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Doha Scenarios, Trade Reforms, and Poverty in the Philippines: A CGE Analysis

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ABSTRACT

The paper examines the possible impact of Doha agreement on Philippine poverty. Using a detailed CGE analysis, the agreement is observed to depress world demand for Philippine agricultural exports, and thus slightly increase poverty, especially among rural households. However, an ambitious full trade liberalization scenario, which involves free world trade and domestic liberalization, leads to increased industrial exports that favor urban households. These impacts are driven primarily by domestic trade liberalization, as free world trade favors the agricultural sector by increasing the cost of competing agricultural imports.

SUMMARY

Since the early 1980s, the Philippines has undertaken substantial trade reform. The current Doha round of WTO negotiations is now likely to bring further reform and shocks to world import and export prices and world export demand. The impact of all these developments on the poor is not very clear and is the subject of intense debate.

A detailed economy-wide CGE model is used to run a series of policy experiments. Poverty is found to increase slightly with the implementation of expected Doha scenario. These effects are focused primarily among rural households in the wake of falling world prices and demand for Philippine agricultural exports.

The impacts of full liberalization – involving free world trade and complete domestic liberalization – are found to depend strongly on the mechanism the government adopts to offset foregone tariff revenue. If an indirect tax is used, the incidence of poverty falls marginally, but the depth (poverty gap) and severity (squared poverty gap) increase substantially. If, instead, an income tax is used, all measures of poverty increase. Regardless of the compensatory mechanism, full liberalization favors urban households, as exports, which are primarily non-agricultural, expand.

In separate simulations, we discover that free world trade is poverty-reducing and favors rural households, whereas domestic liberalization is poverty-increasing and favors urban households. Under free world trade, rural households benefit from increasing world agricultural export prices and demand. The anti-rural bias of domestic liberalization

stems from the fact that import prices fall more for agricultural goods than for industrial goods, as initial import-weighted average tariffs rates are higher for the former.

In conclusion, the current Doha agreement appears likely to slightly increase poverty, especially in rural areas and among the unemployed, self-employed and rural low-educated. The Philippines is found to have every interest in pushing for more ambitious world trade liberalization, as free world trade holds out strong promise for reducing poverty. In contrast, domestic liberalization is found to likely increase poverty, suggesting that accompanying policies should be considered such as tying domestic liberalization to progress in free world trade. Whereas free world trade favors rural households and actually increases urban poverty, the opposite is true of domestic liberalization. This suggests that some regional compensatory policies should be considered. Similar contrasting effects are noted according to the employment status of the household head – salaried vs. unemployed or self-employed; skilled vs. unskilled – implying that targeted accompanying policies may be important.

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DOHA SCENARIOS, TRADE REFORMS, AND POVERTY IN THE PHILIPPINES: A CGE ANALYSIS

Caesar B. Cororaton, John Cockburn, and Erwin Corong[1]

1. INTRODUCTION

Since the early 1980s, the Philippines has undertaken substantial trade reform wherein tariff rates have been reduced, tariff structure simplified, and quantitative restrictions "tariffied". The current Doha round of WTO negotiations is now likely to bring major changes for the Philippines, particularly its agriculture sector, as well as pressure for further liberalization of its trade policies. The impact of all these developments on the poor is not very clear and is the subject of intense debate. Will the outcome of the Doha Round, together with further Philippine trade liberalization, be favorable or harmful for the poor? Will the effects differ between different types of poor? What alternative or accompanying policies may be used in order to ensure a more equitable distribution of the gains from freer trade? What are the channels through which these changes are most likely to affect the poor? These are examples of very challenging concerns that occupy the ongoing debate on trade reforms. We employ a 35-sector CGE model calibrated to Philippine data to analyze the impacts of various WTO-Doha and Philippine trade reform scenarios on resource allocation, factor demands and factor prices, household income, consumer prices and poverty. Given the agricultural focus of

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the Doha Round, particular attention is paid to disaggregating and modeling the agriculture sector.

2. SURVEY OF LITERATURE

There are two recent survey of literature that looks into the link between trade and poverty: (1) Winters, McCulloch, and Mckay (2004); and (2) Hertel, and Reimer (2004). Both surveys analyze the theoretical link and cite empirical evidence so far. In particular, the link between trade and poverty may be found in: (a) price and availability of goods; (b) factor prices, income and employment; (c) government taxes and transfers influenced by changes in revenue from trade taxes; (d) incentives for investment and innovation, which affect long-run economic growth; (e) external shocks, in particular changes in the terms of trade; and (f) short-run risk and adjustment cost. There are various methods of analysis employed which can be grouped into: partial equilibrium models/cost-of-living analysis, general equilibrium models, and models on trade, growth and poverty. So far, the empirical evidence indicates that there can be no simple general conclusion about the relationship between trade liberalization and poverty. The present paper falls under the general equilibrium method, in particular in the CGE-poverty literature. In terms of the trade and poverty link, the paper traces the impact of changes in factor prices on household income, compares two compensatory tax schemes to offset the possible lose in government revenue from tariff reduction, and analyzes the possible changes in the terms of trade arising from the Doha agreement.

In this section, we shall not delve into the empirical results in the literature on trade and poverty. Instead, we shall mention that there have been numerous attempts to adapt CGE models to the analysis of income distribution and poverty issues. Generally, one must impose strong assumptions concerning the distribution of income among household in each category. A popular approach is to assume a lognormal distribution of income within each category where the variance is estimated with the base year data (De Janvry, Sadoulet, and Fargeix 1991). In this approach, the CGE model is used to estimate the change in the average income for each household category, while the variance of this income is assumed fixed. Decaluwé *et al* (2000) argue that a beta distribution is preferable to other distributions because it can be skewed left or right and thus may better represent the types of intra-category income distributions commonly observed. In this paper, we do not impose assumption concerning the functional form of the distribution of income among households. Instead, we take the actual distribution of income within the 12 household categories in the model from the 1994 Family Income and Expenditure Survey (FIES) which comprise 24,797 Filipino households. The 12 household categories are obtained by grouping households by region (urban-rural), the education of the household head and his/her occupation. Averages household income variations are derived for each household category from the CGE and then applied to all corresponding households in the FIES to compute FGT poverty indices.

There have been a number of CGE analyses conducted to analyze the effects of policy reforms in the Philippines. Cororaton (1994) provided a review of literature on CGE modeling in the Philippines. The review highlights that although there are a number

of CGE models available in the country[2] with various sectoral breakdown, it was observed that most of these models focused mainly on analyzing production efficiency and reallocation effects. The analysis of tracing down the impact of trade reforms to the household level has not been emphasized or has been completely missed out. The paper attempts to address this gap within the context of the Doha Development Agenda (DDA).

3. BACKGROUND ON PHILIPPINE AGRICULTURE

The agricultural sector employs about 35 percent of the labor force and accounts for roughly 20 percent of GDP. If linkages with sectors such as agricultural-related processing, including food processing and the farm supply industry are added, the farm and food related industry contributes 40 percent of GDP and employs two-thirds of the labor force (David 1997). The sector has been characterized by low productivity and correspondingly low growth rates in the last two decades. Growth decelerated from an annual average of 6.7 percent in the 1970s to 1.1 percent in the first half of the 1980s (Table 1). Although the second half of the 1980s saw some recovery, agriculture again lost steam in the 1990s with an annual growth rate of just 2 percent.

