

A Computation Analysis of The Effects of The Tokyo Round Negotiations on Preferential Trading Arrangements

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This paper presents results from a general equilibrium computational trade model on the economic effects of the Tokyo Round, with particular attention to the implications for the preferential effects of the EEC, EFTA, and GSP. The computational results indicate that the erosion of tariff preferences under the GSP is of little importance in evaluating the welfare effects of the Tokyo Round. In contrast, lowering the tariff wall around the EEC and EFTA is welfare improving for the larger members, Germany, Italy, and the U.K., but welfare reducing for the smaller members, Belgium, Luxembourg, Denmark, Norway, and Sweden.

I. Introduction

The Tokyo Round of trade negotiations was completed in the late 1970s and the final stages of the agreement were implemented just this past year. Most studies of the economic effects of the Tokyo Round are in agreement that the major economic players in the negotiations, the U.S., the EEC, and Japan, will gain, but there is very little agreement concerning how the smaller countries in the world are going to be affected.

During the course of the negotiations, the developing countries, in particular, were very concerned with how the multilateral tariff reductions would affect the various trade preferences that the LDCs had negotiated with the industrialized countries prior to the Tokyo Round. There are a number of these agreements, such as the Generalized

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This paper was prepared with financial support from the Ford Foundation for a program of research on trade policy at The University of Michigan. I am indebted to Alan Deardorff and Robert Stern for helpful comments on an earlier version and to Asieh Mansour for research assistance.

System of Preferences (GSP) whereby most of the industrialized countries grant duty-free access to the manufactured exports of the LDCs; the Lomé agreement, under which the EEC grants preferential tariffs to many of the developing countries in Africa, the Caribbean, and the Pacific; the Caribbean Basin Initiative, etc. The fear among the LDCs was that a round of multilateral tariff reductions would erode these tariff preferences, and thus make them worse off.

In addition to the loss of preferences, many of the products of greatest export interest to the developing countries, such as textiles and agricultural goods, were not included in the discussions. These omissions further increased the likelihood that the developing countries would not gain from the Tokyo Round.

However, the early evidence suggested that the LDCs would, in fact, not be made worse off by multilateral tariff reductions. Prior to the completion of the Tokyo Round, the effects of a hypothetical 50% multilateral tariff reduction¹ on the trade effects of the GSP were examined by Baldwin and Murray (1976) using an *ex ante* partial equilibrium model. They found that beneficiary exports attributable to the GSP would decline by \$32.2 million based on 1971 trade. However, Baldwin and Murray also found that the developing countries would increase exports by \$401.0 million under a 50% multilateral tariff cut due to the broader product and country coverage of MFN reductions.

However, most of the studies that followed the Tokyo Round—Baldwin, Mutti, and Richardson (1980), Brown and Whalley (1980), Deardorff and Stern (1979, 1983), and Whalley (1982)—found that many of the LDCs would be made worse off after the Tokyo Round was fully implemented. This result emerged despite the fact that these studies did not give specific attention to the implications of the Tokyo Round for preferential agreements, with the exception of the EEC. For example, Whalley, using a general equilibrium computational model, found that welfare would rise in the EEC, Japan, and the U.S. by a total of \$3.8 billion, based on 1973 trade data, but that the rest of the world (ROW) would lose almost \$2 billion. Whalley attributes this loss to the omission of agriculture from the Tokyo Round. Deardorff and Stern, also using a computational model, found that the LDCs gained as a group, but 8 of the 16 LDCs included in the study were actually made worse off. The losers surprisingly included Singapore, South Korea, and Hong Kong, three newly industrialized countries (NICs) expected to gain most from a round of tariff cuts concentrated on manufactured items.

1. The 50% reduction applies to the tariffs of the U.S., the EEC, and Japan on trade other than textiles, shoes, and petroleum.

The purpose of this paper is to assess the impact of the Tokyo Round of Multilateral Trade Negotiations (MTN) on the major discriminatory trade arrangements. We present results from the import-disaggregated version of the Michigan Computational Model of World Production and Trade which has been used to analyze the production, trade, employment, and price effects of the tariff and some nontariff barrier (NTB) reductions of the Tokyo Round. The model used in this study, while retaining the same degree of country and product detail obtained by Deardorff and Stern (1981, 1983) distinguishes bilateral trade flows. Thus the model can be constrained to reflect preferential trading. First, the preferential margins afforded by the EEC and the European Free Trade Association (EFTA) to their members, tariff preferences under the GSP², and the tariff-free trade in transportation equipment between the U.S. and Canada covered by the Autopact are incorporated. Second, trade in textiles and clothing covered by the Multi-Fiber Agreement (MFA) is constrained by quotas. Third, tariff changes used in this study were aggregated to highlight the bilateral nature of the multilateral negotiations. Negotiated tariff reductions, though applied multilaterally, were partially the result of bilateral bargaining. Consequently, tariff concessions tended to be larger on product categories defined to include imports from nonreciprocating partners, while smaller on imports from reciprocating partners. Finally, the U.S. obtained bilateral concessions on agricultural trade from individual partners, which are also included.

