SIMULATING THE EFFECTS OF GATT-UR/WTO ON THE PHILIPPINE ECONOMY[1]

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The Philippine economy may be affected by the new GATT/WTO in three possible ways: (a) through the changes in the tariff structure of the economy as a result of the commitments of the Philippines during the Uruguay Round (UR); (b) through the expansion of the world trade as both developed countries (DCs) and less developed countries (LDCs) adjust their respective trade protection structures; and (c) through the changes in the world export and import prices as a result of the realignment in trade and non-trade barriers (NTBs) existing in both DCs and LDCs. The objective of this paper is to simulate the possible impact of these changes on the local economy using a Philippine economic model. Specifically, it will attempt to determine whether the effects will be favorable at the macroeconomic level and progressive in terms of income distribution. Furthermore, the paper will also look into the sectoral output effects.

The model used to simulate these changes is a computable general equilibrium (CGE) model of the Philippine economy called the APEX model. The model can adequately capture the intersectoral reallocation movements of outputs and factors among the different industries and sectors of the economy as a result of changes in the world economy (see Appendix).

The paper is divided into seven sections and one appendix. Section I discusses the country's trade program, with particular emphasis on

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1. Part of the discussion in the paper is based on "The Impact of GATT/Uruguay Round on Employment: Prospects for the Philippines". May 1995, ILO-SEAPAT. However, revisions have been made in the simulations, incorporating new information about the tariff system in the Philippines and projections on the world economy.

Executive Order (EO) 470. Section II discusses briefly the commitments of the Philippines in terms of changes in tariff rates, including the initial bound rates set in 1995 and the final bound rates in 2004. Section III discusses the effective changes in tariff rates both in the agricultural and industrial sectors of the economy, putting in perspective the ongoing trade program of the government. It will specifically determine whether or not at specific industry level the effective change will lead to increases in protection, i.e., relative to the committed initial bound rates set in 1995 whether the present nominal tariff protection rate of the industry is lower or higher. Section IV discusses three sets of projections on the impact of the UR on the world economy. These projections are used to compute for the effects on the Philippine economy. Section V discusses the assumptions made in simulating the GATT/UR effects on the local economy. Section VI summarizes the results of the simulation exercises conducted. The discussion will focus on the following results: (i) changes in general macroeconomic variables to see whether these are sustainable or not; (2) income distribution effects; and (3) industry output effects. Section VII gives a brief summary. Lastly, the Appendix gives a summary of the important features of the APEX model.

THE COUNTRY'S TRADE PROGRAM

The Philippines has been pursuing a series of unilateral trade liberalization programs. For example, in 1981 the government embarked on a five-year (1981–1985) tariff reduction program which resulted in a general decline in the average nominal tariff level. However, because of the balance of payments crisis in the middle of the 1980s, the tariff reduction program was aborted. The same program, however, was later continued by the Aquino government starting 1986 until the government embarked on another round of tariff reduction program in 1991 under EO 470.

EO 470 is a comprehensive program. It reduces the average tariff levels and simplifies the tariff structure from a multi-tariff structure to a structure with only four tariff levels. In particular, the final rates cluster around 3 percent, 10 percent, 20 percent, and 30 percent, as compared to the previous structure where the rates ranged from 10 percent to 50 percent.

Under EO 470 the average nominal tariff is reduced from 28 percent (tariff level at the start of the program) to 20 percent at the end of the tariff program in 1995, or a drop of 29 percent over the five-year period (Table 1). Weighted by imports however, the average tariff declines from 20 percent to 14 percent in 1995, or a drop of 27 percent.

Table1. Nominal average and weighted average tariffs (in percent)

Nominal Average Tariffs (in percent)

Sector	Before EO 470	E O 470				
		Year 1	Year 2	Year 3	Year 4	Year 5
Agriculture	35	35.94	33.89	31.83	29.92	28.02
Mining	14	10.99	11.30	10.72	10.72	10.72
Manufacturing	27	24.77	23.08	21.38	20.73	19.04
OVERALL	**28**	**25.96**	**24.27**	**22.56**	**21.74**	**20.07**

Weighted Average Tariffs (in percent)

Sector	Before EO 470	E O 470				
		Year 1	Year 2	Year 3	Year 4	Year 5
Agriculture	22	23.80	23.48	23.15	22.85	22.56
Mining	11	9.69	10.12	10.05	10.05	10.05
Manufacturing	21	19.35	10.83	15.32	14.98	14.27
OVERALL	**20**	**17.84**	**16.22**	**15.17**	**14.90**	**14.40**

Source: Tariff Commission 1991

Among the three major industrial sectors, manufacturing registers the biggest reduction in average tariffs from 27 percent (unweighted) to only 19 percent in 1995, or a decline of 30 percent. For agriculture, the average tariff declines from 36 percent to 28 percent in 1995, or a decline of 22 percent.

Overall, the tariff reduction program of the early 1980s (which was pursued in the second half of the 1980s) and EO 470 brought down the number of regulated items from 1,924 in 1986 to just 183 at present.

COMMITTED BINDING TARIFF RATES

Table 2 presents the Philippine initial bound tariff rates set in 1995 and the final bound tariff rates in 2004.[2] To better appreciate these binding commitments made, the table also includes the current tariff rates applied in a few agricultural industries.[3] One should note that these tariff rates are nominal in the sense that they do not include the protection effects of the existing quantitative restrictions (QRs) and other non-tariff barriers (NTBs) applied to selected industries. Also, these rates are the 1995 programmed tariff rates under EO 470 which is to terminate in 1995.

Table 2. Initial and final binding tariff rates
         and percent change by sub-sectors

Sub-sectors	Current Applied Rate of Duty 1995	Initial Bound Rate 1995	Final Bound Rate 2004	Percent Change
1. Irrigated rice	20	100	50	−50.00
2. Rain-fed rice	20	100	50	−50.00
3. Corn	20	100	50	−50.00
4. Coconut	50	70	50	−28.57
5. Sugarcane	50	90	50	−44.44
6. Fruits	50	60	40	−33.33
7. Vegetables	30	80	40	−50.00
8. Rootcrops	30	70	40	−42.86
9. Other commercial crops	35	85	45	−47.06
10. Hogs	20	35	27	−22.86
11. Poultry	30	90	40	−55.56
12. Other livestocks	10	20	15	−25.00
13. Agricultural services	–	–	–	–
14. Marine fishing	–	–	–	–
15. Inland fishing	–	–	–	–
16. Forestry	–	–	–	–
17. Crude oil	–	–	–	–
18. Other mining		10	15	50.00

Continued...