The Green revolution was the main driving force behind the high growth in the 1970s. However, because of an inherent policy bias against agriculture, coupled with the collapse in world commodity prices, the growth momentum was not sustained. David (2003) concludes that the negative impact of government's anti-agriculture policy bias

[2] Bautista (1988), Bautista (1987), Clarete and Warr (1992), Clarete (1984 & 1991), Cororaton (1990), Habito (1984), and Gaspay (1993), among others.

was greater than that of declining world commodity prices. The policy bias towards import substitution and against agriculture and exports led to market distortions which promoted rent seeking activities and distorted economic incentives against investments in agriculture up to the 1970s. Moreover, the policy of maintaining an overvalued exchange in support of industrial policy greatly penalized and reduced the rates of return to agriculture (Intal and Power 1990).

Table 1—Growth Rates of Agriculture, Fishery and Forestry

	1970-75	1975-80	1980-85	1985-90	1990-95	1995-2000
Agriculture	6.7	6.7	1.1	3.1	2.0	2.3
Crops						
- Palay	3.8	5.2	3.6	3.6	2.0	4.3
- Corn	7.1	5.0	3.7	5.4	-0.5	0.5
- Sugarcane	7.7	0.1	-3.5	-5.8	1.6	0.5
- Coconut	11.1	11.1	0.0	-8.7	0.9	0.0
- Banana	12.5	20.2	0.8	-4.8	-0.5	6.0
- Other Crops	8.7	6.8	0.5	5.5	1.7	0.9
Livestock	0.0	-1.5	1.3	6.1	3.3	4.7
Poultry	7.4	13.5	3.0	8.0	6.4	5.1
Agricultural Services	0.0	6.7	2.8	8.7	1.0	-0.5
Fishery	4.3	4.2	5.1	1.0	2.6	1.3
Forestry	-6.8	-2.6	-11.4	-6.0	-23.3	-9.2
Agriculture, Fishery and Forestry	**3.1**	**4.5**	**0.4**	**2.0**	**1.3**	**1.9**

Source: National Statistical and Coordination Board.

Agriculture exports were a major source of foreign exchange in the country in the 1970s. The sector as a whole was a net exporter, contributing two-thirds of total exports and representing only 20 percent of total imports, thereby providing the foreign exchange needed to support the import dependent manufacturing sector (Intal and Power 1990). However, the 1990s saw a clear change in agricultural trade patterns as exports stagnated and imports increased dramatically to the point that the Philippines became a net importer of agricultural goods. David (2003) attributes this evolution to the country's fading comparative advantage and low productivity levels in agriculture. Table 2 indicates that

the country's declining comparative advantage in agriculture can be traced primarily to primary agricultural goods where exports have gone from 1400 percent of imports in 1970 to 50 percent in 1998.

Table 2—Philippine Agricultural Exports and Imports 1970-1998 ($US million CIF)

	Primary		Processed		Raw Materials		Inputs		Total	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
1970	51.3	724.6	111.9	123.9	33.0	35.7	33.7	-	229.9	884.2
1975	210.8	951.8	208.6	285.0	71.5	57.7	124.4	-	615.3	1294.5
1980	351.0	1242.8	324.8	790.0	76.6	86.9	215.2	-	985.6	2119.7
1985	359.0	572.5	211.1	633.5	104.7	94.2	144.9	-	819.7	1300.3
1990	800.7	806.0	564.9	675.8	166.8	145.1	232.0	-	1764.4	1626.8
1995	1349.2	988.4	984.0	1234.9	271.8	172.2	379.5	-	3029.4	2395.5
1996	1803.8	981.4	1030.8	1015.4	245.7	199.9	420.8	-	3501.1	2196.7
1997	1738.4	914.7	1152.7	1127.0	288.9	192.8	424.8	-	3604.6	2234.5
1998	1877.3	886.9	862.8	1120.9	200.6	136.2	289.0	-	3229.6	2143.9

Source: David (2000).

4. POST WORLD WAR II TRADE POLICIES

The balance of payments crisis (BOP) that transpired barely four years after the war ended in 1945 shaped the Philippine industrial and agricultural policy landscape. High import demand for economic reconstruction coupled with distressed local production led to a decline in international reserves and the 1949 BOP crisis. The crisis spurred a policy response centered on import and foreign exchange controls through the identification of essential imports, the imposition of import quotas, as well as the allocation of scarce foreign exchange. Though initially intended to be a temporary measure, these policy responses soon became a prominent fixture that resulted in a development strategy geared towards industrial import substitution with lesser emphasis on the agricultural and export sectors.

Import Substitution. The enactment of the highly protective 1957 tariff code reinforced the government's import substitution policy by providing incentives to domestic producers of final consumer goods. High tariff rates were imposed on non-essential consumer goods while low rates were applied to essential producer inputs. This created a strong bias against agriculture and exports. An analysis of effective protection rates (EPR) by sector and commodity (Power and Sicat 1971; Tan 1979) revealed that the highest EPRs from the 1950s to 1970s were granted to import substituting consumer industries; in contrast agriculture and primary (mining) products, which accounted for two-thirds of exports during the period, were characterized by the lowest EPRs. The weighted average EPRs provided to the manufacturing sector was 44 percent in 1974 compared to a much lower nine percent protection for agriculture and mining. Moreover, Tan (1979) revealed a highly skewed protection structure: (a) exportable goods, which comprised mainly of agricultural products, had four percent protection as compared to 61 percent for non-exportable; and (b) consumption goods had 77 percent protection as compared to 23 percent and 18 percent for intermediate and capital goods respectively. In spite of the passage of the revised 1973 tariff code, which was primarily aimed at decreasing tariff dispersion, large disparity in tariff levels persisted, especially by South East Asian standards.

Export Taxes on Agriculture. Agricultural export taxes ranging from 4 to 10 percent were introduced following the 1970 devaluation to stabilize the BOP position. Initially intended to be temporary, the agricultural export tax ended up being incorporated in the 1973 tariff and customs code as a major source of government revenue. The world

commodity prices boom in 1974 prompted the imposition of an additional export tax to enhance government revenue. Not surprisingly, this worsened the bias against agriculture, resulting in additional resource reallocation from agriculture to other sectors of the economy, particularly towards the import substituting consumer goods (Intal and Power 1990). Furthermore, the dispersion in tariff rates openly encouraged assembly operations that focused mainly on the production of import dependent, low value added products. Overall, this did not only prevent the growth of the agricultural and primary sectors, but also the evolution of desirable backward integration (Bautista and Tecson 2003).

Overvaluation of Exchange Rate. The overvalued exchange rate arising from the highly protective trade policy regime also contributed to the bias against agriculture. This occurred despite the removal of exchange rate controls in 1960 and the de facto devaluations of 1962 and 1970. The overvaluation of the peso varied significantly, from 14 percent from 1962 to 1966, to as high as 32 percent from 1975 to 1979 (Intal and Power 1990). The overvaluation of the exchange rate resulted in negative protection rates for rice, sugar and coconut range from -13 percent to -33 percent. This significantly reduced the returns to agricultural production (Intal and Power 1990).