The tariff and other concessions are presented and discussed in Section II. Section III contains a description of the computational model employed, results are presented in Section IV, and conclusions in Section V.

II. Tariff Rate Reductions in the Tokyo Round

During the MTN the Swiss tariff cutting formula was accepted as a general guide but was not applied uniformly by all countries.³ Deviations from this formula occurred

2. The developing countries are beneficiaries of several other preferential schemes not discussed here. For example, the EEC grants duty-free access to the African, Caribbean, and Pacific countries for many of their industrial and agricultural exports under the Lomé (Togo) Convention (February 28, 1975) and to Algeria, Tunisia and Morocco under the Maghreb Convention (1976). However, the beneficiaries of these schemes are not included in this study due to the small volume of trade involved.

3. The Swiss formula is $t_1 = 0.14t_0 / (0.14 + t_0)$ where t_0 is the base rate and t_1 is the offer rate. For further discussion of the tariff cutting formulas, see Chan (1985, pp. 458-459), Cline (1978, pp. 66-83), and Deardorff and Stern (1979, pp. 39-40).

Table 1. Percent Reductions in Tariff Rates Negotiated in the Tokyo Round

EXPORTING REGION AND PRODUCT*	Importing region					
	EEC	EFTA+	US	JPN	CAN	AUST
EEC						
Agriculture	0.0	5.0	23.8	8.2	22.2	11.5
Nondurable Mfr.	0.0	0.0	20.2	1.1	13.1	2.4
Semi-Mfr.	0.0	0.0	42.8	23.3	29.3	5.6
Durable Mfr.	0.0	0.0	35.0	36.3	33.2	2.5
EFTA						
Agriculture	30.8	0.0	10.1	2.4	14.2	20.5
Nondurable Mfr.	0.0	0.0	30.7	1.9	14.3	0.5
Semi-Mfr.	0.0	0.0	52.5	24.9	16.4	2.1
Durable Mfr.	0.0	0.0	37.6	30.0	23.7	4.5
U.S.						
Agriculture	30.8	5.1	0.0	0.4	20.2	17.6
Nondurable Mfr.	27.9	16.3	0.0	8.3	13.8	1.8
Semi-Mfr.	28.6	33.4	0.0	9.1	29.1	7.0
Durable Mfr.	36.0	29.9	0.0	46.2	31.9	4.0
JAPAN						
Agriculture	32.0	5.0	15.5	0.0	28.7	22.9
Nondurable Mfr.	31.4	15.3	26.8	0.8	0.0	4.5
Semi-Mfr.	28.3	31.0	83.6	0.5	0.0	2.8
Durable Mfr.	20.5	28.2	29.6	4.9	0.0	16.2
AUSTRALIA						
Agriculture	31.3	39.1	28.8	0.0	7.8	0.0
Nondurable Mfr.	23.5	10.5	57.9	0.0	57.9	0.0
Semi-Mfr.	32.3	33.8	3.1	0.0	30.0	0.0
Durable Mfr.	6.2	12.3	35.3	19.1	24.9	0.0
LDCs						
Agriculture	29.7	32.3	17.5	2.4	30.5	15.7
Nondurable Mfr.	23.5	6.2	16.2	0.4	6.5	1.2
Semi-Mfr.	25.5	16.4	37.7	15.0	45.3	2.7
Durable Mfr.	29.8	19.9	32.2	17.9	24.7	1.9

Source: Based on data supplied by the Office of the U.S. Trade Representative.

*Agriculture – Agriculture, hunting, forestry and fishing; food, beverages and tobacco
 Nondurable Manufactures – Textiles; wearing apparel; leather and leather and fur products; footwear
 Semi-manufactures – wood and Wood products; furniture and fixtures; paper and paper products; printing and publishing; chemicals; petroleum and related products; rubber products; nonmetal mineral products; glass and glass products.
 Durable manufactures – Iron and steel basic industries; non-ferrous metal basic industries; metal products; electrical and non-electrical machinery; transport equipment; miscellaneous manufactures

+Excluding Portugal

for import sensitive industries or in cases where tariff concessions from significant trade partners were not obtained.

A summary of the negotiated Tokyo Round tariff concessions is presented in Table 1 for the major countries and regions. These figures were calculated by first aggregating the base and offer tariff rates for each country from the detailed line-item level to the 4-digit Brussels Tariff Nomenclature (BTN) level, weighting by each country's total imports. Tariffs were then aggregated from the BTN to the 22-industry International Standard Industrial Classification (ISIC) categorization of the model weighting by bilateral imports, yielding a separate set of tariffs for each pair of trade partners. The difference between the base and offer rates as a percent of the base rate is reported in Table 1. While 22 tradable product categories are distinguished in the Michigan Model, we have combined them into four broad categories in this section for ease of exposition. The four categories are agriculture, wearing apparel (including textiles, furs, and leather), light manufactures, and heavy manufactures.