2. Note that these are the computed sectoral average tariff rates consistent to the sectoral breakdown of the production sector of the APEX model. The actual rates are for very specific tariff lines.
3. Tariff rates for the industrial sector are available but are not included in the table.

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Sub-sectors	Current Applied Rate of Duty 1995	Initial Bound Rate 1995	Final Bound Rate 2004	Percent Change
19. Rice milling	50	40	−20.00
20. Sugar refining	–	–	–
21. Milk and dairy	40	30	−25.00
22. Oils and fats	70	50	−28.57
23. Meat and meat products	80	40	−50.00
24. Flour milling	–	–	–
25. Animal feeds	10	10	0.00
26. Other foods	50	40	−20.00
27. Beverage and tobacco	70	50	−28.57
28. Textiles and knitting	40	30	−25.00
29. Other textiles	50	30	−40.00
30. Garments, leather and rubber foot	50	30	−40.00
31. Wood products	15	20	33.33
32. Paper products	30	25	−16.67
33. Fertilizer	20	10	−50.00
34. Other chemicals	10	20	100.00
35. Coal and petroleum	–	–	–
36. Non-ferrous basic metals	–	–	–
37. Cement, basic metals and non-metals	30	25	−16.67
38. Semi-conductor	30	20	−33.33
39. Metal products and non-electrical	30	20	−33.33
40. Electric machinery	30	20	−33.33
41. Transport equipment	–	–	–
42. Miscellaneous manufacturing	–	–	–
43. Construction	–	–	–
44. Electricity, gas and water	–	–	–
45. Transport and commercial services	–	–	–
46. Trade, storage and warehousing	–	–	–
47. Banks and non-bank services	–	–	–
48. Insurance	–	–	–
49. Government services	–	–	–
50. Other services	–	–	–

One can observe that there is a generally increasing trend in tariffs during the adjustment under the new GATT/WTO. Because of the ongoing unilateral tariff reduction program of the Philippine government which resulted in the lowering of tariff rates during the past years, however, a sizeable number of sectors at the present tariff rate structure may even be seeing increasing tariff protection under the initial bound rates committed in the GATT/UR for 1995. For example, if one excludes the effective protection effects due to QRs and other NTBs applied on corn, one can see an increase in the rates from the applied rate of duty in 1995 of 20 percent to initial bound rate under GATT of 100 percent in 1995. From the rates presented, one can observe that almost all agricultural products may see the same increasing trend in tariffs from the existing levels to the 1995 initial bound rate. This is contrary to the general perception that the new GATT will bring about a substantial reduction in trade protection and will therefore threaten local industries through the possible upsurge in imports.

There is, however, a general decline in tariffs during the 10–year program under the new GATT/UR. The decline in the tariff rates ranges from –16.7 percent (fertilizer; and cement, basic metals and non-metallic industries) to –55.56 percent (poultry). However, a few industries may see increases in tariffs within the period. For example, the tariff rates on other chemical may increase by 100 percent, other mining 50 percent, and wood products 33.33 percent. Overall, the average decline in tariff rates within the period would be around -30 percent.

COMPARING THE EFFECTIVE PROTECTION
WITH THE GATT RATES

Nominal Protection Rates in Agriculture

David (1994) finds the effects of the existing QRs and NTBs on the effective rate of protection in many agricultural products to be substantial. Table 3 presents the average nominal protection rate (NPR) in 1990/92 of these products. NPR of a particular product is defined as the percentage difference between domestic and world price of the product at the country's border. As defined, it effectively measures the impact of government price intervention policies on domestic prices of these products. Furthermore, the measure captures the effect of non-tariff trade barriers on product prices, and thus the impact of GATT on

Table 3. Nominal protection rate (NPR), current tariff,
and GATT binding tariff and minimum access
for 1995 and 2005

	NPR 1990/92 (%)	EO 470	Tariff 1995 Binding	2005	Minimum Access		
					Tariff (%)	Quantity (mt) 1995	2004
Rice	19	50	-no commitment-		50	59,730	238,940
Corn	76	20	100	50	35	130,160	216,940
Sugar	80	50	100	50	50	38,000	64,000
Chicken	74	30	100	40	50	2,218	3,396
	(50)						
Pork	31	30	100	40	30	826	1,376
Beef	nav	30	60	35	30	15,000	32,000
Garlic	500	30	100	40	nap	nap	nap
Onions	0*	30	100	40	30	1,610	2,683
Potatoes	nav	30	100	40	50	1,457	2,429
Cabbage	nav	30	100	40	30	2,105	3,509
Coconut Oil	16	50	70	50			
Copra Oil	16	50	70	60			

*exportable
nap - not applicable
nav - not available

agricultural prices may be observed from the comparison of the NPRs (based on current policies) to the tariffs under GATT.

Aside from NPRs of selected agricultural crops, the table also presents the 1995 tariff rate set in the EO 470 for these products, the binding tariffs provided under GATT for 1995 and 2004, and the tariffs and quantity levels under the minimum access requirement. As can be observed, there are two tariff rates, one for the minimum access volume (which is lower) and another for imports beyond the minimum access level. The minimum access volume is the volume of imports on which the country commits to levy a lower tariff rate, while the binding rate is applied to imports beyond the minimum access volume. Minimum access volume is defined for products where the current imports is less than 3 percent of domestic consumption and is programmed to expand to 5 percent by 2004.

Rice is exempted from the GATT regulations over the next 10 years as requested by the Philippine government during the negotiations. Thus, there is no commitment for rice, although the minimum access requirement is imposed.

The NPR for rice is 19 percent. This is much lower than the 50 percent minimum access tariff set in the GATT. The reason for the much lower NPR for rice can be attributed to the government's price policy on rice under the National Food Authority which has been historically pro-urban consumer and anti-farmer (David 1994). The figures in the present table will also prove this point. Whereas the book tariff rate for rice is 50 percent under EO 470 (i.e., the price difference between local and imported rice should have been 50 percent given the present tariff level), the NPR only shows 19 percent. Thus, given the present lower NPR for rice and the much higher tariff under the GATT, the impact of GATT in terms of tariff changes may not bring about direct adverse effects on local rice producers and farmers.