Government Intervention. Government interventions in the input markets further exacerbated the anti-agriculture bias. Input prices of fertilizers, hand tractors, and irrigation pumps were higher than their corresponding world prices by 10, 33 and 30 percent, respectively (David 1983). Government pricing and marketing interventions in agriculture, purportedly aimed at protecting the domestic economy from instability in

world commodity prices, led to the establishment of government marketing agencies that had monopoly power for imports and monopsony power for exports. In reality, they siphoned off the gains from trade by diverting proceeds from agricultural producers and creating rent-seeking activities (Bautista and Tecson 2003). In particular, heavy restrictions on trading of food grains (rice, corn, and wheat), coconut and sugar reduced domestic prices. For instance, the government controlled the allocation among producers of exports and domestic sugar sales, with domestic sales further forced to sell at below-world prices. The establishment of a de facto government-funded coconut 'parastatal' with substantial monopsony power took advantage of the favorable international market at the expense of domestic coconut producers. Similarly, a government food grain marketing agency reduced the returns to domestic producers as the agency controlled the domestic price of food grains.

5. PHILIPPINE TRADE REFORM

This pattern of intervention in the Philippine economy was not sustainable and it is hardly surprising that reforms became necessary. The first phase of the trade reform program (TRP) started in the early 1980s with three major components: (a) the 1981-85 tariff reduction; (b) the import liberalization program (ILP); and (c) the complimentary realignment of the indirect taxes. During this period the maximum tariff rates were reduced from 100 to 50 percent and sales taxes on imports and locally produced goods were equalized. The mark–up applied on the value of imports (for sales tax valuation) was also reduced and eventually eliminated.

The implementation of TRP however was suspended in the mid–1980s because of a balance of payments crisis. In fact, some of the items that were deregulated earlier were re–regulated during the period. When the Aquino government took over the administration in 1986 the TRP of the early 1980s was resumed, resulting in the reduction of the number of regulated items from 1,802 in 1985 to 609 in 1988. Export taxes on all products except logs were also abolished.

In 1991 the government launched TRP–II, which sought to realign tariff rates over a five–year period. The realignment involved the narrowing of the tariff rates through a reduction of tariff peaks, with a goal of clustering of tariff rates within the 10-30 percent range by 1995. This resulted in a near equalization of protection for agriculture and manufacturing by the start of the 1990s, reinforced by the introduction of protection to "sensitive" agricultural products.

In 1992, a program of converting quantitative restrictions (QRs) into tariff equivalents was initiated. In the first stage, QRs of 153 commodities were converted into tariffs. In a number of cases, tariff rates were raised over 100 percent, especially during the initial years of the conversion. However, a built–in program for reducing tariff rates over a five–year period was also put into effect. QRs were removed for a further 286 commodities in the succeeding stage. At the end of 1992 only 164 commodities were subjected to QRs. There were some policy reversals along the way though. In 1993, QRs were re-introduced for 93 items, largely as a result of the Magna Carta for Small Farmers in 1991.

In 1994, the government started implementing TRP–III at the same time as it was admitted to the WTO. Tariff rates were successively reduced on: capital equipment and machinery (January 1, 1994); textiles, garments, and chemical inputs (September 30, 1994); 4,142 manufacturing goods (July 22, 1995) and "non-sensitive" components of the agricultural sector (January 1, 1996). Through these programs, the number of tariff tiers was reduced, as were the maximum tariff rates. In particular, the overall program was aimed at establishing a four-tier tariff schedule: 3 percent for raw materials and capital equipment that are not available locally; 10 percent for raw materials and capital equipment that are available from local sources; 20 percent for intermediate goods; and 30 percent for finished goods. This further reduced the anti-agriculture tariff bias which by 1995 had turned into effective protection for agriculture (Habito 1999). Indeed, EPRs in agriculture and industry went from 9 and 44 percent, respectively, in 1979 to 25 and 20 percent in 1999, and to 24 and 15 percent by the year 2000 (Bautista, Power and Associates 1979; Manasan and Pineda 1999; Habito 2002).

Between 1994 and 2000, the overall weighted nominal tariff declined by 66.9 percent (Table 3). The decline in the industry tariff (-65.3 percent) was much greater than in agriculture (-48.8 percent). The largest drop in tariff rates was in mining (-88.9 percent), while the smallest decline was in "other agriculture" (-19.9 percent). In 2000, the average sectoral tariff rate was highest in food manufacturing (16.6 percent), whereas 'other agriculture' sector had the lowest tariff rate (0.2 percent).

Table 3—Nominal Tariff Rates

	1994	2000	Percent change
Crops	15.9	8.7	-45.6
Livestock	0.7	0.3	-57.6
Fishing	34.1	80	-76.4
Other Agriculture	0.3	0.2	-19.9
AGRICULTURE	8.8	4.5	-48.8
Mining	44.1	4.9	-88.9
Food manufacturing	37.3	16.6	-55.4
Non-food manufacturing	21.1	7.6	-64.0
INDUSTRY	24.1	8.4	-65.3
TOTAL	23.9	7.9	-66.9

Sources of data for calculation: Various issues of Foreign Trade Statistics, and Manasan and Querubin (1997).

Revenue from import tariff is one of the major sources of government funds. In 1990, the share of revenue from import duties and taxes to the total revenue was 26.4 percent (Table 4). It increased marginally to 27.7 percent in 1995, but then dropped sharply to 19.3 percent in 2000, largely due to the tariff reduction program. The reduction in the share of tariff revenue was compensated primarily by an increase in the share of income and profit taxes from 27.3 percent in 1990 to 30.7 percent in 1995 and 38.6 percent in 2000. The share of excise and sales taxes dropped from 27.2 percent in 1990 to 23.4 percent in 1995, but then recovered to 28.1 percent in 2000.

Table 4—Sources of Government Revenue

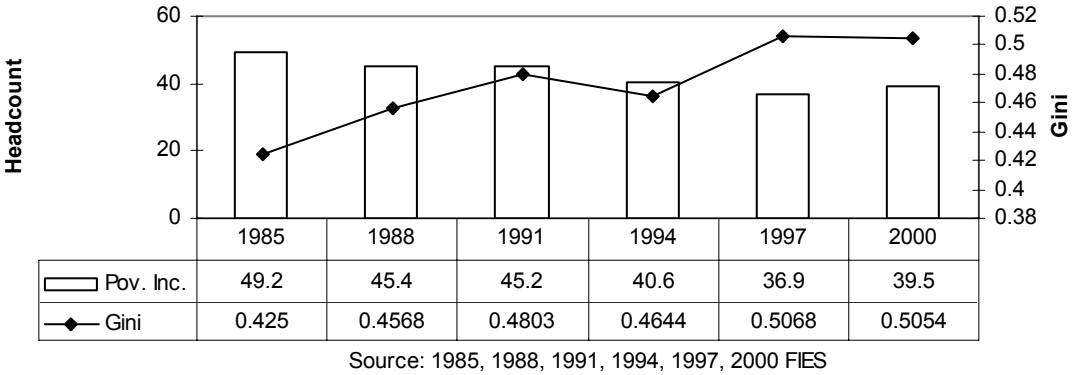
	1990	1995	2000
Tax Revenue	83.9	85.7	89.1
Taxes on net Income and Profits	27.3	30.7	38.6
Excise and Sales Taxes	27.2	23.4	28.1
Import Duties and other Import Taxes	26.4	27.7	19.3
Other Taxes	3.0	3.9	3.1
Non-Tax Revenue	14.8	14.0	10.6
Grants	1.3	0.3	0.3
Total	100.0	100.0	100.0

Source: Selected Philippine Economic Indicators.

