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THE URUGUAY ROUND AND THE DEVELOPING COUNTRIES: THAILAND AND THE PHILIPPINES

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I. INTRODUCTION

THE successful completion of the Uruguay Round of the GATT at the end of 1994 has been widely welcomed. The final agreement is highly complex and several studies have used formal economic models to explore the effects that the Round may have on individual countries. These studies have generally reached optimistic conclusions, suggesting that all or almost all countries—developed and developing—will gain.[1] The recognized exceptions have been the net food-importing countries of sub-Saharan Africa.[2] The developing countries of Southeast Asia have been considered to be among the largest net gainers in proportional terms, especially the net agricultural exporters (World Bank 1995, p. 3; Abreu 1995; Hertel et al. 1995). The present paper looks critically at these issues. It is suggested that the number of developing countries which lose from the Uruguay Round may be significantly larger than is generally assumed.

On closer inspection, the global economic models underlying the conclusions reached by earlier studies generally involve a high degree of aggregation. Those studies which focus on the implications of the Round for individual countries are of course disaggregated at the country level but typically aggregate commodities into broad groups, often containing only ten or even seven such aggregated commodities. Those studies which focus on commodity markets are disaggregated at the commodity level but typically aggregate countries into broad groups such as Southeast Asia, South Asia, East Asia, and so forth, which frequently include

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[1] The World Bank's summary of its own extensive research on this issue (World Bank 1995), subtitled "Winners and Winners," conveys the impression that all countries will gain from the Round. For a review of earlier modeling studies, see Schott and Buurman (1994).

[2] See Goldin, Knudsen, and Van der Mensbrugghe (1993, p. 25) and Hertel et al. (1995). On possible negative effects of the Round, see also UNCTAD (1990), François, McDonald, and Nordström (1994), GATT (1994), Nguyen, Perroni, and Wigle (1995), Schott and Buurman (1994), and Hamilton and Whalley (1995).

countries with very different economic structures. Obviously, aggregation of at least one of these two kinds is often necessary due to the limited time and resources available for the study. However, these aggregated analyses can in some cases give misleading results.

The present paper addresses these issues in the context of Thailand and the Philippines, two countries generally considered to be so similar for trade analysis purposes that they are often grouped together as if their interests were the same. Past studies had predicted that both of these countries would become substantial net gainers from the Uruguay Round.[3] There is a priori reason to expect that both might gain. Since the prices of agricultural commodities are projected to rise, on average, relative to the prices of manufactured goods, exporters of agricultural commodities are usually considered to be the largest net gainers from the agreements reached, and both Thailand and the Philippines are indeed large net exporters of agricultural commodities.

It is demonstrated in this paper that this kind of projection can be misleading when insufficient attention is paid to the level of commodity aggregation that underlies the projections. The *relative* prices of agricultural commodities have also been projected to change significantly; in particular, the prices of temperate zone agricultural products and rice are projected to rise relative to tropical zone products.[4] It follows that not all agricultural commodity exporters will necessarily be affected in the same way. This paper will show that when the analysis is conducted at a disaggregated level, Thailand is indeed a net gainer from the Round but the Philippines is a net loser.

The method of analysis consists first of reviewing past studies which examined in detail the likely impact of the Uruguay Round on international commodity markets and in particular its implications for commodity prices. The most disaggregated available studies of these issues were selected for this purpose. Ten sets of quantitative projections were reviewed. The paper then applied Thai and Philippine trade data to these projected price changes at a disaggregated level and showed that *all* of the ten sets of projections reviewed indicated an improvement in Thailand's net commodity terms of trade and a *decline* in the Philippines'.

The projected changes in international prices were then applied within disaggregated general equilibrium models of the Thai and Philippine economies, respectively, to analyze the implications of the projected terms of trade changes in more detail. The structure of the two models used for this purpose is sufficiently similar to make it possible to compare the results directly. In addition to the usual macroeconomic indicators, we also examined the implications of the Uruguay Round for income distribution in each of these countries. The results suggest that

[3] See Hertel et al. (1995) and the various studies reviewed by Schott and Buurman (1994).
[4] See FAO (1995) and the detailed sets of commodity price projections reviewed in Table I.

the distributional effects of the Round differ between these two countries, as do the aggregate effects.

II. URUGUAY ROUND PRICE CHANGES AND THE TERMS OF TRADE

The Uruguay Round was the eighth in a series of multilateral trade negotiations under the auspices of the General Agreement on Tariffs and Trade (GATT), and was concluded in December 1994. The Round includes commitments on: (a) tariff reductions in manufactured products; (b) tariffication of nontariff barriers in agriculture and reductions in the level of agricultural protection; (c) reduction of export and production subsidies in agriculture; (d) gradual elimination of Voluntary Export Restraints (VERs), including the Multifiber Arrangement (MFA); (e) institutional and rule changes, such as the creation of the World Trade Organization (WTO) and safeguards, antidumping and countervailing duty measures; (f) aspects of trade policy not covered by earlier agreements, such as Trade-Related Investment Measures (TRIMs), Trade-Related Aspects of Intellectual Property Rights (TRIPs), and the General Agreement on Trade in Services (GATS); and (g) areas receiving greater coverage, such as government procurement.[5]

Virtually all of the major Uruguay Round commitments on trading rules and market access vary among countries, depending on their levels of development. Developed countries are required to reduce their protection at an average rate of 36 per cent. Developing countries, such as Thailand and the Philippines, are to liberalize at an average rate of 24 per cent, while the least-developed countries are exempted altogether from any obligation to liberalize.