The NTBs for the followings crops will be removed under the new GATT: corn, sugar, livestock and poultry, garlic and onions, potatoes, and cabbage. But this is not a cause for alarm because with the exception of garlic, the initial binding tariffs to replace the NTBs for 1995 under the new GATT are even higher than the actual protection (NPR) conferred by the NTBs in 1990/92 and the tariffs under EO 470. For many of these crops the binding rates are placed as high as 100 percent. And even after 10 years, the tariffs under the new GATT remain high ranging from 35 percent to 50 percent, whereas the average book tariff rate under EO 470 is currently about 30 percent. However, tariffs on import under the minimum access are lower than the binding tariffs, in the order of 30 percent to 50 percent. But the minimum access levels are generally lower, at the most 3 percent of production. Import demand for these commodities at the minimum access tariffs will likely be greater than the minimum access level, and thus the operable protection tariff will likely be the binding tariff.

Binding Tariffs for the Industrial Sector

There are 2800 industrial tariff lines which the Philippines committed itself to bind in the new GATT. These represent 50 percent of the country's total tariff lines.

Medalla (1994) made a careful examination of the current tariff rates in the industrial sectors and observed that of the committed

2800 industrial tariff lines only 24 tariff lines (industrial production) will be reduced. All these are within the textile and clothing product group. These 24 tariff lines represent less than 0.01 percent of the country's tariff lines.

Table 4 presents a list of products that will likely realize some reduction in tariff. As shown in the numbers, the rates of absolute reduction range from 7.5 percentage points to 20 percentage points and will be effected over a period of 10 years starting 1995.

Table 4. Change in tariff in industry

Product	Number of Tariff Lines	Applied Rate (%) 1995	Bound Rate (%) 2004
Combed wool fabrics	12	30	20
Man-made fibers (synthetic and artificial monofilament)	3	20	12.5
Metallised and gimped yarns	2	30	20
Carpets (of wool, felt, man-made fibers, and polyamides	7	50	30
TOTAL	**24**		

It should be noted that the comparison of tariff rates is based on the rates under EO 470 tariff reduction program. However, with the approval of EO 204 the reduction may even be accelerated. The relatively new EO reduces unilaterally the tariff on textiles, garments, and the industry's chemical inputs to as low as 3 percent for the period 1994 to 2000. Tariffs on fabrics will be cut from 30 percent and 20 percent starting this year to 10 percent in 1997. The rates on garments and other made-up textile articles will be reduced from 50 percent to 30 percent in 1994, to 20 percent in 1997 and to 10 percent by the turn of the century.

In exchange for these commitments, the Philippines got tariff concessions from its major trading partners with an across-the-board reduction in tariff rates by at least 33 percent. Table VIII.5 shows the

Table 5. Changes in tariff of major trading partners (in percent)

	US	JAPAN	EU
Total Industrial	35	56	34
Fish and Fish products	36	20	20
Wood, pulp, paper, and furniture	97	68	53
Leather, rubber, footwear, and travel goods	7	4	51
Metals	72	77	57
Chemicals and photographic supplies	47	63	37
Transport equipment	5	100	10
Non-electrical Machinery	67	100	52
Electric Machinery	61	97	30
Mineral products & precious stones & metals	24	89	67
Manufactured articles, nes	64	81	41
Industrial tropical products	68	56	55
Plaiting products	23	36	46
Rubber, tropical wood	69	59	55
Jute and hard fibres	32	68	47

percentage reduction of tariffs on industrial products committed by the major trading partners of the Philippines. In 1992, these industrial products had a combined export value of US$6.6 billion, representing 84 percent of the country's total exports during the year. On the average, the US, Japan, and the European Union committed to reduce their tariffs by 35 percent, 56 percent, and 34 percent respectively.

Thus, in the light of the above, the Philippine industrial sector may not even be experiencing any effective reduction in tariff protection under the new GATT/WTO arrangements. If ever there will be any reduction (e.g., EO 204) it will essentially be due to the unilateral program of the government as part of its effort to liberalize further the country's foreign trade sector. It will not be from the commitments made by the Philippines during the UR.

THE PROJECTED WORLD ECONOMY

The GATT Secretariat made projections on how the new GATT/WTO will impact the world economy. Table 6a shows that the projected effects are generally favorable. Within the 10-year program

the total value of world exports is expected to increase by 10.1 percent. The sector on clothing, footwear and luggage is expected to show the highest increase of 60 percent, followed by textiles, 34.4 percent. The expected impact on the service and mining sectors is very small; about 1 percent increase in the next 10 years.

Table 6a. Projected world trade effects of GATT

Sectors	Percentage Changes		
	Value	Quantity	Price
1. Agriculture, forestry & fishery prods.	20.3	17.7	2.2
2. Mining	1.2	0.7	0.5
3. Processed food & beverages	18.7	18.4	0.3
4. Textiles	34.4	44.4	-6.9
5. Clothing, footwear, and luggage	60.2	105.7	-22.1
6. Wood products	6.3	6.2	0.1
7. Fossil fuels and chemicals	9.1	9.1	0
8. Metals	14.9	14.8	0.1
9. Other manufactures	6.9	7	-0.1
10. Services	1.7	1.5	0.2
TOTAL CHANGES	**10.1**	**12.1**	**-1.8**

In terms of volume increases, world trade is projected to improve by 12.1 percent. Clothing, footwear and luggage sector is again expected to lead all sectors with a rate of increase of 105.5 percent. Again this sector is followed by the textile industry with an increase of 44.4 percent.

Because of the general decline in tariffs, world prices of commodities are expected to decline by -1.8 percent. The decline will be highest in clothing, footwear and luggage with world prices decreasing by -22.1 percent. Textile follows with a decline of about 7 percent.

In a separate study, Yang (1993) came out with a different set of projections on the world economy. He employed a world CGE model to estimate the impact on sectors in major regions of the world.

Based on Yang's calculations, ASEAN may be seeing a decline in exports in all sectors, except in textiles and clothings. Mining would decline by -18 percent and services -13 percent. Textile, however, would increase by 34 percent, and clothing by a huge 325 percent. The effects on other regions are presented in the table.