The degree of tariff liberalization varies noticeably across countries. The developing countries agreed to minimal tariff reductions and Australia's tariff concessions are much smaller than those of the other industrialized countries. Japan's tariff reductions on manufactured imports from the large trading blocs, the U.S., the EEC, and the EFTA, are comparable to those offered by these countries. However, Japan's tariff reductions on imports from the smaller countries—Canada, Australia, and the developing countries—are much smaller. This may be partially the result of selective concessions. However, it should be noted that Japan unilaterally reduced tariffs subsequent to the Kennedy Round. Thus, during the Tokyo Round, Japan accepted the Swiss formula but was only willing to apply the formula to its tariff rates as they were before the unilateral liberalization.

Variation in the degree of liberalization across countries has important implications for the distribution of welfare gains from the Tokyo Round. That is, the countries which reduce tariffs comparatively deeply will tend to suffer a deterioration in the terms of trade, which will offset some of the efficiency gains from tariff concessions.

Agricultural products were originally excluded from the negotiations, but in the final agreement there were some concessions made in this category. However, the reductions are negligible on important bilateral trade flows. For example, Japan lowered tariffs on imports from the EEC but excluded products imported from its major agricultural suppliers. The average reduction on Japan's imports from the EEC was 8.2%, but there were virtually no concessions on imports from the U.S., Canada, and Australia.

Similarly, the EEC reduced tariffs on imports from all partners, but the unchanged NTBs on agriculture and food render these tariff reductions virtually meaningless. In response to the failure to reach agreement on meaningful liberalization in agriculture on an MFN basis, the U.S. pursued bilateral discussions with individual countries, and was successful in obtaining some limited concessions on NTBs in agriculture and food.⁴

The rates on textiles were lowered substantially as well in some cases, but as with agriculture, NTBs control trade in these products. The only meaningful concessions were, therefore, in the manufacturing product categories. The emphasis on manufacturing in the Tokyo Round benefits Japan, which more than any other industrialized country, is a net exporter of manufacturing items to all other industrialized countries.

The tariff calculations reflect the preferential arrangements of the EEC, EFTA, GSP, and Autopact. Both the base and offer rates on trade within the EEC and EFTA are set at zero. Tariffs on nonagricultural trade between the EEC and EFTA were removed in 1979, so the corresponding tariff changes have been set to zero, as well.

Preferences for the developing countries under the GSP are reflected in the aggregation of the base and offer rates. For products which receive preferential treatment the base and offer rates are set equal to a weighted average of the relevant GSP and MFN rates. The weights are determined by the fraction of imports within a BTN line-item which actually receive GSP treatment and the fraction subject to the MFN rate. This adjustment is necessary since a large fraction of LDC exports to the donor countries is excluded from the GSP for competitive need reasons, or due to quantitative restrictions or restrictive rules of origin.

The effect of the Tokyo Round tariff reductions on individual members of the EEC and EFTA is expected to vary with the size of the country. From the literature on customs union theory we know that the formation of the union will generally benefit the smaller members at the expense of the larger members.⁵

In the standard two good-three country theoretical model the small country will trade exclusively with its customs union partner. This implies that the small country receives the world price plus the partner's tariff for its exports to the large partner, but does not apply a tariff to any of its imports. This arrangement is clearly welfare

4. For a details on the concessions, see Deardorff and Stern (1979, pp. 72-79).

5. For a more complete discussion of the general equilibrium effects of a preferential tariff, see Chacholiades (1978, pp. 567-75).

improving for the small country, both because it removes the distortion effect of its tariff on imports and raises the price it receives for its exports over the world price.

In contrast, the large country is generally made worse off by a customs union, for two reasons. First, the large country loses tariff revenue normally levied on imports from the partner country. Second, trade continues with the rest of the world and is subject to a tariff. Thus, at the margin, the trade distorting effect of the tariff remains after the formation of the customs union.

The tariff reductions in the Tokyo Round then, reduce the distortions attendant to the tariff in the large country and reduce the transfer from the large country in the union to the small country. The reduction in the transfer from the large to the small country effectively improves the large country's terms of trade. Thus, the welfare of the small country may decline if the deterioration in its terms of trade with the large partner exceeds the efficiency gain from reducing tariffs on the nonmember trade partners.

A similar argument applies to the developing countries which receive preferential treatment for their manufactured exports to the industrialized countries. However, there are factors which offset the erosion of the preferential margin. It is clear from Table 1 that developing country exports still benefit from substantial tariff concessions from the industrialized countries. Although the preferential margin is eroded, the tariff cuts on imports from the LDCs are, in many cases, greater than those on exports by EFTA, Canada, and Australia. Preferences under the GSP are limited by quantitative restrictions, rules of origin, and product coverage. The Tokyo Round, on the other hand, covers a much broader range of products which are important LDC exports. Thus it is possible that the broader product coverage of the Tokyo Round may counter-balance the loss of preferential treatment.

A second issue concerning the developing countries is the terms-of-trade effect associated with protectionism in the industrialized countries, a central element of the North-South debate. The relatively large tariff reductions on LDC exports under the Tokyo Round, reported in Table 1, indicate a willingness on the part of the industrialized countries to include products of export interest to the developing countries in the negotiations. However, it remains to be determined whether tariff concessions by the industrialized countries will improve the terms of trade of the developing countries, as the LDCs contend.