Several economic studies have attempted to quantify the impact that a trade liberalization broadly comparable to that achieved in the Uruguay Round may be expected to have on international commodity markets (Brandão and Martin 1993; Dee, Jomini, and McDougall 1992; Dee 1995; Andrews, Roberts, and Hester 1994; Vanzetti et al. 1993; Vanzetti, Melanie, and Barry 1994; Goldin, Knudsen, and Van der Mensbrugghe 1993; Duncan, Robertson, and Yang 1994). Based on these studies, ten sets of projections of changes in world prices associated with the conclusion of the Uruguay Round are summarized in Table I.[6] These studies were based on various global computable general equilibrium models. The levels of commodity aggregation used within them varied but in the table their projections were presented at a level of aggregation corresponding to the two general equilibrium

[5] See GATT (1994) for details, and Schott and Buurman (1994) for a qualitative assessment of the agreement.

[6] For a critical review of most of these studies, see Schott and Buurman (1994).

TABLE I

PROJECTED CHANGES IN INTERNATIONAL PRICES

(%)

	Commodity	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	
											Import	Export
1.	Rice	1.99	4.22	1.84	1.86	8.00	10.00	7.00	–1.90	5.60	1.80	7.80
2.	Maize	2.79	4.42	8.17	11.68	6.00	4.00	7.00	3.60	19.00	21.90	7.10
3.	Cassava			8.17	11.68						21.90	
4.	Soybean	2.51	4.52	8.17	11.68	1.00	1.00	2.00	4.10	17.70	21.90	
5.	Peanuts			–0.15	–0.45	6.00		7.00			4.70	
6.	Mung beans			–0.15	–0.45	6.00		7.00			4.70	8.80
7.	Sugarcane	6.31	10.18	–0.15	–0.45	1.00	1.00	3.00	10.20	59.30	4.70	
8.	Sorghum	2.79	4.42	8.17	11.68	5.00		7.00	3.60	19.00	21.90	7.10
9.	Kenaf & jute			–0.15	–0.45						4.70	
10.	Cotton	1.64	2.23	–0.15	–0.45	2.00	1.00	3.00	3.70	15.60	4.70	
11.	Vegetables & fruit			–0.15	–0.45						4.70	
12.	Coconut			–0.15	–0.45						4.70	
13.	Oil palm			–0.15	–0.45						4.70	
14.	Coffee	0.85	0.41	–0.15	–0.45				–6.10	–11.40	4.70	8.80
15.	Tobacco leaf			–0.51	–0.59						1.20	
16.	Crude rubber			–0.15	–0.45						4.70	
17.	Other crops			–0.15	–0.45						4.70	
18.	Cattle	5.13	6.08	0.71	–0.07	6.00	6.00	9.00	4.70	27.00	0.90	
19.	Swine	2.20	3.20	0.71	–0.07	7.00	6.00	7.00	1.00	9.90	0.90	
20.	Other livestock	2.20	3.20	0.71	–0.07	3.00		5.00	1.00	9.90	0.90	
21.	Poultry	2.20	3.20	0.71	–0.07	2.00	2.00	4.00	1.00	9.90	0.90	
22.	Silk	1.65	1.96	3.34	3.80				2.00	9.80	–0.60	
23.	Forestry			–0.55	–0.88						4.00	
24.	Ocean fishing			–0.21	–0.66						0.90	
25.	Mining			–0.67	–0.56						0.90	
26.	Meat processing	5.31	6.08	6.39	16.78	6.00	6.00	9.00	4.70	27.00	12.30	

TABLE I (Continued)

(%)

	Commodity	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	
											Import	Export
27.	Food processing	0.71	0.65	–0.31	2.98				–1.70	–2.20	0.80	7.70
28.	Refined sugar	6.31	10.18	–0.15	–0.45	1.00	1.00	3.00	10.20	59.30	4.70	8.80
29.	Animal feed	2.79	4.42	8.17	11.68	5.00		7.00	3.60	19.00	21.90	7.10
30.	Beverages			–0.51	–0.59						1.20	
31.	Cigarettes			–0.51	–0.59						1.20	
32.	Spinning			–1.85	–1.07						–0.10	
33.	Textiles & garments			–1.85	–1.07						–0.10	–23.10
34.	Leather & footwear			–1.56	–0.99						0.20	1.20
35.	Paper and wood			–0.71	–0.77						0.20	
36.	Printing & publishing			–0.71	–0.77						0.20	
37.	Chemicals			–0.59	–0.74						0.20	
38.	Fertilizers & pesticides			–0.59	–0.74						0.20	
39.	Refined petroleum			–0.64	–0.64						0.20	
40.	Rubber & plastic			–0.59	–0.74						0.20	1.20
41.	Cement nonmetallic			–0.28	–0.46						0.20	
42.	Basic metals			–0.79	–0.37						0.20	
43.	Metal products			–0.58	–0.65						0.20	
44.	Agricultural machinery			–0.31	–0.53						0.20	
45.	Other machinery			–0.31	–0.53						0.20	
46.	Electrical equipment			–0.31	–0.53						0.20	
47.	Motor vehicles			–1.02	–2.02						0.20	
48.	Other manufacturing			–0.32	–0.57						0.20	
49.	Construction			–0.76	–0.62						0.90	
50.	Transport & commun.			–0.17	–0.08						0.90	7.00
51.	Trade			–0.17	–0.08						0.90	7.00
52.	Banking & insurance			–0.42	–0.22						0.90	
53.	Other services			–0.42	–0.22						0.90	

Sources: Scenario 1 = Column 1 of Table 7 in Brandão and Martin (1993).
Scenario 2 = Column 5 of Table 7 in Brandão and Martin (1993).
Scenario 3 = Dee (1995).
Scenario 4 = Table 3 in Dee, Jomini, and McDougall (1992).
Scenario 5 = Table 1 in Andrews, Roberts, and Hester (1994).
Scenario 6 = Scenario 1 of Table 9 in Vanzetti, Melanie, and Barry (1994).
Scenario 7 = Column 2 of Table 2 in Vanzetti et al. (1993).
Scenario 8 = Column 2 of Table 3.1 in Goldin, Knudsen, and Van der Mensbrugghe (1993).
Scenario 9 = Column 3 of Table 3.1 in Goldin, Knudsen, and Van der Mensbrugghe (1993).
Scenario 10 = Duncan, Robertson, and Yang (1994).

