as the decrease in production due to the tax exceeds that in consumption due to the increase in world price. At exactly what rate the tax has to be applied to equalize export subsidies and tax revenue depends on the change in world price and the relative responsiveness of producers and consumers. For the member countries of the EEC, a uniform tax is applied on production if the EEC is a net exporter in the base period. Hence, whether a particular member country is an exporter or not has no influence on the tax being paid by producers in that country. The common tax rate is fixed so as to finance the exports of the EEC at world market prices.

(b) *Minimum access import requirement*

According to the GATT proposal, countries maintaining import restrictions would be required to allow imports to reach at least $X\%$ of domestic production, which in this study, for illustrative purposes, is taken to be 10%. Hence, all import restricting countries that do not import at least 10% of domestic production in the initial situation would be subject to the minimum access requirement. This would uniformly apply to countries that are net importers initially as well as to countries that are net exporters because of import restrictions rather than because of comparative cost advantages. The GATT document does not spell out how the affected countries should proceed to meet the minimum access requirement. One could imagine a number of different policy responses, each one having a different effect on the world market. In what follows four alternative responses and their respective quantitative implications are investigated. All four are based on the assumption that the additional imports under the minimum access obligation are not immediately reexported. Also, it is assumed that imports resulting from the minimum access obligation are subject to the same tariff as other imports. This is to illustrate the likely magnitude of additional government finance that could be used to compensate those farmers hardest hit by the minimum access obligation. The presence or absence of this assumption, however, does not change any of the other results.

Maintaining the initial protection level. If one

assumes that those countries subject to the minimum access requirement maintain their initial protection level, domestic consumption would decrease and production would increase for a rise in the world price. Minimum access imports would further increase domestic supply. If one excludes the possibility of additional exports of the same magnitude in the case of countries that are either initially net exporters or become potential net exporters because of the minimum access imports, the imports under the minimum access requirement would either add to stocks or have to be converted into a different product or destroyed. Given the problems associated with each of these alternatives, i.e., mounting stock piles of the original or converted product or consumer resistance to continued food destruction, maintaining the initial protection level seems to be impossible to sustain in the long run given minimum access. Hence, the calculations provided for this case are of a rather tentative nature.

Constant domestic support price. According to this reaction pattern, developed countries that do not fulfill the 10% minimum access in the initial situation are assumed to reduce their protection level in the face of a rising world price so as to keep the domestic support price constant in absolute terms. Clearly, this implies that both domestic consumption and production will remain at the initial level, whereas the nominal protection level will be somewhat lower in the final equilibrium. Since gross imports will increase, net imports are raised or net exports reduced. Similar to the case of a constant protection level, a country with a domestic market surplus which follows this reaction pattern has to find a way to cope with continually rising stock piles of the price supported product. In the long run this may not be possible without changing to a different policy option.

Constant market surplus. Given the potential problem of mounting stock piles in the two previous cases, governments could be inclined to reduce the internal support price. Along with avoiding continually rising stocks this policy option would lower the financial obligations that derive from market support. For illustrative purposes, it is assumed that the internal support price and hence the level of nominal protection is adjusted downward so that the domestic surplus in the final equilibrium situation equals the initial surplus before minimum access.⁷ For each country, the internal price reduction needed to generate this result, can be determined iteratively and independently of the change in the

world price. In contrast to the previously discussed schemes, both consumption and production adjust according to the change in the domestic support price. On the basis of the reduced domestic price the new lower nominal protection level can be determined.

Domestic market clearing. For developed countries that do not meet the minimum access condition in the initial situation, the prospect of continually adding to stocks and hence expanding the outlays for market support could possibly lead to a thorough reassessment of their policy of market support. In this section it is assumed that, as a result, the government reduces the protection level so that domestic demand just equals domestic supply, with the minimum import quota of 10% being part of domestic supply. In this case, the government rids itself of any financial obligations for market support. The price for both consumers and producers falls. The country is just importing 10% of domestic production in the new equilibrium.