6. POVERTY PROFILE

Figure 1 presents the evolution of the poverty headcount index and the Gini coefficient from 1985 to 2000. The poverty headcount index dropped continuously from 49.2 percent in 1985 to 36.9 percent in 1997, but then rebounded to 39.5 percent in 2000 as a result of the 1998 El Nino and the Asian Crisis. El Nino resulted in a 30 percent contraction in agriculture, the greatest drop in more than 30 years. On the hand, income inequality has steadily increased over this period, as the Gini coefficient climbs from 0.42 in 1985 to 0.51 in 2000.

Figure 1—Income Distribution and Poverty: The Philippines (1985–2000)



	1985	1988	1991	1994	1997	2000
Pov. Inc.	49.2	45.4	45.2	40.6	36.9	39.5
Gini	0.425	0.4568	0.4803	0.4644	0.5068	0.5054

Source: 1985, 1988, 1991, 1994, 1997, 2000 FIES

In 1994, the base year the household survey underlying our analysis, about 41 percent of the population of 67 million was below the poverty threshold (Table 5). Generally, rural households, which represent roughly half the population, are substantially poorer than urban households. Whether in urban or rural areas, households with low-educated heads are by far the poorest. These four household categories (low-

educated salaried and self-employed households in rural and urban areas) combine to encompass more than 60 percent of the total population of the Philippines and the bulk of the poor.

Table 5—Poverty Indices in 1994

Households	Population	Share of population	Headcount	Gap	Severity
Low-ed salaried	6.5	9.6	41.7	12.9	5.6
Hi-ed salaried	6.4	9.4	15.5	3.7	1.3
Civil servants	3.2	4.7	10.2	2.5	0.9
Low-ed self/un-employed	9.4	14	42.3	14.9	6.9
Hi-ed self/un-employed	6.2	9.2	16.9	4.8	2.1
Family business	1.9	2.8	18.2	6.0	2.8
Total-Urban	**33.6**	**49.7**	**28.0**	**8.9**	**3.9**
Low-ed salaried	6.5	9.7	58.7	19.7	8.8
Hi-ed salaried	1.9	2.8	31.3	9.7	4.3
Civil servants	1.6	2.4	22.4	6.8	2.9
Low-ed self/un-employed	18.1	26.8	61.0	21.9	10.3
Hi-ed self/un-employed	3.3	5	37.5	12.0	5.0
Family business	2.4	3.6	39.9	12.0	5.2
Total-Rural	**33.8**	**50.3**	**53.2**	**18.4**	**8.4**
Total-Philippines	**67.4**	**100**	**40.7**	**13.7**	**6.2**

Source: 1994 Family Income and Expenditure Survey.
Legend: low-ed – zero education to third year high school; hi-ed – high school graduate and up.

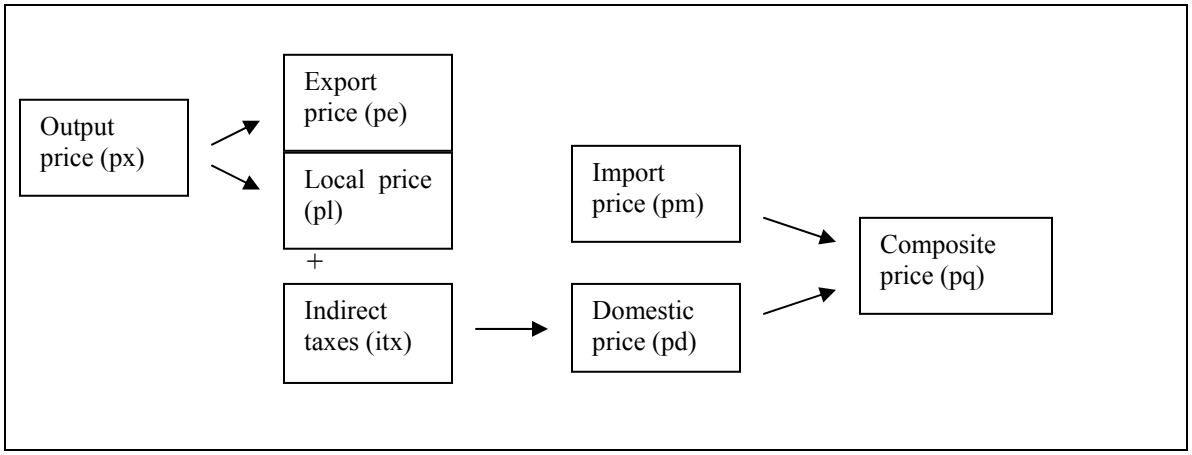
7. THE MODEL: SPECIFICATION, PARAMETERS AND ECONOMIC STRUCTURE

Basic Structure. The model has 35 production sectors, with 13 sectors for agriculture, fishing and forestry, 19 for industry, and three for service sectors, including government service. In the agricultural sector, the model distinguishes capital, land and four types of labor inputs: skilled (high school diploma) and unskilled agricultural labor, and skilled and unskilled production workers. Agricultural workers are employed only in agriculture, while production workers employed in agriculture are mobile between the

farm and non-farm sectors. Non-agricultural sectors, except government service, use capital as well as skilled and unskilled production worker inputs. Sectoral capital is fixed. Sectoral intermediate input is determined using a Leontief fixed coefficient, whereas the components of value added are aggregated using a Cobb-Douglas (CD) function.

Figure 2 shows the basic price relationships in the model. Output price, px, affects export price, pe, and local prices, pl. Indirect taxes are added to the local price to determine domestic prices, pd, which together with import price, pm, will determine the composite price, pq. The composite price is the price paid by the consumers. Import price, pm, is in domestic currency, which is affected by the world price of imports, exchange rate, er, tariff rate, tm, and indirect tax rate, itx. All prices adjust to clear the factor and product markets. Consumer demand is derived from CD utility functions. An Armington-CES (constant elasticity substitution) function is assumed allocates this demand between local and imported goods, while a CET (constant elasticity of transformation) function determines the allocation of domestic production between export supply and local sales. A downward-sloping export demand curve is assumed.

Figure 2—Basic Price Relationship in the Model



Model Closure. Nominal government consumption is equal to exogenous real government consumption multiplied by its (endogenous) price. Fixing real government spending neutralizes any possible welfare/poverty effects of variations in government spending. Total government income is held fixed. Any reduction in government income from tariff reduction is compensated endogenously by the introduction of an additional uniform sales or income tax. Thus, the government's budget balance (public savings) is endogenously determined, although the only variations are due to changes in the nominal price of government consumption.

Total nominal investment is equal to exogenous total real investment multiplied by its price. Total real investment is held fixed in order to abstract from inter-temporal welfare/poverty effects. The price of total real investment is endogenous. The current account balance (foreign savings) is held fixed and the nominal exchange rate is the model's numéraire. The foreign trade sector is effectively cleared by changes in the real exchange rate, which is the ratio of the nominal exchange rate multiplied by the world

export prices, divided by the domestic price index. The propensities to save of the various household groups in the model adjust proportionately to accommodate the fixed total real investment assumption. This is done through a factor in the household saving function that adjusts endogenously.