Table 6b. Changes in exports resulting from Uruguay Round Reform (%)

	Australasia	North America	EU	Japan	NIEs	ASEAN	China	South Asia	Latin America	Rest of the World
Agriculture	8	33	-37	28	12	-3	23	7	7	18
Mining	3	9	10	5	-4	-17	-8	-13	-21	3
Processed Food	13	8	11	18	18	-9	-10	-8	-11	13
Textiles	-6	-2	5	15	32	34	12	22	-8	-2
Clothing	-23	1	-1	-30	6	325	67	143	-33	-40
Iron and Steel	3	11	14	2	3	-7	-2	-12	-8	18
Transport equipment	42	-11	-5	-5	40	-1	56	-31	409	4
Machinery and Equipment	-2	4	7	6	-4	-4	-10	-20	-21	0
Other Manufactures	2	9	11	15	5	-8	-6	-12	-14	6
Services	-2	5	5	2	-6	-13	-6	-15	-18	1

Source: Yang (1994) "Trade Liberalization with Externalities: A General Equilibrium Assessment of the Uruguay Round", National Centre for Development Studies, Australian National University

ASSUMPTIONS

The above discussions will allow us to formulate the assumptions needed in assessing the impact of the new GATT/WTO on the Philippines. These assumptions will be inputed into the APEX model to simulate the possible impact on the economy in terms of the macroeconomic, income distribution, and sectoral output effects.

As discussed in Section III on industrial tariff, only about 0.01 percent of the total Philippine tariff lines will be affected by the commitments made under the new GATT/WTO. Given this one can safely assume that practically the entire industrial sector will not be directly affected. Thus, in Table 7 we assume zero tariff change for all industrial sectors during the 10-year period in the program. The same thing holds for the service sector.

Again discussions in Section III on agricultural tariffs pointed out that not all agricultural crops will be facing uniform tariff reduction within the period. Specifically, the following crops will not be affected: rice, coconut, fruits, rootcrops, and other commercial crops. However, from the computed NPR of corn to the final bound rate set in 2004, corn may experience a reduction in tariff by −34.2 percent, and sugar −37.5 percent.

Based on the computed NPR for hogs, it may enjoy additional tariff protection of 29 percent within the period. The opposite may be true for poultry and other livestock. Poultry may suffer a −59.4 percent drop in tariffs, while other livestock may experience a drop of 17 percent.

The two sets of projection on the world economy will allow us to conduct scenario analyses. The simulation using the GATT projection is called **Scenario A**. Table 8a presents the GATT projections in terms of expected export growth of industries in the model. The estimates of Yang provide another scenario, which is called **Scenario B**. Table 8b presents the expected growth of the different industries using Yang's estimates.

SIMULATION RESULTS

There are three sets of assumptions inputed into the APEX model: (i) the tariff change in Table 7; (ii) the export projections in Tables 8a and 8b; and (iii) the 10-year growth in factor resources: labor supply and

Table 7. Tariff change over the 10-year period

No.	Sector	Tariff Change	No.	Sector	Tariff Change
1	Irrigated rice	0.0	26	Other foods	0.0
2	Rain-fed rice	0.0	27	Beverage and tobacco	0.0
3	Corn	-34.2	28	Textiles knitting	0.0
4	Coconut	0.0	29	Other textiles	0.0
5	Sugarcane	-37.5	30	Garments, leather & rubber ftwear.	0.0
6	Fruits	0.0	31	Wood products	0.0
7	Vegetables	33.0	32	Paper products	0.0
8	Rootcrops	33.0	33	Fertilizer	0.0
9	Other commercial crops	0.0	34	Other chemicals	0.0
10	Hogs	29.0	35	Coal and petroleum	0.0
11	Poultry	-59.4	36	Non-ferrous basic metals	0.0
12	Other livestocks	17.0	37	Cement, basic metals & non-metallic	0.0
13	Agricultural services	0.0	38	Semi-conductor	0.0
14	Marine fishing	0.0	39	Metal products and non-electrical	0.0
15	Inland fishing	0.0	40	Electrical machinery	0.0
16	Forestry	0.0	41	Transport equipment	0.0
17	Crude Oil	0.0	42	Miscellaneous manufacturing	0.0
18	Other mining	0.0	43	Construction	0.0
19	Rice milling	0.0	44	Electricity, gas and water	0.0
20	Sugar refining	0.0	45	Transport and commercial services	0.0
21	Milk and dairy	0.0	46	Trade, storage and warehousing	0.0
22	Oils and fats	0.0	47	Banks and non-bank services	0.0
23	Meat and meat products	0.0	48	Insurance	0.0
24	Flour milling	0.0	49	Government services	0.0
25	Animal feeds	0.0	50	Other services	0.0

Table 8a. Expected sectoral export volume growth over the 10-year period using GATT projection

No.	Sector	Growth (%)	No.	Sector	Growth (%)
1	Irrigated rice	0.00	26	Other foods	18.80
2	Rain-fed rice	0.00	27	Beverage and tobacco	0.00
3	Corn	0.00	28	Textiles knitting	0.00
4	Coconut	17.70	29	Other textiles	44.40
5	Sugarcane	17.70	30	Garments, leather & rubber footwear	105.70
6	Fruits	18.75	31	Wood products	6.20
7	Vegetables	0.00	32	Paper products	0.00
8	Rootcrops	0.00	33	Fertilizer	0.00
9	Other commercial crops	17.70	34	Other chemicals	0.00
10	Hogs	0.00	35	Coal and petroleum	0.00
11	Poultry	0.00	36	Non-ferrous basic metals	9.10
12	Other livestocks	0.00	37	Cement, basic metals & non-metallic	0.00
13	Agricultural services	0.00	38	Semi-conductor	14.80
14	Marine fishing	17.70	39	Metal products and non-electrical	0.00
15	Inland fishing	0.00	40	Electrical machinery	0.00
16	Forestry	0.00	41	Transport equipment	0.00
17	Crude Oil	0.00	42	Miscellaneous manufacturing	0.00
18	Other mining	0.70	43	Construction	1.50
19	Rice milling	0.00	44	Electricity, gas and water	0.00
20	Sugar refining	18.40	45	Transport and commercial services	0.00
21	Milk and dairy	0.00	46	Trade, storage and warehousing	0.00
22	Oils and fats	9.10	47	Banks and non-bank services	0.00
23	Meat and meat products	0.00	48	Insurance	0.00
24	Flour milling	0.00	49	Government services	0.00
25	Animal feeds	0.00	50	Other services	0.00