4. DATA BASE AND RESULTS

The quantitative analysis is conducted for one commodity, total sugar measured in raw equivalents (*FAO Trade Yearbook* classification number 061).⁸ Sugar is selected because previous studies of trade liberalization in agricultural products indicate that it is one of the commodities which offers developing countries the greatest opportunity to increase foreign exchange revenues. It also happens to be one of the commodities most highly protected by developed countries. Finally, some further investigation revealed that using other commodities that promise large benefits to developing countries in the case of trade liberalization, such as beef, did not change the basic thrust of the results.

Data on domestic production, consumption, exports, and imports for 58 less developed countries with a 1980 population of more than five million, and 17 OECD countries are taken from the *Food Balance Sheets* of the Food and Agriculture Organisation of the United Nations. The figures are averages for the years 1979 to 1981. All remaining countries of the world, i.e., small market-economy, developing countries as well as centrally-planned economies, are lumped together in a category identified as Rest of the World.

The initial world market price ($p_{w0} = \$396.7$) equals the average deflated world export unit value for the years 1979 to 1981. It is measured in 1980 US dollars per metric ton.⁹ For each LDC,

unit values of trade are calculated as a simple average of the deflated unit values of the years 1979 to 1981. The raw data come from the 1981 *FAO Trade Yearbook*. Average regional unit trade values are substituted whenever a country's trade value was judged unreliable because of a very small level of trade.

Values for domestic demand and supply elasticities are taken from a variety of published sources.¹⁰ In all cases where country estimates could not be obtained, default values were substituted similar to those values available. The elasticity assumptions are summarized in Table 1. *Ad valorem* equivalents of tariff and non-tariff trade barriers for the developed countries are derived from a comparison of domestic wholesale prices and the corresponding import unit values or border prices.

The results of the model simulations as they affect the world price and the foreign exchange earnings of the developing countries (the 58 included in the study) are summarized in Table 2. Similar to what one would expect in the case of a removal of trade barriers in the OECD countries, the world price increases in each case. This is the result of a rightward shift of the world import demand curve. The size of the predicted increase depends not only on the type of measure proposed, i.e., producer-financed export subsidies of minimum access, but also on the type of domestic adjustment one hypothesizes for those countries directly affected by the changes in the trade regime.

To put the changes reported in Table 2 in perspective, it is useful to compare them with those of a more comprehensive type of trade liberalization as discussed earlier. For example, if

Table 1. Price elasticities of domestic supply and demand for sugar

Country or country group	Supply elasticities	Demand elasticities
LDCs		
Sub-Saharan Africa	0.6	-0.4
Asia	0.6	(-1.75; -0.4)
North Africa/ Middle East	0.6	(-0.8; -0.4)
Latin America	0.6	(-0.6; -0.4)
DCs except Australia	0.6	(-1.0; -0.25)
Australia	0.6	-0.39
EEC	0.6	(-0.85; -0.24)

Source: Zietz and Valdés (1986b).

Table 2. *Effect of GATT proposals on world price and LDC foreign exchange earnings — sugar*

Type of GATT proposal analyzed	Percentage change in world price	Change in LDC foreign exchange earnings	
		US\$ mill.	percentage
Producer financed export subsidies	0.73	105.6	4.0
Minimum access			
constant protection level	1.91	276.8	10.4
constant domestic price	2.30	334.2	12.6
constant absolute surplus	2.10	305.9	11.5
domestic market clearing	6.74	1,018.7	38.4

Note: Values are measured in constant 1980 US dollars.