models described in the following section.[7] For commodities not covered by the study concerned, no entry appears in the table.[8]

The price changes indicated in Table I refer to a time frame of six to ten years after the conclusion of the Round, during which the policy adjustments agreed upon in the Round are to be implemented. They refer to price changes after this period of adjustment, but these changes are to be considered permanent thereafter. It is important that the price changes summarized in Table I project the effects of the Uruguay Round, ceteris paribus. They are estimates of the proportional differences between the prices that will emerge after the completion of the Round compared with what those prices would otherwise have been if the Round had not been successfully completed but all other relevant circumstances had been the same. That is, these projections should not be confused with *predictions* of the price changes that will actually occur in the period following the Round. These actual price changes will result from many changes in market conditions other than the completion of the Uruguay Round and the projections shown in Table I do not allow for factors other than the completion of the Round itself.

Since the early 1990s, perceptions of the achievements of the Uruguay Round have abated significantly. In general, the more recent the study, the more modest are the changes in international price projected to result from the Round. Nevertheless, all these studies have concluded that the Uruguay Round agreements would result in net aggregate gains for the world, and for developing countries as a whole. The estimated magnitude of the gains varies significantly from study to study, depending on the model and assumptions used.

All ten sets of projections indicate increases in agricultural products prices, *on average*, relative to manufactured goods prices. One of the studies suggests potential adverse impacts on the food-importing developing economies because of projected increases in the international prices of food grains in particular, relative to manufactured goods (Goldin, Knudsen, and Van der Mensbrugghe 1993, p. 25). In addition, it is strongly felt that developing countries, and especially the net exporters of agricultural products, may be expected to gain from the Round. It should be noted, however, that in all cases the *relative* prices of agricultural commodities are projected to change significantly, as well as their average prices relative to manufactured goods.

We shall now consider the implications that the price projections indicated in Table I have for the commodity terms of trade of Thailand and the Philippines. The trade patterns of Thailand and the Philippines are summarized in Table II. Both

[7] Note that Duncan, Robertson, and Yang (1994) distinguish projections of the f.o.b. export prices and c.i.f. import prices for both Thailand and the Philippines and these projections are shown separately in Table I.

[8] In the quantitative work which follows, all such entries were treated as zero.

TABLE II

TRADE SHARES: THAILAND AND THE PHILIPPINES

Commodity	Thailand		The Philippines	
	Export	Import	Export	Import
1. Rice	0.09	0.00	0.00	0.00
2. Maize	0.02	0.00	0.00	0.00
3. Cassava	0.00	0.00	0.00	0.00
4. Soybean	0.00	0.00	0.02	0.03
5. Peanuts	0.00	0.00	0.00	0.00
6. Mung beans	0.01	0.00	0.00	0.00
7. Sugarcane	0.00	0.00	0.00	0.00
8. Sorghum	0.00	0.00	0.00	0.00
9. Kenaf & jute	0.00	0.00	0.00	0.00
10. Cotton	0.00	0.02	0.00	0.00
11. Vegetables & fruit	0.01	0.00	0.02	0.00
12. Coconut	0.00	0.00	0.06	0.00
13. Oil palm	0.00	0.00	0.00	0.00
14. Coffee	0.00	0.00	0.00	0.00
15. Tobacco leaf	0.00	0.00	0.00	0.00
16. Crude rubber	0.00	0.00	0.00	0.00
17. Other crops	0.01	0.00	0.00	0.00
18. Cattle	0.00	0.00	0.00	0.00
19. Swine	0.00	0.00	0.00	0.00
20. Other livestock	0.00	0.00	0.00	0.00
21. Poultry	0.00	0.00	0.00	0.00
22. Forestry	0.00	0.01	0.00	0.00
23. Ocean fishing	0.00	0.02	0.03	0.00
24. Mining	0.01	0.14	0.05	0.03
25. Meat processing	0.01	0.00	0.00	0.00
26. Food processing	0.10	0.03	0.04	0.03
27. Refined sugar	0.03	0.00	0.01	0.00
28. Animal feed	0.07	0.00	0.01	0.01
29. Beverages	0.00	0.00	0.00	0.00
30. Cigarettes	0.01	0.01	0.00	0.00
31. Spinning	0.04	0.02	0.01	0.04
32. Textiles & garments	0.08	0.01	0.05	0.00
33. Leather & footwear	0.02	0.00	0.03	0.00
34. Paper and wood	0.02	0.02	0.06	0.00
35. Printing & publishing	0.00	0.00	0.00	0.02
36. Chemicals	0.01	0.10	0.03	0.10
37. Fertilizers & pesticides	0.00	0.03	0.01	0.01
38. Refined petroleum	0.01	0.11	0.01	0.11
39. Rubber & plastic	0.06	0.01	0.00	0.00
40. Cement nonmetallic	0.01	0.01	0.01	0.06
41. Basic metals	0.03	0.08	0.04	0.01
42. Metal products	0.01	0.03	0.01	0.08

TABLE II (Continued)

Commodity	Thailand		The Philippines	
	Export	Import	Export	Import
43. Agricultural machinery	0.00	0.00	0.00	0.00
44. Other machinery	0.01	0.11	0.00	0.00
45. Electrical equipment	0.04	0.07	0.10	0.06
46. Motor vehicles	0.00	0.04	0.01	0.05
47. Other manufacturing	0.06	0.05	0.01	0.05
48. Construction	0.00	0.00	0.01	0.00
49. Transport & commun.	0.09	0.01	0.05	0.08
50. Trade	0.09	0.00	0.11	0.00
51. Banking & insurance	0.00	0.01	0.00	0.01
52. Other services	0.04	0.04	0.21	0.22
Total	1.00	1.00	1.00	1.00

Sources: Thailand = National Economic and Social Development Board, Bangkok.
The Philippines = National Economic Development Authority, Manila.

countries are net exporters of agricultural commodities.[9] However, the composition of these agricultural exports is quite different. Thailand is a large net exporter of grains while the Philippines is a net importer. Likewise, the Philippines is a large net exporter of coconut products while for Thailand this commodity is unimportant. Clearly, there is ample scope for the changes in relative prices among agricultural commodities, as indicated in Table I, which may result in different overall implications for these two countries.