In addition to tariff negotiations, NTB liberalization was discussed extensively during the Tokyo Round, with modest success. Among the codes concerning NTBs,

those regulating government procurement are the most readily quantifiable, and will be evaluated in the computational analysis, along with the NTB concessions in agriculture discussed above. These codes are designed to open bidding on nondefense public procurement to both domestic and foreign firms. Below we present a computational model which is used to evaluate these central issues in the Tokyo Round.

III. The Computational Model

While the model and its implementation are described in detail in Brown (1988), some brief comments may be useful here. There are 34 countries included in the model, with the rest of the world (ROW) constituting an abbreviated 35th country. In addition to the 22 tradable goods based on 3-digit ISIC categories, there are seven 1-digit nontradable industries. Country and industry coverage are shown in Tables 2 and 3.

Any of the 29 goods may be used to satisfy final demand or as intermediate inputs in the production of other goods. Final and intermediate demand are derived from explicit utility and production functions assuming utility and profit maximization. Production is also a function of the primary inputs—capital, which is industry specific, and labor. The wage paid to labor is fixed and macroeconomic policy is assumed to maintain national employment at the base level.

Imports are disaggregated by place of production in the manner suggested by Armington (1969). Each tradable good which enters as an argument in the utility and production functions is itself an aggregate of the products of each country. A CES function aggregates the products produced by each of the 34 included countries and the ROW to form a composite tradable good. The 22 composite goods are then nested in a Cobb-Douglas utility function and a fixed proportion production function.

Goods markets are assumed to be perfectly competitive and prices determined in world markets which equate supply and demand for each of the 22 tradable goods from each of the 34 countries and the ROW, yielding 770 individual markets. Exchange rates for most industrialized countries are permitted to fluctuate to maintain the trade balance at the also level. However, Australia and the EFTA countries (excluding Austria) are assumed to peg their exchange rates to a basket of currencies. Among the LDCs, Hong Kong, Israel, Yugoslavia, and Mexico allow their currencies to float, while Singapore is assumed to peg to a basket of currencies which is dominated by the Japanese yen. The remaining LDCs, as well as New Zealand, are represented as pegging their currencies, but subject to the condition that expenditure on imports not exceed the available foreign

Table 2. Estimated Changes in Country Imports, Exports, US Bilateral Trade, Terms of Trade and Welfare due to the Tokyo Round (Trade in Million of U.S. Dollars)

Country	Total trade		Trade with U.S.		Terms of trade % change	Welfare	
	Imports*	Exports*	Imports*	Exports*		\$ Mill.	% GDP
INDUSTRIALIZED COUNTRIES:							
Australia	133.6	36.5	77.2	4.5	0.2	43.3	-0.40
Austria	83.0	67.7	20.1	20.0	0.3	24.3	0.06
Canada	815.1	1,146.2	630.6	828.2	-0.8	-374.4	-0.19
Finland	228.2	117.8	25.3	17.4	-0.1	-4.6	-0.02
Japan	1,359.4	330.4	716.5	154.6	1.4	1,050.7	0.19
New Zealand	28.6	28.9	10.3	13.7	0.1	-16.0	-0.12
Norway	338.8	151.2	48.5	20.5	-0.3	-33.7	-0.11
Sweden	757.6	383.1	103.0	44.0	-0.3	-91.3	-0.12
Switzerland	441.4	213.7	61.5	79.3	-0.0	24.7	0.04
United States	2,023.0	3,556.1	0.0	0.0	-0.4	-984.7	-0.06
EUROPEAN COMMUNITY:							
Belgium-Luxembourg	315.1	406.1	111.2	34.8	-0.3	-220.5	-0.31
Denmark	129.3	177.1	36.4	35.7	-0.3	-49.1	-0.12
France	628.9	713.9	274.7	132.0	-0.1	-66.0	-0.02
Germany	1,342.3	1,053.0	379.6	210.5	0.2	165.5	0.04
Ireland	22.8	10.4	13.7	6.8	0.4	14.8	0.18
Italy	425.7	363.9	122.4	195.8	0.2	72.0	0.04
Netherlands	338.9	357.8	136.3	33.9	-0.1	-32.4	-0.04
United Kingdom	653.7	630.8	317.0	195.8	0.1	-8.8	-0.00
TOTAL EC	3,856.7	3,713.0	1,391.4	759.0			
TOTAL INDUSTRIALIZED	10,065.5	9,744.6	3,084.5	1,941.1			
DEVELOPING COUNTRIES:							
Argentina	30.8	20.1	10.4	1.8	0.1	3.6	0.01
Brazil	61.9	58.1	39.0	4.2	0.1	-8.4	-0.01
Chile	17.3	18.1	10.3	1.2	-0.2	2.8	0.03
Colombia	13.4	12.7	10.3	1.4	-0.0	-3.5	-0.02
Greece	17.8	28.7	5.0	0.2	0.3	-0.7	-0.00
Hong Kong	119.4	2.5	31.6	3.4	1.8	138.3	1.49
India	49.3	33.9	16.3	4.0	0.2	15.5	0.02
Israel	26.2	13.4	11.1	4.0	0.7	19.5	0.14
South Korea	103.7	75.6	48.1	26.3	0.4	-7.2	-0.03
Mexico	85.2	53.2	92.1	42.1	0.6	12.9	0.02
Portugal	1.2	11.1	1.9	1.4	0.1	1.5	0.01
Singapore	-7.9	8.2	16.7	1.6	0.9	53.5	0.91
Spain	152.3	173.0	38.2	14.7	0.2	-18.9	-0.02
Taiwan	93.7	56.2	49.5	10.9	0.3	20.6	0.12
Turkey	-2.6	8.5	4.2	-0.4	0.2	2.4	0.01
Yugoslavia	60.0	38.0	6.4	-0.9	0.6	32.5	0.10
TOTAL DEVELOPING COUNTRIES	821.8	611.3	391.2	115.9			
ALL COUNTRIES**	10,887.2	10,355.9	3,475.6	2,057.0			