one hypothesizes a complete removal of trade barriers in all OECD countries, not a partial reduction in only some countries as in this study (Table 3), the increase in world price has been calculated at 16.7% for the same model and set of model and parameter set (Zúñiga and Valdés, 1986b). The accompanying increase in LDC foreign exchange revenue would be about US\$ 2,800 million. The rather large discrepancy between these results and those of Table 2 derives from the fact that both producer-financed export subsidies and the minimum access rule are tied to conditions that *a priori* exclude many highly protective OECD countries from the disciplines of these schemes. In fact, only two countries on the export scheme and three countries on the minimum access rule (including the EEC) are directly affected. Countries with highly protec-

tive trade regimes in sugar, such as the US or Japan, would not be forced to reduce their protection level under the GATT proposals. This is because they either do not export sugar and hence are not subject to the export subsidy regulations, or they import an amount equal to or in excess of domestic production and hence evade any discipline under the minimum access rule.¹¹

From the results of Table 2 it seems that developing countries should have a greater interest in the minimum access proposal rather than the producer-financed export subsidies. However, there is a possibly important caveat to be mentioned, that is, that the minimum access calculations are based on the assumption that countries refrain from increasing their exports by an amount equal or close to their minimum

Table 3. *Sugar protection levels in developed countries directly affected by GATT proposals after trade adjustment*

GATT proposal analyzed	Nominal protection coefficient		
	Austria	Sweden	EEC
Producer financed export subsidies	0.65	•	0.57
Minimum access			
constant protection level	0.65	0.17	0.57
constant domestic price	0.61	0.14	0.54
constant absolute surplus	0.53	0.09	0.39
domestic market clearing	0.14	0.02	0.07

Note: The final protection levels given for "producer-financed export subsidies" and "constant protection level" equal the initial protection levels. The dot for Sweden in the first line indicates that Sweden would not be affected by the GATT on export subsidies.

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import requirement. Should this assumption not hold, then one could certainly not expect an increase in world price. Under the assumptions of the model this would also eliminate any foreign exchange gains of LDCs. Clearly in that case, the minimum access rule would be the worse scheme of the two because it would be ineffective.

Tables 4 and 5 give a survey of how the two GATT proposals are likely to affect OECD countries. As has already been discussed, only two countries on export subsidies and three

countries on minimum access are directly affected. None of the others exported sugar or imported less than 10% of domestic production during the years 1979 to 1981. Again, this does not mean that many other countries have not also built up substantial trade barriers against sugar imports. Prominent among those countries are Japan, the US, Canada, and Switzerland.¹² Unfortunately, the results hardly change if, say, the 10% rule is simply replaced by a 20% or 30% rule.

Some preliminary work on beef seems to lead

Table 4. *Impact of producer financed export subsidies on directly affected OECD countries — sugar*

Country directly affected	Percentage change in		Tax on production (percent)	Export subsidy (US\$ mill.)
	production	exports		
EEC	-3.6	-16.0	6.5	545.8
Austria	-3.8	-16.7	6.8	19.4

Note: Values are measured in constant 1980 US dollars.

Table 5. *Impact of minimum access rule on directly affected OECD countries — sugar*

Country directly affected	Percentage change in domestic price	Percentage change in			Additional tariff revenue (US\$ mill.)
		production	consumption	exports	
— Constant protection level —					
EEC	1.9	1.1	-0.9	-40.3	322.4
Austria	1.9	1.1	-0.8	-41.1	12.0
Sweden	1.9	1.1	-0.5	•	1.8
— Constant domestic price —					
EEC	0.	0.	0.	-48.5	320.0
Austria	0.	0.	0.	-50.0	11.9
Sweden	0.	0.	0.	•	1.8
— Constant absolute surplus —					
EEC	-9.5	-5.8	4.7	-45.7	206.6
Austria	-5.3	-3.1	2.4	-25.6	9.4
Sweden	-4.7	-2.9	1.6	•	0.7
— Domestic market clearing —					
EEC	-27.0	-17.4	15.6	-100.0	37.4
Austria	-26.5	-16.9	13.7	-100.0	2.2
Sweden	-7.0	-4.3	2.4	•	-0.3

Note: Sweden is a net importer in 1979/81. Exports are defined as net exports. All values are measured in constant 1980 US dollars.