The implications of Tables I and II for the overall terms of trade of the two countries are reported in Table III. All ten sets of price projections imply an *improvement* in Thailand's terms of trade and a *deterioration* in the Philippines'. Obviously, to reveal this difference it is necessary to look at the effects of the Round at a finer level of commodity disaggregation than is contained in most of the earlier country-specific studies. These studies have frequently aggregated all agricultural commodities into a *single* commodity whose price is expected to rise as a result of the Round, relative to manufactured goods. Under these conditions, both Thailand and the Philippines appear as net gainers from the Round, because both are net exporters of agricultural commodities, considered as a single aggregate. This aggregated approach overlooks the fact that the *relative* prices of agricultural commodities are projected to change significantly as well. When the implications of the

[9] Defining commodities 1 to 23 inclusive in Tables I and II as agricultural, the combined export shares of agricultural commodities for Thailand and the Philippines were 15 and 13 per cent, respectively, and the combined import shares are 5 and 3 per cent, respectively. The difference between agricultural commodities' export and import shares was therefore 10 per cent in both cases.

TABLE III

PROJECTED CHANGES IN INTERNATIONAL PRICES

(%)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10
Thailand:										
Import price index	0.062917	0.077517	–0.542766	–0.485920	0.054640	0.029123	0.079324	0.025910	0.283951	0.583854
Export price index	0.691427	1.140974	0.659087	1.401412	1.267689	0.986568	1.412933	0.275438	3.711513	1.972161
Commodity terms of trade	0.628510	1.063457	1.201853	1.887332	1.213049	0.957445	1.333608	0.249528	3.427561	1.388307
The Philippines:										
Import price index	0.23295	0.278441	–0.198341	0.416166	0.394556	0.357313	0.411832	0.167226	1.255618	0.745644
Export price index	0.11201	0.161977	–1.238733	–0.201584	0.013497	0.013497	0.040492	0.073403	0.717220	0.018858
Commodity terms of trade	–0.12094	–0.116465	–1.040392	–0.617750	–0.381058	–0.343816	–0.371340	–0.093822	–0.538398	–0.726785

Source: Author's calculations from Tables I and II.

Round for developing countries, including the net agricultural exporters, are examined, the composition of those countries' trade is very important. As a result, the level of aggregation at which the analysis is conducted can be crucial; when the issues are examined at a disaggregated level, the conclusions reached from highly aggregated analyses can, as in this case, be reversed.

III. GENERAL EQUILIBRIUM SIMULATIONS

The structure of trade plays an important role in determining the consequences of international price changes, but the overall welfare effects depend on additional factors, including the domestic policy distortions that remain. The use of a multisectoral applied general equilibrium model to address these issues is thus appropriate. Such an approach can also accommodate the fact that the implementation of the Uruguay Round agreement is likely to affect the economies of Thailand and the Philippines not only through changes in international prices, which are primarily (though not entirely) a consequence of liberalizations undertaken by larger countries, but also through the changes in protection within Thailand and the Philippines themselves, as agreed under the Round. Finally, a general equilibrium treatment enables to examine the implications of the Round for the structure of the economy and for the distribution of incomes within Thailand and the Philippines, issues that can be studied only crudely without a general equilibrium framework.

A. *The Models*

The general equilibrium models of the Thai and Philippine economies used in this paper are referred to as PARA and APEX, respectively. Each belongs to the class of general equilibrium models which are linear in proportional changes, sometimes referred to as Johansen models. We will subsequently use the term "Johansen models" to refer to this class of "linear in proportional change" general equilibrium models. The advantage of the linearity properties is that the models can be solved using software packages relying on linear algebra techniques. By defining the variables of the system as *proportional changes* in the levels of economic variables of interest, the use of Johansen models enables to build larger economic models and to solve them using more user-friendly computing procedures than would otherwise be possible. Models whose variables are defined in the *levels* of economic variables require the use of nonlinear solution techniques. The disadvantage of linearization is that unless special provision is made for handling nonlinearities, Johansen models are in general useful only for handling relatively small shocks. However, recent software developed by Codsi, Pearson, and Wilcoxen (1991) enables to handle the nonlinearities which may be involved in large shocks without abandoning the use of linearized Johansen-type models.

The two general equilibrium models used here share many structural character-

istics with the influential ORANI general equilibrium model of the Australian economy (Dixon et al. 1982), but these characteristics have been adapted in taking account of the situation of the Thai and Philippine economies.[10] Each of these two models incorporates a disaggregated and detailed representation of the economy concerned and also incorporates the results of a large econometric research program which estimated the economic behavioral parameters underlying the model. The outcome of this program of empirical work is that every element of the social accounting matrix data base and every behavioral parameter entering each of these two models is based on original empirical work using data from the country concerned. Few applied general equilibrium models, constructed for any country, can match this claim.

The versions of the two models reported in the present paper contain sixty (Thailand) and fifty (Philippines) producer goods and services. The analytical structure of the two models is similar and the equation systems include the following major components:

—A complete consumer demand system based on twenty (Thailand) and twelve (Philippines) consumer goods, estimated from cross-sectional household survey data. Five individual households are distinguished in this demand system, differentiated in each case by income quintile.[11]

—Income determination for each of the five households based on their endowments of factors of production, also based on cross-sectional household survey data.