*Dollar value of change in trade volume

**Excluding the rest of the world

Table 3. Estimated Changes in Bilateral Imports due to the Tokyo Round for the EEC, EFTA, Japan, and the U.S. (Millions of U.S. Dollars)

PRODUCT	EEC/EFTA+ IMPORTS FROM			JAPANESE IMPORTS FROM		US IMPORTS FROM	
	EEC EFTA+	US	JPN	EEC EFTA+	US	EEC EFTA+	JPN
Agriculture	-4.3	92.5	-0.4	0.6	163.8	2.1	-2.2
Food	-4.9	1.3	-0.2	11.0	8.5	97.5	-0.7
Textiles	85.8	32.3	4.5	5.1	8.2	27.0	18.5
Clothing	24.7	23.2	5.5	6.8	1.4	46.7	24.2
Leather Prod.	39.9	8.8	0.7	1.2	7.3	2.5	-0.0
Footwear	1.4	0.4	-0.3	0.9	0.4	-3.5	-0.9
Wood Prod.	31.2	13.1	0.4	0.2	36.5	2.2	6.4
Furniture, Fixtures	38.8	2.7	0.1	3.1	0.8	15.2	1.1
Paper Prod.	161.1	44.2	3.7	3.0	7.5	3.0	0.6
Printing, Publishing	48.7	8.6	0.4	2.5	4.4	-0.2	-1.2
Chemicals	208.1	357.6	28.6	63.5	88.6	155.5	11.7
Petrol. Prod.	143.3	24.3	-0.3	-0.1	12.1	-0.4	-0.0
Rubber Prod.	83.2	25.5	2.2	5.4	6.2	30.7	0.6
Nonmetal Mineral Prod.	70.7	15.2	3.9	2.3	5.3	29.2	25.4
Glass Prod.	-0.1	5.4	0.2	1.6	1.8	8.6	1.7
Iron, Steel	3.3	5.6	-3.9	1.6	4.0	14.5	-17.7
Nonferrous Metals	68.5	18.3	0.2	0.9	3.0	8.8	-1.2
Metal Prod.	115.7	59.1	8.9	10.4	15.4	56.4	3.4
Nonelectric Machinery	512.2	243.6	22.9	42.8	86.2	194.0	60.9
Electric Machinery	263.4	124.7	34.4	16.5	47.8	48.8	87.8
Transport Equipment	682.1	317.4	50.5	66.9	155.3	88.9	-78.5
Misc. Mfrs.	70.9	225.9	52.6	50.2	52.0	112.5	14.5
TOTAL	2,643.6	1,649.8	214.7	296.2	716.5	940.1	154.6

+Excluding Portugal

exchange earned through exports. This is accomplished with an endogenously determined tariff equivalent of an import license which constrains the value of import demand to be equal to the revenue earned through exports.

Although the underlying market structure is perfectly competitive, the solution of the model is constrained by the presence of NTBs, which may take the form of a quota or target price and are represented by their endogenously determined tariff equivalents. The target price mechanism is included for the purpose of modeling the variable levy on imports of agricultural products by the EEC. All other NTBs are represented by the quota facility.⁶

The equations of the model are proportionately differentiated, yielding a linear system that is solved for the percent deviation of each variable from its base level which occurs as a result of an exogenous change. The tariff reductions discussed in Section II are exogenously inserted into the model, which is then solved for the percent changes in each of the variables necessary to restore equilibrium. It is assumed that the tariff reductions were made all at once rather than being phased in as was actually the case between 1980 and 1987. In addition to the tariff reductions, the agricultural concessions negotiated between the U.S. and several of its trade partners and the effect of the code regulating international bidding on nondefense government procurement were included. The agricultural concessions were modeled as an increase in bilateral quotas in the agriculture and food product categories. Nondefense government procurement opened for international bidding was modeled as a switch in demand from the domestic good to imports. Procurement was allocated between imports and domestically produced goods in proportion to private consumption patterns.⁷

The base year for data on production, employment, trade, and tariffs for each of the 34 countries is 1976, which was the reference year for the Tokyo Round negotiations. Input-output coefficients for the production function are derived from the U.S. input-output table for 1972, and the 1970 tables for each of the members of the EEC, Japan, and Brazil. The elasticity of substitution in the CES function used to aggregate products from different sources in the utility and production functions was derived from import demand elasticities reported in Stern et al. (1976). The elasticity of substitution between

6. For more details, see Deardorff and Stern (1979, pp. 68-92).

7. The tariff rate which applies to each product category is a weighted average of the endogenously determined nominal tariff equivalent of each of the applicable NTBs, where the weight is the fraction of the sector subject to the relevant policy. These weights were adapted from data in Murray and Walter (1978).

capital and labor in the production function was obtained from Zarembka and Chernicoff (1971).