Economic Structure. The sectoral export demand curve elasticities used in the model are equal to the Armington elasticity estimates used in the GTAP model[3] (Hertel *et al* 2004). The sectoral CES and CET elasticities in the model in turn are derived as one-half of the Armington elasticities in the GTAP (Table 6). Total exports in 1994 are composed of 6.1 percent agriculture exports, 63.1 percent industrial exports, and 30.8 percent service sector exports. The principal industrial exports are semi-conductors and textile-garments. The semi-conductor industry is highly export intensive, followed by coconut processing, bananas and textile-garments. 98.5 percent of total imports are industrial. The sectors which are highly import-intensive are mining (75.3 percent; mainly due to crude oil imports), semi-conductors, machinery, and fertilizer[4]. While agriculture generally has higher value-added ratio compared to industry, its contribution to the overall value added is relatively small. Agriculture contributes 19.9 percent of domestic value added (GDP), as compared to industry (31.5 percent) and services (48.5 percent). Labor intensity is uniformly higher in the agricultural sectors, with the exception of fishing and "other livestock".

[3] The appendix gives a discussion of how the Philippine model is linked with the GTAP model.
[4] The Philippines does not produce all items in the semi-conductor sector, but instead imports these items. For example, it does not have the facilities to produce wafers (motherboards) and monitors, which are major parts of computers. Domestic production focuses on hard disks, disk drives, processors, and some chips. Thus, while there is substantial domestic production and exports in the semi-conductor sector, there are also substantial imports.

Table 6—Elasticities and Key Parameters (1994)

		Foreign Trade				Production (percent)		
	GTAP	Exports (percent) *		Imports(percent) *			VA Share	Lab-Cap
	Elasticities	Share	Intensities	Share	Intensities	(VA/X)i	(VAi/VA)	Ratio**
Irrigated Palay	10.1			0.00	0.0	73.9	1.95	0.94
Non-irrigated Palay	10.1					93.0	0.83	2.07
Corn	2.6	0.01	0.24	0.16	3.9	79.7	1.09	2.15
Banana	3.7	1.25	58.96			62.9	0.49	3.28
Fruit	3.7	0.73	13.57	0.40	7.2	75.9	1.52	1.63
Coconut	3.7	0.36	10.74			86.5	1.07	3.02
Sugarcane	5.4					71.9	0.56	1.14
Other agricultural crops	6.5	0.67	7.08	0.17	1.7	78.4	2.81	1.46
Hog	4.0			0.57	6.5	56.0	1.59	1.09
Poultry products	4.0	0.00	0.0	0.04	0.4	55.6	1.83	0.96
Other livestock	3.1	0.02	0.4	0.03	0.6	74.0	1.39	0.50
Fishing	2.5	3.09	21.6	0.03	0.2	71.7	3.80	0.58
Other Agriculture	6.8			0.12	2.9	77.0	0.99	2.30
AGRICULTURE		**6.13**		**1.51**			**19.9**	
Mining	12.7	2.51	50.2	8.22	75.3	55.0	1.02	0.88
Meat Processing	8.3	0.09	0.7	0.97	6.4	28.5	1.43	0.30
Fruit/vegetable canning	4.0	1.36	30.8	0.18	5.3	36.9	0.60	0.87
Fish processing	8.8	2.03	41.9	0.03	1.0	24.5	0.42	0.75
Coconut processing	4.0	2.93	65.6	0.43	21.0	22.3	0.36	0.90
Rice & corn milling	5.2	0.03	0.2	0.19	0.9	32.3	2.44	0.29
Sugar milling & refining	5.4	0.38	9.8	0.26	6.6	30.1	0.43	0.85
Beverages, sugar, etc	2.8	0.20	4.0	0.20	3.9	45.7	0.83	0.53
Other food processing	4.8	1.31	6.2	4.81	19.1	29.3	2.22	0.80
Textile and garments	7.6	12.08	57.0	8.56	46.1	36.3	2.81	0.81
Wood/paper products	6.3	3.72	32.8	5.28	39.5	34.8	1.43	0.61
Fertilizer	6.6	0.49	42.2	1.24	64.0	33.5	0.14	0.48
Other chemicals	6.6	1.87	14.4	10.24	46.3	40.7	1.95	0.35
Petroleum products	4.2	1.09	6.0	3.48	16.8	20.2	1.32	0.48
Metal products	7.3	6.06	49.5	8.44	56.4	23.7	1.05	0.47
Semi-conductors	8.8	14.09	76.2	12.53	73.0	24.9	1.66	0.73
Machinery (inc. cars)	7.4	6.56	39.5	24.76	70.9	19.8	1.15	0.80
Other manufacturing	6.8	5.85	39.4	8.66	46.7	37.6	2.03	0.79
Construction/utilities	4.7	0.45	1.1			52.9	8.24	0.58
INDUSTRY		**63.10**		**98.49**			**31.5**	
Wholesale trade	3.8	12.99	21.7			64.1	14.24	0.51
Other service	3.8	17.78	15.2			61.4	26.64	0.37
Government services	3.8					69.0	7.67	
SERVICES		**30.8**					**48.5**	
TOTAL		**100.0**		**100.0**			**100.0**	

Notes: *: export intensity is the ratio of exports to domestic production whereas import intensity is the ratio of imports to domestic consumption; **: lab-cap is the labor-capital ratio; va: value added; x: output

8. DEFINITION OF SCENARIOS

The paper utilizes two sets of results. One set is generated from the GTAP model and another from the Philippine CGE model. The first model generates results concerning about the possible changes in the external environment due to Doha facing the Philippine economy. Given such external environment, the second model calculates the potential impact on the Philippine economy, particularly on poverty. Appendix A discusses how the models are linked.

The GTAP model analyzes the various Doha scenarios. Based on the aggressive interpretation of the July 2004 Framework of DDA, Anderson and Martin (2005) suggest a tiered formula for reductions in tariffs, domestic support and full elimination of agricultural exports subsidies. However, if the reduction is focused solely on tariff bound rates without consideration of the applied rates, tariff discontinuities could arise. To avoid such tariff discontinuities in the reduction of bound tariffs, applied tariff will be reduced only when and to the extent that the new bound rate is below the initial applied rate. Furthermore, the tiered formula is applied to various inflexion points and marginal cuts, depending upon the level of development. For developed countries the inflexion points are at 15 and 90 percent and the marginal cuts are 45, 70, and 75 percent. For developing countries the inflexion points are placed at 20, 60, and 120 percent, and with marginal cuts of 35, 40, 50, and 60 percent. Also, to be consistent with the Special and Differential Treatment (SDT) provisions in the July 2004 Framework, least-developed countries (LDCs) are not required to undertake any reduction in commitments. For non-agricultural

commodities, developed countries are assumed to cut bound tariffs by 50 percent, developing countries by two-thirds of 50 percent, and LDCs no cuts. Using the version 6 of the GTAP database and the tariffs rates from the MacMap-HS6 database, the GTAP model generates scenarios involving Doha with SDT (Doha-SDT) and Doha without SDT (Doha-All).

However, to avoid implementing national policy reforms twice, once in the global model and once in the national model, we implemented a two-step approach. In the first step the GTAP model was simulated without the Philippine trade reforms. The GTAP results from this step would capture the impact on the world market of policy reforms in all countries, except the Philippines. In the second step, we adopted these results as shocks into the Philippine model and work out various Philippine policy reform experiments.