—A factor demand system which relates the demand for each primary factor to industry outputs and price of each of the primary factors. This reflects the assumption that factors of production may be substituted for one another in ways that depend on factor prices and on the elasticities of substitution between the factors. The latter are estimated with a combination of time-series and cross-sectional industry-level data.

—An intermediate good demand system which assumes that intermediate inputs are used in each industry in proportion to the output produced (the Leontief assumption).

—Zero profit conditions for each industry determining specific factor returns from commodity prices, intermediate good prices, and mobile factor returns.

[10] Further detail on the structure of the PARA model of the Thai economy may be found in Warr, Khatikarn, and Pant (1994) and further detail on the APEX model is provided in Clarete and Warr (1992). Other papers, presented at the same conferences as these two papers on model structure, describe the data bases of the two models and the estimation of the behavioral parameters used.

[11] The Thailand model (PARA) differentiates between rural and urban households unlike the Philippine model (APEX), but to facilitate comparison between the results of the two models, the rural and urban households of the Thai model were aggregated to the national level for the purposes of this paper.

—Demands for imported and domestically produced versions of each good, incorporating Armington elasticities of substitution between the two, the latter estimated from trade data obtained from the respective customs departments.
—Market-clearing conditions for each commodity and factor of production ensuring that aggregate demand does not exceed aggregate supply for that commodity or factor.
—A set of equations determining the incomes of households from their ownership of factors of production, their rates of return, and transfers from elsewhere in the system.
— A set of macroeconomic identities which ensures that standard macroeconomic accounting conventions are observed.

In each of the two models, production functions assume constant returns to scale. This assumption enters via the factor demand functions, which are homogeneous of degree one in output and through the zero profit conditions, which relate unit commodity prices to unit costs of production. All behavioral functions are homogeneous of degree zero in prices. The nominal exchange rate is fixed exogenously within each model to determine the domestic nominal price level. Thus, for example, a 10 per cent increase in the exchange rate will result in a 10 per cent increase in all nominal domestic prices while no change will occur in any quantity determined within the model. Since there is no monetary sector in either model, the nominal exchange rate does not play any role in the achievement of the trade balance which is obtained by endogenous adjustments in the domestic relative prices, in particular through the "real exchange rate"—the ratio of traded to non-traded goods prices.

There are four mobile or semi-mobile primary factors of production: skilled labor, unskilled labor, agricultural mobile capital, and nonagricultural mobile capital. Skilled labor refers to those in the work force who are capable of performing tasks requiring more than a specified level of work experience, training, or both. Educational criteria were used to distinguish skilled and unskilled labor. Unskilled labor arbitrarily refers to those who did not complete high school, while skilled labor refers to those who at least graduated from high school. This criterion provides at best an imperfect way of distinguishing between skilled and unskilled labor but it was employed because data were readily available.[12] Unskilled labor is

[12] In the case of Thailand the main data source used for this decomposition of labor was the 1985 Socio-Economic Survey conducted by the National Economic and Social Development Board. In the case of the Philippines the main sources were the 1980 National Statistical Office publication *Gainful Workers 15 Years Old and Over of Private Households by Major Occupation Group, Major and Minor Industry Groups Survey* and data on the *Number of Employed Persons by Highest Grade Completed by Major Occupation Group, October 1987 and 1988* published by the National Economic Development Authority in 1989.

freely mobile between the nonagricultural and agricultural sectors of the economy, but skilled labor is not used in agriculture.[13]

Each industry also uses an industry-specific fixed factor. Only unskilled labor is freely mobile across all industries. Two factors are freely mobile across all agricultural industries: unskilled labor and mobile agricultural capital, and three primary factors are freely mobile among the nonagricultural industries: skilled labor, unskilled labor, and nonagricultural mobile capital. The length of run implicit in the models' comparative static adjustment processes should range between two and four years.

B. *Model Closure*

Real household consumption was selected as the welfare measure in our analysis, both at the aggregated level and at the household level. It is important that the closure of the model be compatible with this measure because a single period economic model is being used to capture welfare effects which in reality involve inter-temporal issues. To achieve this objective, we ensured that the full welfare effects of the shocks to be introduced are channeled into consumption and do not "leak" into other directions, with real world inter-temporal welfare implications not captured by our welfare measure. That is, model closure was used to ensure that the welfare measure used, real household consumption, is consistent with the single period economic model used to measure it.

To prevent inter-temporal leakages of this kind from occurring we conducted our simulations with balanced trade (exogenous current account, expressed in foreign currency), to ensure that the potential benefits of the export tax do not flow to foreigners, through a current account surplus, or that increases in domestic consumption are not achieved at the expense of borrowing from abroad, in the case of a current account deficit. For the same reason, real government spending and real investment demand for each good were held fixed exogenously. The government budget deficit was held fixed in nominal terms by adjustments to the income tax rate, in response to changes in government revenue so as to restore the base level of the budgetary deficit. Household savings were determined endogenously so as to satisfy Walras's law, through the identity that the (absolute) change in the level of total investment must be equal to the sum of the changes in household savings, government savings, and foreign savings.

Within these two general equilibrium models, no explicit labor supply relations are specified. To close the models, either the level of aggregate employment or the level of real wages must ordinarily be specified by the user for each of the two categories of labor. In the simulations reported here levels of aggregate employ-

[13] The reason is that the data sources listed above indicate virtually zero employment in agriculture of workers meeting the educational criterion for "skilled labor" that we have employed.

ment were treated as exogenous for both skilled and unskilled labor, and real wages were endogenous. This does not imply that there is no unemployment, but that the level of unemployment is treated independently of the external shocks applied. External shocks produce changes in the demand for labor, through their effects on the various industries, and in the simulations these shifts in labor demand affect households by the changes in real wages at given levels of employment, rather than through changes in levels of employment at given real wages.