IV. Computational Results

According to the model calculations, the total volume of world trade is estimated to increase by \$10.9 billion, based on 1976 trade, as a result of the Tokyo Round concessions. Most of the expansion in trade is accounted for by the industrialized countries, which increase exports by \$10.1 billion. Exports by the LDCs increase by \$21.8 million. Further details on trade, terms-of-trade, and welfare effects are summarized in Table 2.

The reported changes in the terms of trade are largest for Hong Kong (1.8%), which is followed closely by Japan (1.4%), Singapore (0.9%), and Israel (0.7%). Thus, protectionism in the North clearly has negative implications for the terms of trade of some of the developing countries, with the NICs most adversely affected.

There are several characteristics which lead to a terms-of-trade gain. First, Japan offered smaller tariff reductions than any other major industrialized country, and the developing countries agreed only to minimal tariff reductions. Consequently, there is a net rise in demand for products produced by these countries, requiring an increase in the relative price. Secondly, the emphasis on manufactures in the Tokyo Round most strongly affected Japan and those developing countries which are major exporters of manufactured products, such as Hong Kong and Singapore. Third, close trading ties with a large industrialized country which is reducing tariffs stimulates exports and improves the terms of trade. For example, Mexico benefits from tariff cuts by the U.S. and Israel benefits from tariff cuts by both the U.S. and the EEC.

At the other end of the spectrum are the countries that cut tariffs deeply but did not obtain similar concessions from their important partners. This is most notably the case for Canada whose terms of trade deteriorate by 0.8%. The terms of trade also decline for Chile (-0.2%). Both of these countries rely heavily on agricultural and materials exports, products which were not emphasized in the Tokyo Round.

Within the EEC, the terms-of-trade changes depend on the volume of extra-EEC trade, as discussed in Section II. The Tokyo Round is estimated to improve the terms of trade of the large members, such as Germany (0.2%), Italy (0.2%), and the U.K. (0.1%) at the expense of the smaller countries, Belgium-Luxembourg (-0.3%), Denmark

(-0.3%), and the Netherlands (-0.1%). The EFTA countries are also adversely affected by the smaller preferential margin received on manufactured products. In particular, the terms of trade worsen for Finland (-0.1%), Norway (-0.3%), and Sweden (-0.3%).

The terms-of-trade changes are reflected in net exports. Most countries included in the model are constrained to maintain their nominal current account balance at the base level.⁸ Hence, a deterioration in the terms of trade requires an increase in exports relative to imports to finance current imports.⁹ For example, Canada's exports rise by \$1.1 billion while imports rise by only \$815.1 million. A similar pattern emerges for Belgium-Luxembourg, Denmark, and France. In contrast, net exports fall if the terms of trade improve. This is most notably the case for Japan, for which imports rise by \$1.4 billion, while exports rise by only \$330.4 million. This is also the case for Australia, Austria, Germany, Ireland, Italy, and the U.K., as well as many of the developing countries.

The welfare effect of the Tokyo Round is measured by the equivalent variation (EV), the income change at base level prices which yields the same level of utility as the tariff changes. Among the DCs, Japan appears to gain more than other countries, with an estimated EV of \$1.1 billion which is 0.2% of 1976 GDP. For the small members of the EEC—Belgium-Luxembourg, Denmark, and the Netherlands—and some members of EFTA—Finland, Norway, and Sweden—the deterioration in the terms of trade is substantial enough to overwhelm the efficiency gains from the tariff cuts, resulting in a decline in welfare of up to 0.3% of GDP. In addition, the welfare of the U.S. and Canada decline by \$984.7 million and \$374.4 million, respectively.

The welfare outcome for the LDCs is variable, as well. EV is positive for most

8. The only exceptions are some of the EFTA countries, the U.S., Australia, and Singapore. The exchange rates of these countries are pegged, so there is no restriction on the size of the current account imbalance. In the case of Finland, Norway, Sweden, and Switzerland the deterioration in the terms of trade lowers the value of exports and raises the value of imports. However, the exchange rate is pegged so that a current account deficit results. The opposite holds true for Singapore. The improvement in the terms of trade raises the value of exports so that a current account surplus emerges.