In all Philippine simulation experiments, the calibrated tariff rates in the Philippine model, which are initially set at 1994 levels, are re-calibrated to the 2001 tariff rates used in the GTAP model for the Philippines. The solution of the model using the re-calibrated tariff rates serves as the base model to which all subsequent policy simulations are compared. For all but the last scenario, the GTAP world model is run separately to generate estimates of the resulting changes in world prices for Philippine exports and

imports, demand for Philippine exports, and, in the case of the Doha scenarios, new Philippine tariff rates[5]. The following experiments are conducted and analyzed:

1. Doha with Special and Differential Treatment (SDT) for developing countries and indirect tax as replacement tax (Doha-SDT)
2. Doha without SDT for developing countries and indirect tax as replacement tax (Doha-All)
3. Free world trade, full domestic liberalization[6] and indirect tax as replacement tax.
4. Free world trade, full domestic liberalization and income tax as replacement tax.
5. Free world trade, no domestic liberalization and indirect tax as replacement tax.
6. Full domestic liberalization, no world trade liberalization and indirect tax as replacement tax.

Experiments (1) and (2) are the Doha scenarios. These simulations involve Doha-specified reductions in world and domestic tariff rates, export subsidies and domestic support. Under scenario (1), developing countries are required to make smaller reductions under Special and Differential Treatment (SDT), whereas no such treatment is granted under scenario (2). An indirect tax is introduced to compensate lost domestic tariff revenue in both scenarios. Scenarios (3) and (4) are the full (world and domestic) liberalization scenarios, involving the elimination of all world and domestic import

[5] Tariff rate changes are derived from GTAP-estimated variations in the power of tariffs under Doha scenarios. If x is the tariff rate, the power of tariff is p_tm = (1+ x/100). GTAP generates results for p_tm, which in turn is used to compute the new tariff rate.
[6] All domestic tariffs are set to zero.

tariffs, under two alternative replacement tax schemes: indirect tax and income tax, respectively. Finally, scenarios (5) and (6) isolate the respective impacts of free world trade and full domestic liberalization from scenario (3).

Table 7 summarizes the 2001 tariff rates for the Philippines, as well as the variations in world import and export prices, world export demand and Philippine import tariff rates as estimated by the GTAP world model. Given the agricultural focus of the Doha negotiations, it is important to recall that almost all Philippine trade is industrial in nature, although food processing represents roughly ten percent of exports (Table 6). We first note that the results of the two Doha scenarios are very similar in terms of their impacts on world prices and demand for Philippine exports and world prices for Philippine imports.

With the exception of fruit, world export prices increase slightly (by less than one percent) under the two Doha scenarios, whereas variations are greater, although more often negative, in the case of full liberalization. Much more substantial impacts are noted in terms of world demand for Philippine exports, particularly under full liberalization. These impacts are strongly positive for Palay rice[7], textiles and garments and a number of food processing industries (meat/fish processing, sugar and beverages). However, they are moderately negative for several agricultural products (fruit, sugarcane and, in the case of the Doha scenarios, livestock) and certain manufacturing and service sectors.

[7] As Palay rice exports were practically nil in the base year, these large percentage increases have no actual impact on the results.

Table 7—GTAP-Simulated World Prices and Demand Variations

Sectors	2001 GTAP Tariffs for Philippines	Doha-SDT				Doha-ALL				Full Liberalization		
		Export		Import	New	Export		Import	New	Export		Import
		Price	Volume	Price	Tariff*	Price	Volume	Price	Tariff*	Price	Volume	Price
AGRICULTURE												
Irrigated Palay	20.9			3.6	20.9			3.4	20.9			8.3
Non-irrigated Palay												
Corn	25.7	0.2	3.8	1.9	22.6	0.2	3.7	1.8	22.6	-1.6	35.4	8.4
Banana	8.8	-0.2	-6.3	0.9	7.6	-0.3	-6.4	0.8	7.6	-1.9	-6.3	2.2
Fruits	8.8	-0.2	-6.3	0.9	7.6	-0.3	-6.4	0.8	7.6	-1.9	-6.3	2.2
Coconut	8.8	-0.2	-6.3	0.9	7.6	-0.3	-6.4	0.8	7.6	-1.9	-6.3	2.2
Sugarcane	0.0	0.7	-22.9	1.5	0.0	0.7	-23.1	1.4	0.0	-1.4	-33.1	2.3
Other agricultural crops	4.7	0.3	-0.7	2.0	4.7	0.3	-0.8	1.9	4.7	1.9	49.9	8.2
Hog	3.0	0.5	-7.9	2.3	3.0	0.4	-7.9	2.3	3.0	-0.7	39.4	6.6
Chicken, egg & other poultry products	3.0	0.5	-7.9	2.3	3.0	0.4	-7.9	2.3	3.0	-0.7	39.4	6.6
Other livestock	5.9	0.1	-0.4	1.4	5.0	0.1	-0.4	1.4	5.0	-1.5	10.8	4.4
Fishing	4.1	0.4	0.3	0.5	4.1	0.4	0.4	0.6	4.1	1.4	2.5	2.1
Other Agriculture	0.1			0.6	0.1			0.6	0.0			1.8
INDUSTRY												
Mining	3.0	0.7	0.0	0.1	3.0	0.6	0.1	0.1	3.0	0.9	2.0	0.6
Meat Processing	17.8	0.2	41.3	0.7	14.3	0.1	41.5	0.7	14.3	-0.4	172.3	0.0
Canning of fruits, vegetables, etc	6.2	0.4	3.7	0.5	6.1	0.4	3.8	0.5	6.1	0.5	16.9	0.6
Fish canning & processing	30.2	0.1	36.4	0.0	20.6	0.1	36.7	0.0	20.6	-0.4	170.8	-2.2
Coconut processing	6.2	0.4	3.7	0.5	6.1	0.4	3.8	0.5	6.1	0.5	16.9	0.6
Rice & corn milling	49.9	0.1	-36.0	0.1	49.9	0.1	-36.0	0.1	49.9	-2.1	-24.6	6.8
Sugar milling & refining	46.7	0.5	56.7	4.8	39.2	0.5	56.5	4.8	39.2	0.3	188.4	6.7
Beverages, sugar, confectionery, etc	11.1	0.3	22.7	1.0	10.4	0.3	22.7	1.1	10.4	0.5	108.8	2.6
Other food manufacturing	5.2	0.4	2.4	1.9	5.1	0.4	2.5	1.9	5.1	1.1	12.3	3.0
Textile and garments	6.5	0.5	11.0	0.4	6.5	0.4	10.8	0.3	6.5	-0.7	44.9	0.7
Wood_paper products	4.7	0.3	-1.9	0.3	4.7	0.3	-1.9	0.3	4.7	0.6	3.8	1.1
Fertilizer	4.5	0.2	3.4	0.1	4.5	0.2	6.2	0.1	4.5	-0.6	28.6	0.4
Other chemicals	4.5	0.2	3.4	0.1	4.5	0.2	6.2	0.1	4.5	-0.6	28.6	0.4
Petroleum_related products	2.7	0.1	0.9	0.1	2.7	0.1	1.5	0.1	2.7	-2.0	13.3	-0.2
Metal and related products	3.9	0.3	-2.1	0.2	3.9	0.3	-2.7	0.2	3.9	1.0	-3.7	0.6
Semi_conductors & others	0.1	0.2	-1.3	0.1	0.1	0.2	-1.6	0.1	0.1	0.5	-3.4	0.4
Motor vehicles & other machineries	3.9	0.2	-1.2	0.2	3.9	0.2	-0.5	0.2	3.9	-0.3	9.0	0.5
Other manufacturing	5.1	0.4	-4.0	0.2	5.1	0.3	-3.8	0.3	5.1	0.6	-2.0	0.9
Construction and utilities	0.0	0.3	-1.4			0.3	-1.3			1.2	-3.6	
SERVICES												
Wholesale trade	0.0	0.3	-0.9			0.3	-0.8			1.1	-1.6	
Other service	0.0	0.3	-1.2			0.3	-1.1			1.7	-4.5	
Government services	0.0	0.3	-1.2			0.3	-1.1			1.8	-5.4	

On the import side, world prices increase for almost all imports, with the strongest increases among agricultural goods and under full liberalization. The changes in Philippine tariff rates are minimal under both Doha scenarios, as these reductions apply to bound tariff rates, which are much higher than the applied tariff rates presented in Table 7. Under the full liberalization scenario, all Philippine import tariffs are eliminated.