IV. SIMULATION RESULTS

Eleven sets of general equilibrium simulations were carried out for each country: one based on each of the ten sets of world price changes summarized in Table I and another analyzing the effects of a 24 per cent across-the-board tariff cut in that country. The 24 per cent tariff cut represents the average rate of liberalization required of developing countries such as Thailand and the Philippines under the final Uruguay Round agreement.[14]

Tables IV to VII summarize the results of these simulations. Simulation results labeled "price 1" to "price 10" correspond to the effects of exogenous changes in international prices equivalent to the projected international price effects of the Uruguay Round marked 1 to 10 in Table I, respectively, and the final column labeled "tariff" corresponds to the simulated effects of a 24 per cent across-the-board reduction in protection undertaken respectively by Thailand and the Philippines themselves.

Tables IV to VII provide simulation results relating, on the one hand, to the implications of international price projections, and on the other, to the effects of reduced protection. These results are presented separately, rather than combined, so that the contributions of these two aspects of the Round can be examined individually. The linearity in percentage changes of the two underlying general equilibrium models indicates that for any given model closure the combined effect of any two sets of exogenous shocks is equal to the sum of their separate effects. The simulated effect of the Uruguay Round as a whole is thus obtained by adding the results of (a) any *one* of the projected price change columns (whichever is considered to be most realistic), to those of (b) the tariff change column. For example, if price projection 1 is considered to be realistic, the overall projected effects of the Uruguay Round on real GDP in Thailand are obtained by adding the simulated effects on real GDP of the projection "price 1" (0.001 per cent) to the simulated effects on real GDP of a 24 per cent tariff reduction (0.031 per cent), giving a simulated increase in real GDP of 0.032 per cent.

[14] We are ignoring the issue of "dirty tariffication." Its relevance is addressed in the Conclusions below.

TABLE IV

THAILAND: SIMULATED MACROECONOMIC EFFECTS OF THE URUGUAY ROUND

	Simulation										
	Price 1	Price 2	Price 3	Price 4	Price 5	Price 6	Price 7	Price 8	Price 9	Price 10	Tariff
A. Output (GDP at market prices):											
GDP (nominal)	0.489	0.741	0.027	0.889	0.576	0.443	0.673	0.042	2.233	2.576	–0.442
GDP (real)	0.001	0.001	–0.006	0.000	–0.003	–0.007	–0.001	0.006	0.019	0.209	0.031
B. Aggregate price indices:											
Consumer price index	0.430	0.650	–0.109	0.627	0.514	0.434	0.587	–0.015	1.842	1.745	–0.245
GDP deflator	0.489	0.740	0.033	0.888	0.578	0.450	0.674	0.036	2.214	2.384	–0.473
C. External sector:											
Export revenue (U.S.$)	0.102	0.141	–0.602	–0.426	0.167	0.132	0.184	–0.079	0.205	0.307	0.718
Import bill (U.S.$)	0.082	0.113	–0.484	–0.343	0.134	0.107	0.148	–0.063	0.165	0.247	0.578
D. Government budget:											
Revenue (nominal)	0.577	1.006	0.574	0.179	1.632	1.639	1.624	–0.271	2.010	7.805	–1.493
Expenditure (nominal)	0.360	0.717	0.893	–0.225	1.577	1.636	1.521	–0.244	1.191	5.191	–1.572
E. Wages:											
Skilled labor (nominal)	–0.076	–0.255	–0.810	0.042	–0.734	–0.745	–0.714	–0.185	–0.994	2.222	0.391
Unskilled labor (nominal)	1.192	2.049	1.129	2.023	2.377	2.209	2.519	0.427	6.599	2.466	0.382
F. Household aggregate consumption:											
Consumption (nominal)	0.622	0.952	0.174	1.207	0.772	0.601	0.895	0.070	2.904	1.930	–0.244
Consumption (real)	0.192	0.302	0.283	0.580	0.258	0.167	0.308	0.085	1.061	0.214	0.001

Source: Author's calculations.

Note: All results are expressed in percentage changes and all nominal quantities are expressed in local currency (baht) unless otherwise indicated.

A. *Macroeconomic Effects*

Tables IV and V show the simulated aggregate economic effects of the Uruguay Round on the Thai and Philippine economies, respectively. As expected, a reduction in protection resulted in a decline in both the consumer price index and the GDP deflator in both countries. The improvement in Thailand's external terms of trade coincided with small increases in real GDP under most price projections but small declines in real GDP were also indicated in some cases. These results should be interpreted with caution. "Real" GDP refers to the GDP measured at constant prices, but it is essential to consider which prices are being used. "Real" GDP in this instance is the change in nominal GDP deflated by the change in the GDP deflator. Essentially, GDP is being measured at the prices which held initially, prior to the shock. But these prices are distorted by the effects of the tariffs and other tax distortions captured in our data base. The change in "real" GDP, so measured, should therefore not be confused with a change in real economic welfare. Real welfare does not necessarily move in the same direction as this change in "real" GDP.

A reliable indicator of real welfare is aggregate real consumption, under the assumption that a dollar's worth of consumption for any one household has the same social value as a dollar's worth for any other household. This indicator is shown in the final row of Tables IV and V. Real welfare in Thailand increased by each of the 10 sets of price projections and further increased slightly by the 24 per cent reduction in protection shown in the final column.

For the Philippines, real GDP and real welfare (aggregate real consumption) were reduced by each of the ten sets of price projections, a result which is consistent with their implications for the external terms of trade, shown in Table III. As in the case of Thailand, trade liberalization in the Philippines caused a small increase in aggregate real consumption but this increase was *insufficient* to offset the aggregate welfare reductions induced by the decline in the Philippines' external terms of trade, as indicated by any of the ten sets of projections reviewed.