9. The change in the terms of trade reported in Table 2 is the difference between the percent changes in the cost of the base period export and import bundles. If a country has a large trade imbalance, this calculation may indicate that the terms of trade and net exports move in the same direction. This is the case for the Netherlands and several of the LDCs.

countries, except Brazil, Colombia, Greece, South Korea, and Spain¹⁰, and is close to 1% of GDP for countries such as Hong Kong and Singapore. The tariff concessions in the Tokyo Round thus appear to have been sufficiently broad to compensate most of the LDCs for diminished preferential treatment under the GSP.

The effect of the Tokyo Round on the preferential arrangements can be seen more clearly by examining the bilateral trade flows. The change in bilateral trade among the three major industrialized country trading blocs are provided in Table 3. The most surprising result is that trade within the EEC and EFTA actually *increases* as a result of the Tokyo Round. The increase in intra-EEC/EFTA trade is most notable in the heavy manufacturing categories: nonelectric machinery (\$512.2 million), electric machinery (\$263.4 million), and transportation equipment (\$682.1 million). In fact, there are only six product categories in which intra-EEC/EFTA trade increases less than trade with the U.S. or Japan. These categories are agriculture, food, chemicals, glass products, iron and steel, and miscellaneous manufactures.

On a percentage basis the increase in intra-EEC/EFTA trade is much smaller than the change in trade with the U.S. and Japan. The percent increase in imports (not shown in the table) from other members ranges from -0.1% to 2.4% over the 22 product categories. This is much smaller than that for trade with Japan and the U.S., which ranges from zero to 17.7%. However, the volume of intra-EEC/EFTA trade is so large that it increases by \$2.6 billion, which is greater than increased imports from the U.S., at \$1.6 billion, and several times larger than the change in imports from Japan, which is \$214.7 million.

Trade between members rises mainly for two reasons. The improvement in the terms of trade for some member states increases total imports which are allocated among various partners according to the pre-existing volume of trade. In particular, Germany, the U.K., and Italy increase import from other member partners substantially. The improvement in the terms of trade of the large members of the EEC and EFTA is balanced by a deterioration for the smaller countries. Normally we might expect that these two effects would offset each other, resulting in a zero net change in intra-EEC/EFTA trade. However, many of the smaller members also peg their exchange

10. There are several cases in which welfare declines for countries which experience a terms-of-trade gain, such as New Zealand, Brazil, Greece, South Korea, and Spain. This inconsistency is partially a reflection of the difficulty with calculating the change in the terms of trade discussed in the previous footnote.

rates. The deterioration in the terms of trade thus is reflected in a current account deficit, rather than in a reduction in imports. Consequently, total trade within the EEC and EFTA rises.¹¹

A second reason for increased trade among EEC members stems from changes in NTBs. The negotiated increase in government procurement of imports applies to members as well as nonmembers, further stimulating intra-EEC/EFTA trade.

The terms-of-trade effects also play an important role in determining the pattern of imports for the U.S. and Japan. The improvement in Japan's terms of trade relative to both the U.S. and the EEC results in increased Japanese imports from both of these groups. In contrast, U.S. imports increase primarily from the Community. U.S. imports from Japan actually *decline* in 9 of the 22 product categories. This is most notably the case for transportation equipment (-\$78.5 million) and iron and steel (-\$17.7 million). U.S imports from Japan rise by only \$154.6 million, which is dramatically smaller than the \$940.1 million increase in imports from the EEC and EFTA.

The bilateral concessions in agriculture and food have a nontrivial effect on the trade in these products. EEC and EFTA imports of agricultural products from the U.S. increase by \$92.5 million and Japanese imports rise by \$163.8 million. U.S. concessions in food increase U.S. imports from the EEC and EFTA in this product category by \$97.5 million but have no effect on U.S. imports from Japan.

Finally, the increases in LDC exports to the major industrialized countries are reported in Table 4. As discussed above, the results strongly indicate that the developing countries would not be adversely affected by the reduction of the preferential margin under the GSP, due to the Tokyo Round. The LDCs included in the study increase exports to the industrialized countries by an estimated \$523.4 million as a result of the Tokyo Round. The EEC absorbs most of the new LDC exports, \$295.9 million, which is 57% of the total change. However, on a percentage basis the increases in EEC imports from the developing countries is similar to that for EFTA and Japan.

Australia and Canada are the only countries which reduce import (-\$2.8 million and -\$6.4 million, respectively) from the developing countries. More significantly, U.S. imports from the LDCs decline in 5 of the 22 product categories, such as footwear

11. The increase in intra-EEC trade constitutes an important difference between the results presented here and those obtained by Brown and Whalley (1980), who aggregate all members of the EEC into a single trading bloc, thus ignoring any changes in trade within the bloc. Consequently, a 60% tariff reduction in the Brown and Whalley model would be required to generate world trade increases similar to those obtained in the current study using tariff reductions which average 25%.