Table 8b. Expected sectoral export volume growth over the 10-year period using Yang's projection

No.	Sector	Growth (%)	No.	Sector	Growth (%)
1	Irrigated rice	0.00	26	Other foods	-9.00
2	Rain-fed rice	0.00	27	Beverage and tobacco	0.00
3	Corn	0.00	28	Textiles knitting	0.00
4	Coconut	-3.00	29	Other textiles	1.71 *
5	Sugarcane	-3.00	30	Garments, leather & rubber footwear	70.17 *
6	Fruits	18.75	31	Wood products	-8.00
7	Vegetables	0.00	32	Paper products	0.00
8	Rootcrops	0.00	33	Fertilizer	0.00
9	Other commercial crops	-3.00	34	Other chemicals	0.00
10	Hogs	0.00	35	Coal and petroleum	0.00
11	Poultry	0.00	36	Non-ferrous basic metals	-7.00
12	Other livestocks	0.00	37	Cement, basic metals & non-metallic	0.00
13	Agricultural services	0.00	38	Semi-conductor	-4.00
14	Marine fishing	-3.00	39	Metal products and non-electrical	0.00
15	Inland fishing	0.00	40	Electrical machinery	0.00
16	Forestry	0.00	41	Transport equipment	0.00
17	Crude Oil	0.00	42	Miscellaneous manufacturing	0.00
18	Other mining	-17.00	43	Construction	-13.00
19	Rice milling	0.00	44	Electricity, gas and water	0.00
20	Sugar refining	-9.00	45	Transport and commercial services	0.00
21	Milk and dairy	0.00	46	Trade, storage and warehousing	0.00
22	Oils and fats	-8.00	47	Banks and non-bank services	0.00
23	Meat and meat products	0.00	48	Insurance	0.00
24	Flour milling	0.00	49	Government services	0.00
25	Animal feeds	0.00	50	Other services	0.00

* corrected growth using market share of Philippine & ASEAN for Textiles and Garments

capital stock. Labor supply is assumed to grow by 3.8 percent per year in the next ten years. Capital stock is assumed to grow by 10 percent per year within the same period. These assumed growth rates are consistent with the historical growth of these variables.

In the APEX specification, one has to attribute the assumed growth in resources to skilled and unskilled labor, and to variable and fixed capital. In the present exercise it is assumed that the 1989 factor distribution holds. This is necessary because the APEX model is calibrated using 1989 Social Accounting Matrix. Thus, for labor the distribution is 53 percent unskilled labor and 47 percent skilled labor, while for capital stock the distribution is 23 percent variable capital and 77 percent fixed capital.

After the simulations are done, results are divided by 10 to get the average annual effects of the changes introduced. Since only three sets of changes are introduced, the results should be considered as the **average marginal effects due to these changes only** and should not be considered as projections of what will happen to the economy in the next ten years. In the next ten years, a number of things may happen. The government may pursue vigorously its trade liberalization program unilaterally. It may pursue very actively its export promotion program. These types of changes are not captured in the present simulation exercise, and therefore the present results should not be analyzed against these possible policy changes.

Furthermore, the computer simulator of the APEX model has the facility of breaking up the total effects to the respective individual changes. Thus in the presentation of results, the following partial effects are shown: (a) the effects due to the tariff change; and (b) the effects due to the expansion of export volume. In the comparative analysis of the effects of export volume expansion and tariff change, however, we added in the former the effects due to the change in resources, i.e., the assumed growth in labor and capital. We did not add the effects of resource change to the effects due to the tariff change. The reason being that a tariff change means a change in relative prices. Changes in relative prices only lead to movements along the same production frontier. Export expansion, however, requires an increase in resources for the expansion to be realized.

Table 9a presents the results of selected macroeconomic indicators under **Scenario A**. The effect due to the change in tariff is nil. This is expected because as discussed above, the effective change in tariff due to the reforms in the new GATT is almost zero as far as the Philippine

Table 9a. Macroeconomic indicators:
           average annual percentage change over the 10-year period
           Scenario A

	Change due to Tariff Reduction	Change due to Export Expansion*	Total Change
Output and Price:			
Real GDP	-0.000	0.700	0.700
Agriculture	-0.000	0.085	0.085
Mining	0.000	0.008	0.008
Manufacturing	-0.000	0.217	0.217
Construction Utilities	0.000	0.035	0.035
Services	-0.000	0.356	0.356
External Balances:			
Value of Imports			
in Foreign Currency	0.000	0.476	0.598
Value of Exports			
in Foreign Currency	0.000	-0.341	1.486

* with resource change

industries are concerned. This is primarily due to the unilateral tariff reduction program which the government pursued. However, the effect due to export expansion (with resource change) is positive. In fact, almost all of the effects shown under the total effects column come from the export expansion with resource change.

Under the present scenario, real GDP will increase by 0.7 percent per year on the average during the 10-year adjustment period. The sectors that will benefit the most is services, followed by manufacturing. The impact on agriculture construction-utilities and mining is small.

The impact on exports, however, is favorable. Total exports in dollar terms will increase by 1.5 percent per year on the average. Imports will also increase, but at a much lower rate at 0.6 percent. Thus, the overall effects will be sustainable, with a positive impact on the trade balance.

Under **Scenario B**, real GDP shows a slightly lower average increase of 0.65 percent per year (see Table 9b). The leading sector is services with an average increase of 0.358 percent. This is followed

Table 9b. Macroeconomic indicators:
          average annual percentage change over the 10–year period
          Scenario B

	Change due to Tariff Reduction	Change due to Export Expansion*	Total Change
Output and Price:			
Real GDP	–0.000	0.654	0.654
Agriculture	–0.000	0.049	0.049
Mining	0.000	0.016	0.016
Manufacturing	–0.000	0.142	0.142
Construction Utilities	0.000	0.085	0.085
Services	–0.000	0.358	0.358
External Balances:			
Value of Imports			
in Foreign Currency	0.000	0.608	0.609
Value of Exports			
in Foreign Currency	–0.000	0.682	0.682

* with resource change

by the manufacturing sector with 0.142 percent. The impact on both agriculture and construction-utilities is very small of about 0.049 percent and 0.085 percent, respectively. The mining sector will be negatively affected, with an average decline of –0.014 percent. The impact on exports is more favorable than the previous scenario. Under the present scenario, exports will increase by 0.682 percent on the average, while imports increase by 0.609 percent.