The simulated effects on the wages of skilled and unskilled labor were different in the two countries. In the case of Thailand, all ten sets of price projections indicated an increase in unskilled wages relative to skilled wages and in the case of the Philippines all ten indicated exactly the reverse. Reduced protection had negligible effects on relative wages in Thailand, but both rose relative to GDP, implying that the real returns to other factors—principally capital and agricultural land—fell. In the Philippines, reduced protection favored unskilled wages relative to skilled wages but both again rose relative to GDP. We shall examine the causes and the distributional implications of these results below.

TABLE V

THE PHILIPPINES: SIMULATED MACROECONOMIC EFFECTS OF THE URUGUAY ROUND

	Simulation										
	Price 1	Price 2	Price 3	Price 4	Price 5	Price 6	Price 7	Price 8	Price 9	Price 10	Tariff
A. Output (GDP at market prices):											
GDP (nominal)	0.186	0.320	–4.511	–0.843	–0.222	–0.202	–0.148	0.073	1.264	–2.210	–0.134
GDP (real)	–0.077	–0.127	–0.565	–0.157	–0.083	–0.068	–0.105	–0.134	–0.725	–0.688	0.002
B. Aggregate price indices:											
Consumer price index	0.348	0.558	–3.628	–0.421	0.002	–0.006	0.106	0.280	2.502	–1.266	–0.061
GDP deflator	0.263	0.448	–3.945	–0.686	–0.139	–0.135	–0.043	0.207	1.989	–1.522	–0.136
C. External sector:											
Export revenue (U.S.$)	0.171	0.151	–0.712	0.140	0.165	0.190	0.155	–0.039	0.435	0.568	0.313
Import bill (U.S.$)	0.164	0.145	–0.682	0.134	0.158	0.182	0.149	–0.037	0.416	0.544	0.300
D. Government budget:											
Revenue (nominal)	0.756	1.242	–4.642	–0.689	0.120	0.044	0.373	0.916	6.272	0.767	0.196
Expenditure (nominal)	0.143	0.244	–4.499	–0.888	–0.191	–0.180	–0.132	0.058	0.978	–2.024	0.208
E. Wages:											
Skilled labor (nominal)	0.653	1.078	–3.770	–0.256	0.105	0.077	0.305	0.647	5.054	–1.031	0.309
Unskilled labor (nominal)	–0.194	–0.272	–6.676	–1.711	–0.534	–0.488	–0.547	–0.326	–1.567	–3.817	0.838
F. Household aggregate consumption:											
Consumption (nominal)	0.204	0.356	–4.716	–0.850	–0.245	–0.222	–0.164	0.082	1.407	–2.419	–0.058
Consumption (real)	–0.144	–0.202	–1.088	–0.429	–0.247	–0.216	–0.271	–0.198	–1.095	–1.153	0.003

Source: Author's calculations.

Note: All results are expressed in percentage changes and all nominal quantities are expressed in local currency (pesos) unless otherwise indicated.

B. *Sectoral and Distributional Effects*

Tables VI and VII show the decomposition of the sectoral and distributional effects of the Uruguay Round. Four of the ten sets of price projections reviewed in Table I were selected due to their comprehensive coverage of commodities and, for brevity, the tables present results for these four sets of projections alone. As in the case of Tables IV and V, the simulated effects of tariff reductions are presented separately, in the final column, from the effect of projected international price changes.

TABLE VI

THAILAND: SIMULATED STRUCTURAL AND DISTRIBUTIONAL EFFECTS

	Simulation				
	Price 1	Price 4	Price 9	Price 10	Tariff
Structure of output:					
Real aggregate GDP	0.001	0.000	0.019	0.003	0.031
Sectoral outputs:					
Primary industries	0.804	1.483	4.493	1.572	0.032
Natural resources	0.122	1.055	–1.449	1.647	–0.043
Agricultural processing	1.436	3.720	6.216	5.642	0.018
Manufacturing	–0.336	–1.160	–1.672	–16.151	0.196
Services	–0.230	–0.326	–0.909		0.014
Distribution of income:					
Real aggregate consumption	0.192	0.580	1.062	0.214	0.001
Household income distribution:					
Nominal gross incomes:					
HH1 (poorest)	0.694	1.276	3.400	2.505	0.345
HH2	0.515	1.006	2.467	2.389	0.348
HH3	0.406	0.839	1.802	2.361	0.347
HH4	0.342	0.742	1.466	2.333	0.352
HH5 (richest)	0.293	0.670	1.204	2.349	0.353
Real gross income changes (deflated by household specific CPI):					
HH1 (poorest)	0.171	0.443	1.182	0.160	0.529
HH2	0.032	0.271	0.330	0.217	0.582
HH3	–0.050	0.152	–0.210	0.275	0.610
HH4	–0.082	0.132	–0.419	0.458	0.636
HH5 (richest)	–0.033	0.256	–0.231	0.845	0.684
Real consumption expenditures:					
HH1 (poorest)	0.164	0.445	1.174	0.037	0.433
HH2	0.014	0.274	0.305	0.294	0.333
HH3	–0.085	0.156	–0.258	0.647	0.160
HH4	–0.142	0.140	–0.503	–0.177	–0.164
HH5 (richest)	–0.153	–0.271	–0.396	–1.407	–0.909

Source: Author's calculations.
Note: All results are expressed as percentage changes.