Table 4. Estimated Changes in LDC Exports due to the Tokyo Round (Millions of US Dollars)

PRODUCT	IMPORTING COUNTRY						TOTAL
	EEC	EFTA+	AUSTRALIA	CANADA	JAPAN	U.S.	
Agriculture	-2.5	16.8	0.7	1.0	6.6	4.2	26.7
Food	-2.0	1.3	0.7	-1.1	5.3	1.3	5.5
Textiles	4.7	0.4	-0.1	-0.0	1.0	1.9	7.9
Clothing	17.9	-0.7	-0.8	-3.3	0.6	17.4	31.1
Leather Prod.	34.7	4.8	0.2	-0.3	0.4	-0.2	39.5
Footwear	0.5	0.7	0.4	0.5	2.9	-6.9	-1.9
Wood Prod.	8.6	0.3	0.0	0.8	0.6	14.8	25.0
Furniture, Fixtures	8.9	1.0	2.3	0.2	4.5	1.3	18.1
Paper Prod.	7.6	0.7	0.0	0.1	0.2	0.6	9.1
Printing, Publishing	1.4	0.3	-0.6	0.3	0.2	-0.7	1.0
Chemicals	29.9	1.6	-0.0	-0.2	3.1	5.0	39.5
Petrol. Prod.	0.8	1.2	-1.7	0.0	-5.2	-5.7	-10.7
Rubber Prod.	17.3	0.1	0.9	-1.3	1.5	-4.4	14.1
Nonmetal Mineral Prod.	11.6	0.9	0.0	-0.1	2.7	8.0	23.2
Glass Prod.	1.3	0.1	-0.0	0.1	0.2	0.5	2.2
Iron, Steel	11.0	-0.0	0.1	-0.3	2.1	3.9	16.8
Nonferrous Metals	15.3	1.5	-0.0	0.6	4.2	0.1	21.7
Metal Prod.	23.9	2.2	-0.2	1.2	2.9	4.5	34.5
Nonelectric Machinery	19.8	2.3	-0.2	1.2	2.9	4.5	39.8
Electric Machinery	18.2	3.5	-1.4	-3.3	6.9	31.3	55.2
Transport Equipment	36.1	8.5	0.3	0.2	4.4	12.9	62.3
Misc. Mfrs.	31.1	5.4	-3.4	-1.4	19.1	11.9	62.8
TOTAL	295.9	52.8	-2.8	-6.4	67.9	115.9	523.4

+Excluding Portugal

(-\$6.9 million), and petroleum products (-\$5.7 million). The total increase in U.S. imports from the developing countries is \$115.9 million, which is less than half of the increase in EEC imports from the LDCs.

V. Conclusion

In this paper we have presented the results of a general equilibrium computational evaluation of the tariff and some NTB concessions in the Tokyo Round, with an emphasis on the bilateral or otherwise preferential trade characteristics. The tariff rate changes were aggregated using bilateral trade weights in order to reflect the bilateral nature of the negotiations, and the solution was constrained by the presence of five preferential trading arrangements, the EEC, EFTA, GSP, MFA, and Autopact. The main conclusions are as follows:

1. Tariff rate concessions were consistently largest for the exports of Japan, the EEC, and the U.S. and smallest for the less dominant of the industrialized countries, Canada, Australia, and New Zealand. In spite of the reduction of the preferential margin provided for by the GSP, tariff cuts were larger for the LDCs than for some of the smaller industrialized countries.

2. Changes in the terms of trade are an important determinant of the distribution of the welfare gains due to the Tokyo Round. The terms of trade are shown to improve for countries with smaller than average tariff concessions, Japan, Australia, New Zealand, and the LDCs, and to deteriorate for the countries which cut tariffs deeply, like Canada.

3. Japan and such developing countries as Hong Kong and Singapore appear to be the major beneficiaries of the Tokyo Round. Japan gains because its tariff concessions were smaller than average, and it is a major exporter of the manufactured products heavily emphasized in the final negotiated agreement. The Tokyo Round appears less beneficial to exporters of agricultural products, such as Brazil and Colombia.

4. Despite the erosion of the preferential margin provided for under the GSP, most of the LDCs appear to be better off with the tariff reduction in the Tokyo Round. In addition, the Tokyo Round generally improved the terms of trade in the developing countries. This result lends support to the claim by the developing countries that protectionism in the North worsens the terms of trade for the South.

5. Two of the larger members of the EEC, Germany and Italy, are shown to benefit by the reduction of the tariff wall around the EEC. The smaller members of the EEC and EFTA, which trade primarily with the larger members, are made worse

off.

6. Trade within the EEC and EFTA is seen to increase with the Tokyo Round. This surprising result emerges because larger members enjoy a terms-of-trade gain, which increases imports from all partners, including members of the EEC and EFTA. Deterioration in the terms of trade partially reduces imports by the smaller members but also increases the current account deficit for those countries which peg their exchange rates. Further, the relaxation of restrictions on government procurement was applied to imports from members as well as nonmembers, thus further increasing intra-EEC trade.

7. While the results presented here are broadly similar to those obtained in previous studies of the Tokyo Round, such as Brown and Whalley (1980), Deardorff and Stern (1979; 1983), and Whalley (1982), there are some important differences as well, because of the aggregation of the EEC which precludes the inclusion of the increase in intra-EEC/EFTA trade as a result of the Tokyo Round or because EEC and EFTA tariff concessions are applied to all countries of the model, including other members.

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