The net impacts of these changes on the agricultural sector, which is the source of the income for most of the poor, are difficult to anticipate. While world prices and demand fall for a number of agricultural exports, reduced import competition (higher world import prices) and increased world prices and demand for agro-industrial exports are likely to have positive effects on domestic demand for agricultural goods. We now turn our attention to the simulation results from our CGE model to try to sort these (and other) different effects out and to determine the net poverty impacts.

9. SIMULATION RESULTS

DOHA SIMULATIONS

These simulations involve Doha-prescribed reductions in world and domestic tariffs, export subsidies and domestic support with and without special and differential treatment for developing countries. Resulting variations in world import and export prices, export demand and domestic tariffs as estimated by the GTAP model are presented in Table 7. There is little difference between these two scenarios in the specific case of the Philippines.

Macro Effects: The macro effects of the two Doha simulations are almost identical (Table 8). On average, export prices (0.41 percent) increase more than import prices (0.21 percent). The driving factor behind the higher average price increase for Philippine exports is the increase in world demand (Table 7). Domestic producers increase their export volumes in response, simultaneously reducing their local sales. The combination of reduced local sales and increased import and export prices raises domestic consumer and output prices. As local prices increase relative to imports prices, Philippine consumers substitute toward imports.

Table 8—Macro Effects (percent change from base)

	Doha		Full Liberalization		Free World Trade (FT) vs Dom Lib (DL)	
	SDT	All	Ind. Tax	Dir. Tax	FT	DL
Macro items\Scenarios	1	2	3	4	5	6
Overall nominal tariff rate	0	-1	-100	-100	0	-100
Domestic prices						
Imports	0.21	0.21	-2.41	-3.23	0.56	-2.94
Exports	0.41	0.41	0.91	0.90	1.55	-0.63
Domestically-sold output	0.37	0.37	-0.01	-0.83	1.63	-1.61
Household CPI	0.39	0.39	-0.33	-1.16	1.71	-2.00
Total output	0.41	0.42	-0.46	-0.42	1.79	-2.21
Real exchange rate change*	-0.01	0.00	1.68	1.68	-0.03	1.70
Domestic volumes						
Imports	0.15	0.16	4.37	4.35	0.74	3.61
Exports	0.13	0.14	3.88	4.05	0.24	3.63
Domestically-sold output	-0.01	-0.01	-0.96	-0.93	0.00	-0.96
Total consumption	0.03	0.03	0.16	0.17	0.15	0.01
Total output	0.02	0.02	0.04	0.10	0.05	-0.02

* = including indirect taxes; ** = World export price/domestic output price;
Ind. Tax - indirect tax, Inc. Tax - income tax.

Sectoral Trade, Output and Consumption: The Doha results suggest that such as an agreement is likely to lead to reallocation of exports and production from the inward-oriented agricultural and service sectors toward the export-oriented industrial sectors for reasons we will now explore. Table 7 presents the world import price, export price and export demand effects of the Doha SDT scenario according to the 35 sectors of our CGE model. While world export prices and demand increase overall, they decline in the agricultural sector. In response, local agricultural producers reorient a share of their sales to the domestic market, whereas industrial producers turn increasingly to the export market (Table 9). This development is reinforced by the greater increase in the world prices of agricultural imports relative to industrial imports (Table 7), which lead domestic consumers to substitute agricultural imports by domestically-produced agricultural

products (Table 9). This also explains why consumer prices rise more in the agricultural sector. However, when we account for the contrasting export price effects, output prices increase more in the industrial sector than in the agricultural or service sectors. Furthermore, when we take account of larger input cost savings for industrial sectors, we note that industrial sector value added prices (Table 10) increase much more (0.69 percent) than for the agricultural (0.42) or service sectors (0.38). Producers respond by reallocating agricultural and service output toward the industrial sector. Within the industrial sector, the food processing and textile-garments sectors emerge as the main "winners" from the Doha accord, given strong growth in world demand (Table 7). Almost identical results are observed when we compare with the Doha-All scenario, as shown in the major sector results in Table 10.

Factor Remuneration: All factor prices increase as a result of rising world export demand under the two Doha scenarios (Table 11). However, these increases are somewhat smaller for factors used intensively in the agriculture and service sectors, given the general reallocation of production toward the industrial sector and rising relative output prices for industrial goods.

Table 9—Effects on Prices and Volumes (Doha-SDT)

	Price Changes (percent)					Volume Changes (percent)				
Sectors	**Import**	**Export**	**Dom.**	**Cons.**	**Output**	**Import**	**Export**	**Dom.**	**Cons.**	**Output**
Irrigated Palay	3.5		0.3	0.3	0.3	-15.1		0.0	0.0	0.0
Non-irrigated Palay			0.3	0.3	0.3			0.0	0.0	0.0
Corn	-0.7	1.2	0.3	0.2	0.3	1.3	1.2	0.0	0.1	0.0
Banana		-0.9	0.9	0.9	-0.1		-3.9	-0.4	-0.4	-2.5
Fruit	-0.3	-1.2	0.4	0.3	0.2	1.4	-2.9	0.1	0.2	-0.3
Coconut		-1.2	0.6	0.6	0.4		-2.7	0.7	0.7	0.3
Sugarcane			1.0	1.0	1.0			1.3	1.3	1.3
Other agricultural crops	1.9	-2.1	0.3	0.3	0.2	-4.8	-7.3	0.2	0.1	-0.3
Hog	2.2		0.4	0.5	0.4	-3.5		0.0	-0.2	0.0
Poultry products	2.2	-0.9	0.3	0.4	0.4	-3.7	-2.6	-0.1	-0.1	-0.1
Other livestock	0.5	0.1	0.3	0.3	0.3	-0.4	-0.4	0.0	0.0	0.0
Fishing	0.5	0.6	0.9	0.9	0.8	1.0	0.0	0.4	0.4	0.3
Other Agriculture	0.7		0.2	0.3	0.3	-1.7		-0.2	-0.2	-0.2
AGRICULTURE	**1.04**	**-0.34**	**0.45**	**0.46**	**0.42**	**-1.60**	**-2.12**	**0.16**	**0.12**	**-0.03**
Mining	0.1	0.6	0.3	0.1	0.5	0.2	1.0	-0.9	-0.1	0.0
Meat Processing	-2.3	3.0	0.1	-0.1	0.2	10.2	12.0	-0.4	0.4	-0.4
Fruit/vegetable canning	0.3	1.0	0.4	0.4	0.6	0.1	1.2	0.0	0.0	0.4
Fish processing	-7.4	2.8	0.8	0.7	1.7	44.5	7.8	-0.9	-0.3	2.9
Coconut processing	0.3	1.0	0.3	0.4	0.8	0.3	1.5	0.3	0.3	1.1
Rice & corn milling	0.1	-5.3	0.4	0.3	0.4	0.7	-14.2	0.0	0.0	0.0
Sugar milling & refining	-0.6	6.3	0.5	0.4	1.2	3.0	15.7	-0.2	0.1	1.5
Beverages, sugar, etc	0.3	5.4	0.4	0.4	0.7	0.1	6.9	0.0	0.0	0.3
Other food processing	1.8	0.8	0.6	0.8	0.6	-2.6	0.8	0.4	-0.2	0.4
Textile and garments	0.4	1.5	0.8	0.6	1.3	1.3	2.4	-0.3	0.5	1.3
Wood/paper products	0.2	0.1	0.2	0.2	0.2	0.0	-0.7	-0.1	0.0	-0.3
Fertilizer	0.2	0.6	0.3	0.3	0.5	-0.1	0.7	-0.3	-0.2	0.1
Other chemicals	0.1	0.6	0.3	0.2	0.3	0.3	0.8	-0.2	0.0	0.0
Petroleum products	0.0	0.3	0.2	0.2	0.2	0.3	0.0	-0.1	0.0	-0.1
Metal products	0.2	0.1	0.1	0.2	0.1	-0.2	-0.5	-0.1	-0.1	-0.3
Semi-conductors	0.1	0.1	0.1	0.1	0.1	0.0	-0.5	-0.2	-0.1	-0.4
Machinery (inc. cars)	0.1	0.1	0.2	0.1	0.2	0.1	-0.5	-0.1	0.0	-0.3
Other manufacturing	0.2	-0.1	0.3	0.2	0.2	0.0	-1.3	-0.1	0.0	-0.6
Construction/utilities		0.1	0.3	0.3	0.4		-0.6	0.0	0.0	0.0
INDUSTRY	**0.20**	**0.62**	**0.34**	**0.29**	**0.44**	**0.18**	**0.68**	**-0.08**	**0.02**	**0.12**
Wholesale trade		0.2	0.4	0.4	0.4		-0.4	0.0	0.0	-0.1
Other service		0.1	0.4	0.4	0.4		-0.5	0.0	0.0	-0.1
Government services					0.5					
SERVICES		**0.14**	**0.36**	**0.36**	**0.35**		**-0.48**	**-0.08**	**-0.08**	**-0.08**
TOTAL	**0.21**		**0.37**	**0.34**	**0.41**	**0.15**	**0.13**	**0.00**	**0.03**	**0.02**