However, the effect on income distribution is mixed. Under **Scenario A**, Table 10a shows that household 5 (the richest group) would benefit the most with an average increase in income of 0.65 percent per year. This is followed by household 2 with 0.62 percent, and then household 1 (the poorest) followed by household 3. The household with the least impact is household 4.

The income distribution effects under **Scenario B** are different (see Table 10b). Under this scenario, the effect is progressive. It will be household 2 and household 1 (the poorest) who will benefit the most from the adjustments. The progressivity of the effects is also shown in the labor income of households.

Table 10a. Impact on households:
average annual percentage, change over the 10–year period
Scenario A

	Effect due to Tariff Change	Effect due to Export Expansion*	All Shocks
Disposable Income:			
Household 1	0.0002	0.4924	0.4926
Household 2	0.0002	0.6247	0.6249
Household 3	0.0002	0.4575	0.4577
Household 4	0.0002	0.3996	0.3998
Household 5	0.0002	0.6523	0.6525
Labor Income of Households:			
Household 1	0.0002	0.7906	0.7908
Household 2	0.0002	0.9840	0.9842
Household 3	0.0002	0.6613	0.6615
Household 4	0.0001	0.5492	0.5493
Household 5	0.0000	0.9118	0.9118

* with resource change

In terms of specific industry effects, under **Scenario A,** three industries will be negatively affected, all of which are from the agricultural sector: irrigated rice, vegetables, and rootcrops (see Table 11a). Under manufacturing, the industry with the highest increase is garments (5.8 percent), textile knitting (2.1 percent), other textiles (1.9 percent), semi-conductor (1.1 percent), and other manufacturing (1.0 percent). The rest of the industries have less than 1 percent average increase. Under services, it will be government services which will benefit the most, with an average increase of 2.3 percent per year.

Under **Scenario B,** 4 industries will be affected negatively. All of the industries are in the agricultural sector. But the leading sectors will be the government services with 0.151 percent increase. Construction would increase by 0.07 percent, while trade, storage and warehousing will increase by 0.06 percent.

Table 10b. Impact on households:
            average annual percentage, change over the 10–year period
            Scenario B

	Effect due to Tariff Change	Effect due to Export Expansion*	All Shocks
Disposable Income:			
Household 1	0.000	0.251	0.251
Household 2	0.000	0.401	0.401
Household 3	0.000	0.254	0.254
Household 4	0.000	0.218	0.218
Household 5	0.000	0.589	0.589
Labor Income of Households:			
Household 1	0.000	0.490	0.490
Household 2	0.000	0.725	0.725
Household 3	0.000	0.435	0.435
Household 4	0.000	0.356	0.356
Household 5	0.000	0.928	0.928

* with resource change

SUMMARY

In terms of tariff change, the new GATT/WTO will not mean very much as far as the Philippine industries are concerned. The present tariff rates of almost all Philippine industries are below the initial bound rate of the GATT/WTO set in 1995. Tariff protection in the Philippines has declined considerably in the past years due to the series of tariff reduction programs embarked on by the government to liberalize the trade sector. However, the expected change in the world economy in terms of trade expansion is significant as shown in the different world growth scenarios presented in the paper. The paper presented two scenarios of the world economy. Together with the other changes, the paper simulated these to see the impact on the local economy.

Table 11a. Domestic output effects of Uruguay Round Reform (% Change)
Scenario A

	Sectors	Change due to Tariff Reduction	Change due to Export Expansion*	Total Change
1	Irrigated rice	−0.000	−0.007	−0.007
2	Rain-fed rice	−0.000	0.067	0.066
3	Corn	−0.001	0.118	0.116
4	Coconut	0.000	0.917	0.917
5	Sugarcane	0.000	0.724	0.724
6	Fruits	0.000	0.413	0.413
7	Vegetables	0.000	−0.026	−0.026
8	Rootcrops	−0.000	−0.041	−0.041
9	Other commercial crops	0.000	0.818	0.818
10	Hogs	0.000	0.251	0.251
11	Poultry	−0.002	0.296	0.294
12	Other livestocks	0.002	0.247	0.250
13	Agricultural services	−0.000	0.303	0.303
14	Marine fishing	0.000	0.676	0.676
15	Inland fishing	0.000	0.203	0.203
16	Forestry	0.000	0.746	0.746
17	Crude Oil	0.000	0.804	0.804
18	Other mining	0.000	0.412	0.412
19	Rice milling	−0.000	0.035	0.034
20	Sugar refining	0.000	0.752	0.752
21	Milk and dairy	0.000	0.258	0.259
22	Oils and fats	0.000	0.572	0.572
23	Meat and meat products	0.000	0.252	0.252
24	Flour milling	0.000	0.094	0.094
25	Animal feeds	−0.001	0.101	0.100

Continued...

Based on the simulation results, the overall impact of the new GATT/WTO is positive in both scenarios. Under Scenario A, real GDP will have an average increase of 0.7 percent. However, there will be three industries which will be affected negatively, all of which are under the agricultural sector. In terms of income distribution effects,

... con't. Table 11a

	Sectors Tariff Reduction	Change due to Export Expansion*	Change due to Change	Total
26	Other foods	0.000	0.420	0.420
27	Beverage and tobacco	0.000	0.374	0.374
28	Textiles knitting	−0.000	2.073	2.073
29	Other textiles	0.000	1.889	1.889
30	Garments, leather and rubber footwear	0.000	5.820	5.820
31	Wood products	0.000	0.699	0.700
32	Paper products	0.000	0.882	0.882
33	Fertilizer	0.000	0.532	0.532
34	Other chemicals	0.000	0.758	0.758
35	Coal and petroleum	0.000	0.848	0.848
36	Non-ferrous basic metals	0.000	0.735	0.735
37	Cement, basic metals and non-metallic	0.000	0.577	0.578
38	Semi-conductor	0.000	1.130	1.130
39	Metal products and non-electrical	0.000	0.481	0.482
40	Electrical machineries	0.000	0.359	0.359
41	Transport equipment	0.000	0.459	0.459
42	Miscellaneous manufacturing	−0.000	1.005	1.005
43	Construction	0.000	0.344	0.344
44	Electricity, gas and water	0.000	0.628	0.628
45	Transport and commercial services	0.000	0.696	0.696
46	Trade, storage and warehousing	0.000	0.370	0.370
47	Banks and non-bank services	0.000	0.938	0.939
48	Insurances	0.000	0.873	0.874
49	Government Services	−0.001	2.285	2.285
50	Other Services	0.000	0.464	0.465

* with resource change

the results are mixed. In fact, the richest income group will benefit the most, followed by the second household group.