to similar conclusions. For purposes of comparison, it would be interesting to extend the analysis to more commodities. Dairy products, for example, may be a case in which the results are different. At least for sugar, though, the minimum access proposal seems to be rather desirable from the point of view of producers in the three directly affected countries. This applies all the more if the government opts for a constant protection level or constant domestic price. However, these two schemes are also clearly undesirable for the consumers in the affected countries. Since prices are rising or remain constant, consumers are either worse off or subject to the same high prices as before the reform of the trade regime. The latter also applies to the producer-financed export subsidy scheme. Hence, for developing countries and for consumers in the affected OECD countries, minimum access with "constant absolute surplus" or "domestic market clearing" seems to be preferable. However, the problem with this conclusion is that trade regimes, at best, may be influenced by the GATT, but not the domestic

reaction of governments to the ensuing changes. So even if "minimum access" should be adopted as part of a new revised GATT code on trade in agriculture, there is still a wide variety of ways in which individual countries may adjust, only some of which are clearly in the interest of consumers and developing countries. As a consequence, one may conclude that changing the GATT code with regard to export subsidies and/or a minimum access requirement along the lines proposed by GATT's Committee on International Trade in Agriculture, although a step in the right direction, is certainly not a substitute for a general reduction in trade barriers. Also, the analysis points up that if any such scheme were implemented, disagreement among the affected countries on the interpretation of the accompanying rules would be very likely. Hence, it seems to us that there is a very urgent need to strengthen the present GATT rules and disciplines on subsidies and quantitative restrictions, and to improve dispute settlement procedures. The forthcoming Multilateral Trade Negotiations offer a unique opportunity to attack these urgent problems.

NOTES

1. Some detail on this for a number of commodities is provided in Zietz and Valdes (1986a).

2. See Valdes and Stamwalla (1984) for a thorough discussion of this program.

3. For example, Anderson and Tyers (1986), Zietz and Valdes (1986), and Parikh and Tims (1986).

4. Such a result is also obtained in the models of Zietz and Valdes (1986b) or of Koester (1982).

5. Compare the discussion in Nogues (1985, pp 127-129) on this point.

6. For the centrally-planned economies and developing countries with less than five million inhabitants, which are not considered on an individual basis, exports and imports are derived as an aggregate on the basis of average trade elasticities.

7. Clearly, this assumes that the country has a domestic market surplus either before minimum access or thereafter.

8. A detailed description of the data base as well as tables of the basic input data can be found in Zietz and Valdes (1986a).

9. The value of pw_a for sugar is derived by excluding Cuba and the major ACP exporters of sugar from the value and quantity of world exports.

10. See Zietz and Valdes (1986a) for details.

11. Some further analysis by the authors revealed that the results are not very different for beef. For example, neither a 10% nor even a 20% minimum import requirement would affect Japan for the time period considered here, even though it is known for its unusually high protection levels for beef.

12. Details on this point are given in the Appendix of Zietz and Valdes (1986a).

13. Since there does not exist an initial export unit value for countries incurring a trade reversal its regional average substitutes for ϕ_i .

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TECHNICAL APPENDIX TO ANALYSIS OF GATT PROPOSAL

This appendix describes some of the equations central to the understanding of the modeling exercise. More detail on the basic model can be obtained from Zietz and Valdés (1986).

In all countries not directly affected by the GATT proposals, domestic consumption and production change according to the equations

$$\Delta C = C_0 [(1 + \hat{p}w)^\eta - 1] \quad (1)$$

$$\Delta Q = Q_0 [(1 + \hat{p}w)^\epsilon - 1] \quad (2)$$

where Δ denotes absolute change and where η is the domestic price elasticity of demand and ϵ the domestic price elasticity of supply. Final levels of net exports are then determined as