In the case of Thailand, the Round resulted in significant increases in both primary production and agricultural processing as shares of GDP. The shares of manufacturing and services both declined significantly. In the Philippine case, sectoral effects were smaller. Agriculture expanded somewhat relative to manufacturing but the significant difference from the Thai case is that services expanded relative to GDP. These sectoral results account for most of the relative wage movements noted above. Those factors used intensively in sectors which expand experience an increase in returns relative to factors used intensively in sectors which contract in relative terms. Since services industries in the Philippines are more intensive in the use of skilled labor than the economy-wide average, and since the

TABLE VII

THE PHILIPPINES: SIMULATED STRUCTURAL AND DISTRIBUTIONAL EFFECTS

	Simulation				
	Price 1	Price 4	Price 9	Price 10	Tariff
Structure of output:					
Real aggregate GDP	–0.077	–0.157	–0.725	–0.688	–0.002
Sectoral outputs:					
Primary industries	0.025	0.188	–0.062	0.630	–0.112
Natural resources	–0.247	–0.046	–2.244	3.338	0.094
Agricultural processing	0.288	1.116	0.303	0.895	0.107
Manufacturing	–0.111	–0.279	–0.986	–2.381	–0.085
Services	–0.026	–0.137	–0.236	–0.459	–0.009
Distribution of income:					
Real aggregate consumption	–0.144	–0.429	–1.095	–1.153	0.003
Household income distribution:					
Nominal gross incomes:					
HH1 (poorest)	0.445	–0.607	3.420	–1.497	0.439
HH2	0.414	–0.659	3.181	–1.605	0.458
HH3	0.385	–0.709	2.954	–1.696	0.477
HH4	0.352	–0.766	2.692	–1.817	0.498
HH5 (richest)	0.194	–1.019	1.466	–2.044	0.601
Real gross income changes (deflated by household specific CPI):					
HH1 (poorest)	0.043	–0.306	0.528	–0.356	0.481
HH2	0.019	–0.335	0.332	–0.440	0.511
HH3	0.002	–0.355	0.188	–0.505	0.539
HH4	–0.011	–0.371	0.071	–0.579	0.564
HH5 (richest)	–0.117	–0.524	–0.758	–0.699	0.665
Real consumption expenditures:					
HH1 (poorest)	–0.039	–0.300	–0.249	–0.910	–0.119
HH2	–0.064	–0.337	–0.455	–1.008	–0.084
HH3	–0.085	–0.359	–0.627	–1.080	–0.059
HH4	–0.103	–0.375	–0.775	–1.152	–0.038
HH5 (richest)	–0.216	–0.517	–1.669	–1.246	0.043

Source: Author's calculations.

Note: All results are expressed as percentage changes.

services sector expands in that country relative to GDP, skilled wages increased relative to returns to other mobile factors of production, including unskilled labor.

The distribution of nominal gross incomes by household group reflected the movements in relative factor returns noted above. In Thailand, the nominal gross incomes of the poorest quintile rose relative to the richest quintile in each of the four sets of price projections shown. Reduced protection was relatively neutral in its effect on gross income. In the Philippine case, changes in nominal gross incomes slightly favored the poorest households, in relative terms, indicating that the decline in returns to land and capital has implications for the richest households which outweighed the implications of increased returns to skilled labor.

Regarding the effects on real consumption expenditures, this pattern of distributional outcomes was accentuated. In Thailand, the poorest quintile gained absolutely and the richest lost absolutely both as a result of the four price projections shown and also due to reduced protection; both the effects of external price changes and the effects of reduced protection indicated more favorable effects for poorer than for richer households. In the Philippine case, all five quintile groups lost absolutely from each of the four price projections and all but the richest quintile also lost from reduced protection. When these two sets of effects were combined, the proportionate loss was greatest for the richest household quintiles, even allowing for the effects of reduced protection.

V. CONCLUSIONS

The completion of the Uruguay Round of the GATT was rightly considered to be a significant achievement, producing aggregate economic gains at a global level and for many individual countries. But in the enthusiasm to secure global support for the agreement there has been an apparent reluctance to recognize that there will also be net losers. In the present paper it is argued that the number of developing countries which lose from the Uruguay Round may be much larger than is generally assumed. Moreover, we have shown that the losses incurred by those countries which are harmed by liberalization occurring elsewhere are not necessarily offset by concerted liberalizations undertaken by those countries themselves.

These aspects were discussed in the context of Thailand and the Philippines, two apparently similar agricultural exporting countries which have both been considered to gain significantly from the Uruguay Round. When the projected implications of the Round for commodity prices were examined at a disaggregated level, Thailand appears to be a net gainer from the Round, as indicated by its external commodity terms of trade, while the Philippines a significant net loser. At a methodological level, these results show the importance of the level of aggregation used in analyzing the implications of phenomena as complex as the Uruguay Round agreement.

These effects were studied in further detail using disaggregated general equilibrium models of both economies. For both countries, the aggregate benefits from their own liberalizations, as simulated here, were small compared with the gains (Thailand) and losses (Philippines) resulting from the changes in their external commodity terms of trade. Insofar as these terms of changes in trade are the result of other countries' liberalizations, it follows that for both countries the overall welfare effects of the Uruguay Round are dominated by the implications of *other* countries' liberalizations, rather than their own. The result for the Philippines is significant in that it shows that a welfare loss due to the Uruguay Round is not confined to sub-Saharan African countries which failed to liberalize significantly themselves,[15] but can also be found in countries which did agree to significant liberalizations—such as the Philippines.[16]

It must be emphasized that the fact that a country loses from one particular set of negotiations or one particular Round of the GATT does not necessarily imply that compensation of that country is required, or that the country concerned should reject the agreement. The process of international trade liberalization, including the GATT, may be considered to be an extended sequence of negotiations which could indeed generate long-term benefits for all participants, even though any *single* set of agreements reached involves losers as well as gainers. Within countries, there will also be both regions and social groups which gain and others which lose. At the very least, improving the information base under which negotiations are conducted is certainly preferable to pretending that everyone gains from these agreements. Facing these issues directly will presumably increase the prospects for obtaining equitable agreements in future negotiations.

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[15] See, for example, Hertel et al. (1995), where it is implied that countries lose from the Round (only sub-Saharan African countries are identified) because their own commitments to liberalization were insufficient.

[16] In reality, "dirty tariffication" has been a mechanism used by many developing countries, including both Thailand and the Philippines, to reduce the amount of liberalization actually implemented below the 24 per cent agreed upon. The positive welfare effects of the liberalizations actually undertaken will therefore be even smaller than those estimated in our simulations, which reinforces the qualitative conclusions drawn above.

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