Under Scenario B, real GDP will increase at an average of 0.64 percent. Manufacturing will be the leading sector. Mining industries will be negatively affected. The effect on income distribution is

Table 11b. Domestic output effects of Uruguay Round Reform (% Change)
           Scenario B

	Sectors	Change due to Tariff Reduction	Change due to Export Expansion*	Total Change
1	Irrigated rice	−0.000	0.003	0.003
2	Rain-fed rice	−0.000	0.003	0.003
3	Corn	−0.000	−0.001	−0.001
4	Coconut	−0.000	−0.002	−0.002
5	Sugarcane	−0.000	0.001	0.001
6	Fruits	−0.000	−0.003	−0.003
7	Vegetables	0.000	0.002	0.002
8	Rootcrops	−0.000	0.001	0.001
9	Other commercial crops	0.000	−0.000	−0.000
10	Hogs	0.000	0.003	0.003
11	Poultry	−0.000	0.006	0.006
12	Other livestocks	0.000	0.004	0.004
13	Agricultural services	−0.000	0.001	0.001
14	Marine fishing	−0.000	0.014	0.014
15	Inland fishing	−0.000	0.011	0.011
16	Forestry	0.000	0.012	0.012
17	Crude Oil	0.000	0.000	0.000
18	Other mining	0.000	0.015	0.015
19	Rice milling	−0.000	0.008	0.008
20	Sugar refining	−0.000	0.001	0.001
21	Milk and dairy	0.000	0.001	0.001
22	Oils and fats	−0.000	0.002	0.002
23	Meat and meat products	0.000	0.007	0.007
24	Flour milling	−0.000	0.001	0.001
25	Animal feeds	−0.000	0.001	0.001

Continued...

progressive. The poorest income groups will benefit the most. Under
this scenario, there will be 4 industries which will register negative
growth effect. These industries will come mostly from the agricultural
and mining sectors.

    Although the overall simulated effects of the new GATT/WTO are
positive, they are just potential effects. They may not translate into

... con't. Table 11b

	Sectors	Change due to Tariff Reduction	Change due to Export Expansion*	Total Change
26	Other foods	−0.000	0.018	0.018
27	Beverage and tobacco	0.000	0.008	0.008
28	Textiles knitting	−0.000	0.006	0.006
29	Other textiles	−0.000	0.002	0.002
30	Garments, leather and rubber footwear	−0.000	0.020	0.020
31	Wood products	0.000	0.005	0.005
32	Paper products	0.000	0.009	0.009
33	Fertilizer	0.000	0.001	0.001
34	Other chemicals	−0.000	0.013	0.013
35	Coal and petroleum	0.000	0.014	0.014
36	Non-ferrous basic metals	−0.000	0.007	0.007
37	Cement, basic metals and non-metallic	0.000	0.004	0.004
38	Semi-conductor	−0.000	0.006	0.006
39	Metal products and non-electrical	−0.000	0.005	0.005
40	Electrical machineries	0.000	0.002	0.002
41	Transport equipment	0.000	0.001	0.001
42	Miscellaneous manufacturing	0.000	0.002	0.002
43	Construction	0.000	0.069	0.069
44	Electricity, gas and water	0.000	0.016	0.016
45	Transport and commercial services	0.000	0.032	0.032
46	Trade, storage and warehousing	−0.000	0.060	0.060
47	Banks and non-bank services	0.000	0.024	0.024
48	Insurances	0.000	0.053	0.053
49	Government Services	−0.000	0.151	0.151
50	Other Services	0.000	0.038	0.038

* with resource change

higher growth (in particular higher export growth) in the local industries unless other conditions are fulfilled. One such condition is the improvement in the marketability of the country's product in the international market. With the new GATT/WTO the world market will be very competitive. Getting an additional market share in the world market will be difficult. The task of getting additional market share in

the world market can probably be lightened if a concerted effort is exerted to address the problem of declining productivity in the Philippine manufacturing sector. Cororaton et al (1995) found that in the past three decades, productivity in the Philippine manufacturing sector dropped considerably. It was further established that the drop was mainly caused by the absence of technical progress which, in turn, is related to outdated technology. Thus technology investment and improvement in key strategic sectors of the economy will have to be pushed and promoted. This can be done via transfer of technology through direct foreign investment or joint ventures with foreign firms. These foreign firms will not only assist in terms of penetrating other big markets where they are based, but they will also be the major the source of new equipment and machineries and other information on efficient plant operations.

Another important factor to consider is an aggressive marketing effort to penetrate markets especially in non-quota areas. Philippine exports go mainly to the US and Europe. With the gradual dismantling of export quotas in these market under the new GATT/WTO, the Philippines would have to penetrate quality-conscious markets such as Japan. This is especially true for garments. Other markets in the Arab countries will also be a promising market destination of Philippine exports.

APPENDIX

THE APEX MODEL[4]

There are a number of existing CGE models of the Philippine economy. But the most recent and the biggest is the APEX model. APEX stands for agricultural policy experiments. Although the original intention of the builders of the APEX model was to do policy experiments for agriculture, at its present sectoral breakdown of 50 sectors it can very well accommodate policy experiments for the other two major sectors of the economy, the industrial and the service sectors.

The entire agricultural sector is represented by 16 sectors in the model; from rice (sections 1 and 2) to forestry (sector 16). The entire industrial sector has 28 sub-sectoral breakdown, 24 of which are manufacturing sectors, both food processing and non-food manufacturing. The other 4 sectors are mining and utilities sectors. The service sector is represented by 6 sectors in the model.

The APEX model is essentially a neoclassical, Walrasian, general equilibrium model wherein the market clearing variables are prices. The model has well-defined production (or supply) and consumption (or demand) sectors. These two major sectors are balanced through changes in prices.