$$X_1 = X_0 + \Delta Q - \Delta C \quad \text{if } X_0 > 0 \quad (3a)$$

$$X_1 = -(M_0 + \Delta C - \Delta Q) \quad \text{if } (\dots) < 0 \quad (3b)$$

and $M_0 > 0$

$$X_1 = 0 \quad \text{otherwise.} \quad (3c)$$

Similarly, net imports are derived as

$$M_1 = (M_0 + \Delta C - \Delta Q) \quad \text{if } (\dots) > 0 \quad (4a)$$

$$M_1 = 0 \quad \text{otherwise.} \quad (4b)$$

The change in the world price ($\hat{p}w$) associated with each proposal is determined iteratively. An equilibrium value is identified as a price increase that clears the world market, that is, exports just match imports after

all adjustments are completed. The change in export revenue of exporting country i ($\Delta V X_i$) is then given as

$$\Delta V X_i = (X_1 p w_1 - X_0 p w_0) \phi_i \quad (5)$$

where $p w_1$ represents the world price in the new equilibrium, ϕ_i equals the ratio of the export unit value of country i to the initial world price.¹³

The behavioral assumptions for those developed countries directly affected by the GATT proposal vary according to the particular scheme being analyzed. In all cases, however, the initial domestic price (expressed in international currency units) is assumed to be given by equation (6)

$$p_0 = p w_0 (1 + \tau_0) \quad (6)$$

where τ_0 is the *ad valorem* equivalent of a particular country's tariff and non-tariff barriers prior to trade reform.

In the case of producer financed export subsidies the tax on producers (ψ) would reduce the net price to producers (p^n) to

$$p^n = p w_1 (1 + \tau_0) (1 - \psi) \quad (7)$$

where $p w_1$ is the world price in final equilibrium. The price change experienced by producers is then given as

$$\hat{p} = (1 + \hat{p}w) (1 - \psi) - 1 \quad (8)$$

The change in domestic production resulting from \hat{p} is found by replacing $\hat{p}w$ in (8) by \hat{p} . The change in consumption continues to be given by equation (1).

The new levels of exports and imports then follow from a set of equations similar to (3a) and (4a) but with the additional possibility of a trade reversal from a net exporting to a net importing trade status. The tax rate ψ that equalizes the outlays for export subsidization and tax revenue is chosen so as to meet the condition

$$\psi = (1 - \frac{C_1}{Q_1}) (\frac{\tau_0}{1 + \tau_0}) \quad (9)$$

where C_1 and Q_1 are the levels of consumption and production in the final equilibrium situation.

In the case of the minimum access rule and regardless of the particular reaction hypothesis, countries that are directly affected are assumed to collect additional tariff revenue from the minimum access imports. For countries that are net exporters initially, the additional tariff revenue would amount to

$$TR = 0.1 Q_1 p w_1 \tau_1 \quad (10)$$

For initial net importers the corresponding expression is

$$\Delta TR = M_0 p w_0 \tau_0 \quad (11)$$

In the case where the initial protection level is maintained, both consumption and production react to the ensuing rise in the world price according to equations (1) and (2). In the new equilibrium situation, each developed country and EEC as a whole is importing at least 10% of domestic production

In the case of a constant domestic support price, $\hat{p} = 0$. This implies the the nominal protection level in the final equilibrium equals

$$\tau_1 = (\frac{1 + \tau_0}{1 + \hat{p}w}) - 1 \quad (12)$$

A constant domestic surplus for a country subject to minimum access is defined as

$$(1.1 Q_1 - C_1) = X_0 \quad (13)$$

where the required import level equals 0.1 Q_1 . The corresponding final protection level is given by

$$\tau_1 = (1 + \tau_0) (\frac{1 + \hat{p}}{1 + \hat{p}w}) - 1 \quad (14)$$

This also happens to be the appropriate determining equation for τ_1 in the case of minimum access with domestic market clearing.

For all model calculations, the EEC is assumed to affect the world market only as a net trading entity, similar to a large country with several regions or states. To incorporate such an effect, the sum of the net imports of all net importing EEC member countries is subtracted from the sum of the net exports of all net exporting countries to arrive at EEC net exports or imports. Each individual EEC member country is assumed to react according to the same behavioral postulates as any other developed country.