The APEX model belongs to the Johansen (1962) class of applied general equilibrium models[5]. The distinguishing characteristic of a Johansen-type model is that it is written as a system of linear equations in percentage changes of the variables.[6] To see this clearly, assume a 2-sector model whose production can be written as

(1) $Y = f(X_1, X_2)$,

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4. The discussion in this section is generally based on Clarete and Warr (1992). For a lengthy and detailed discussion of the structure of the model, see the reference cited.
5. Another famous Johansen-type CGE model is the Orani model of the Australian economy which is twice as big as the APEX model.
6. For a detailed treatment of a 2-sector model see Dixon, et. al. (1982).

where Y is output and X_1 and X_2 are inputs. In a Johansen-type model (1) is rewritten in linear percentage change form as

(2) $y - e_1 x_1 - e_2 x_2 = 0,$

where e_i is the elasticity of output with respect to inputs of factor i, and y, x_1 and x_2 are the percentage changes in Y, X_1, and X_2.

In matrix notation, this type of model can be represented by

(3) $Az = 0,$

where A is an $(m \times n)$ matrix of coefficients and z is an $(n \times 1)$ vector of percentage changes in the model's variables. Since the A matrix is assumed fixed, (3) provides only a local representation of the equations suggested by economic theory, i.e., this equation is valid only for "small" changes in X_1 and X_2.

Through appropriate closure, z may be partitioned into a vector of endogenous variables (y^*) and a vector of exogenous variables (x^*).[7] Once the choice of exogenous variables has been made, (3) can be rewritten as

(4) $A_1 y^* + A_2 x^* = 0.$

Provided A_1 is invertible, one can proceed from (4) to the solution

(5) $y^* = -A_1^{-1} A_2 x^*.$

This equation expresses the percentage change in each endogenous variable as a linear function of the percentage changes in the exogenous variables.

The exogenous variables can be chosen in many different ways. In fact, much of the flexibility of the APEX model in policy applications arises from the user's ability to swap variables between the exogenous and endogenous categories.

To date, the APEX model is the most disaggregated applied general equilibrium or computable general equilibrium model of the Philippine economy. On the production side, the model has 50 producer goods and

7. To solve this model $(n-m)$ variable must be declared exogenous.

services sectors. On the demand side, the model has 7 categories of consumer goods and 5 household types.

The model is divided into agricultural and non-agricultural sectors. There are 3 primary factors which are mobile among the various non-agricultural industries. These are variable capital, skilled and unskilled labor. Variable capital includes non-agricultural land and structures which are not necessarily devoted to any particular line of production activity, e.g. buildings and related fixed structures. Thus, when relative prices change, owners of such land and capital assets can rent these assets out to producers who face more favorable terms of trade. Unskilled labor is also freely mobile between non-agricultural and agricultural parts of the economy. However, skilled labor (defined to include high school graduates) and variable capital are not used in agriculture. Thus, skilled labor and variable capital are mobile only among the non-agricultural industries of the model.

There are 5 households classified as quintiles in the personal income distribution. Each household is assumed to have its own respective endowments in the primary factors in the model, i.e., each household derives its income from the sale of factor services and non-factor income. The sources of household income include: labor income, returns to variable and fixed capital, and rental income from letting out farm lands in primary agricultural production. The household's non-factor income consists of lump sum net income transfers from the government.

There are 7 consumer goods and services which are directly consumed by the various households in the model. The consumed amounts of each of these consumer commodities and services are used as arguments in the underlying utility functions of the various households of the model. Unlike producer goods, consumer goods production requires only intermediate goods as inputs, and not primary factors.

Household savings determine the total savings available for investment. The model assumes that only physical capital assets are obtainable using such savings. Financial assets such as bonds, equity, and bank deposits are not incorporated into the model. With this level of savings, additional units of physical capital are produced during the current period. This capital is then allocated to each sector-specific capital goods and the variable capital using the relative user cost of such capital inputs.

An implicit financial assets market is assumed to exist whereby every household buys claims to every one of the fixed and variable

capital stock. Such claims entitle the household to a portion of the newly produced capital during the current period. On the supply side of such a market are the respective supplies of fixed capital for each of the 50 sector and the variable capital. Their respective entitlements are then used to update the household's endowment in capital inputs, both fixed and variable.

Various industries of the model are classified as either export-oriented or import-competing. The criterion used for classifying these industries is the proportion of an industry's imports to its exports. If the ratio exceeds 1.5 then the industry is regarded as producing an importable. The observed exports of this industry is regarded as exogenous in the model. However, if this ratio is less than 0.5, then the industry is export-oriented. For ratios between 0.5 and 1.5, other relevant information was used in classifying the industry.

The APEX model assumes the country to be price taker in imported goods. As in other CGE models, the APEX model imposes imperfect substitutability between imports and locally produced products through the use of the Armington trade elasticities.

Export demand in the model have large but finite elasticities. The country can be regarded as price taker in a particular commodity in the world markets if the price elasticity of the world demand for the product is very large.

In the present model closure, the foreign exchange rate is assumed fixed. This therefore assumes that equilibrium in the external sector is reached through foreign capital flows. On the domestic side, equilibrium is reached through adjustments in the domestic absorption until savings and government balances equate to zero. The model does this by introducing a lump sum tax which assumes a positive (negative) value whenever the government incurs a deficit (surplus). This tax is captured in the model by introducing a personal income tax rate shifter. The shifter scales this rate up or down depending upon whether the government is in deficit or surplus.

One important feature of the APEX model is that it uses empirically estimated behavioral parameters in its structure. Thus, essentially almost all of the elasticities in the production, consumption, and trade sectors were estimated econometrically using Philippine data.[8]

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8. For a detailed discussion on the data set used to calibrate the model see the paper of Clarete and Cruz, 1992.

The benchmark period of the model is 1989. The major sources of data used to calibrate the model are: (i) 1985 input-output table. This is used to specify the production side of the economy. The 1985 IO table was updated to 1989 using the 1989 National Income Accounts of the Philippines; (ii) National Income Accounts for 1989; (3) 1991 Philippine Statistical Yearbook; (4) 1988 Family Income and Expenditure Survey; (5) 1989 Foreign Trade Statistics of the Philippines.

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