* = including indirect taxes; Dom=Domestic sales of local output; Cons. = Total domestic consumption.

Table 10—Effects on Prices and Volumes by Major Sector (percent change from base year)

	Prices						Volumes						
	Import	**Export**	**Dom.**	**Cons.**	**Output**	**VA**	**Import**	**Export**	**Dom.**	**Cons.**	**Output**	**VA**	**Labor**
1. Doha-SDT (Special Differential Treatment)													
Agriculture	1.04	-0.34	0.45	0.46	0.42	0.42	-1.60	-2.12	0.16	0.12	-0.03	-0.02	-0.05
Industry	0.20	0.62	0.34	0.29	0.44	0.69	0.18	0.68	-0.08	0.02	0.12	0.11	0.33
Service		0.14	0.36	0.36	0.35	0.38		-0.48	-0.08	-0.08	-0.08	-0.08	-0.17
2. Doha-ALL (No Special Differential Treatment)													
Agriculture	0.98	-0.34	0.44	0.45	0.41	0.42	-1.49	-2.13	0.16	0.12	-0.03	-0.03	-0.05
Industry	0.20	0.62	0.34	0.29	0.44	0.69	0.19	0.68	-0.08	0.02	0.12	0.11	0.33
Service		0.17	0.37	0.37	0.36	0.40		-0.46	-0.08	-0.08	-0.08	-0.08	-0.17
3. Full liberalization: free world trade and domestic liberalization with replacement indirect tax													
Agriculture	-0.43	-0.80	-0.07	-0.09	-0.91	-1.13	-1.21	-1.72	-0.02	-0.04	-0.17	-0.12	-0.21
Industry	-2.44	1.38	-0.40	-1.20	-0.55	-0.06	4.45	6.02	-1.77	0.48	0.24	0.16	0.65
Service		0.33	0.53	0.53	-0.20	-0.21		0.85	-1.77	-0.14	-0.14	-0.14	-0.29
4. Full liberalization: free world trade and domestic liberalization with replacement income tax													
Agriculture	-1.27	-0.71	-0.72	-0.74	-0.72	-0.54	-0.85	-1.97	-0.02	-0.04	-0.19	-0.14	-0.26
Industry	-3.26	1.33	-1.36	-2.10	-0.64	1.06	4.43	6.37	-1.65	0.55	0.43	0.29	1.02
Service		0.38	-0.21	-0.21	-0.10	0.43		0.65	-1.65	-0.24	-0.24	-0.24	-0.50
5. Free world trade													
Agriculture	5.11	0.28	2.33	2.39	2.35	2.67	-5.56	-5.32	0.48	0.34	0.00	0.01	0.02
Industry	0.50	1.98	1.40	1.10	1.71	2.51	0.83	1.71	-0.26	0.13	0.25	0.21	0.65
Service		0.95	1.61	1.61	1.65	1.84		-1.49	-0.26	-0.19	-0.19	-0.19	-0.39
6. Domestic liberalization													
Agriculture	-5.23	-1.09	-2.34	-2.42	-3.17	-3.68	4.62	3.90	-0.53	-0.42	-0.16	-0.12	-0.22
Industry	-2.91	-0.59	-1.77	-2.26	-2.23	-2.56	3.60	4.25	-1.50	0.36	-0.03	-0.07	-0.04
Service		-0.62	-1.05	-1.05	-1.82	-2.01		2.38	-1.50	0.06	0.06	0.06	0.13

Notes: Dom=Domestic sales of local production; Cons. = Consumption (domestic); VA = Value added.

Table 11—Effects on Factor Remunerations (percent change from base year)

	Wage rates					Returns to capital			
	Agriculture		Non-agriculture		Land				
	Skilled	**Unskilled**	**Skilled**	**Unskilled**	**rent**	**Agriculture**	**Industry**	**Service**	**All**
Doha-SDT	0.31	0.31	0.56	0.61	0.30	0.53	0.74	0.30	0.49
Doha-All	0.30	0.30	0.57	0.61	0.28	0.53	0.75	0.31	0.50
Full Lib. (Ind. Tax)	-1.49	-1.49	-0.01	0.30	-2.08	-0.87	-0.18	-0.34	-0.37
Full Lib. (Inc. Tax)	-0.91	-0.91	0.87	1.21	-1.48	-0.33	1.06	0.20	0.42
Free World Trade	2.45	2.45	2.25	2.34	2.46	2.98	2.66	1.65	2.20
Dom. Lib	-3.80	-3.80	-2.23	-2.02	-4.41	-3.74	-2.83	-1.95	-2.53

Household Income: These variations in factor remunerations affect the income of different household groups according to their respective factor endowments (Table 12). We note that there is a stronger distinction between households headed by salaried workers (including civil servants) and those headed by the self/un-employed, than there is between urban and rural households. Whereas households with salaried heads derive most of their income from wages, households with self/un-employed heads are more dependent on capital and foreign income. Nonetheless, rural households do derive a somewhat larger share of income from agricultural factors (labor and agricultural capital), as compared to urban households. This is particularly true for rural households with low-educated heads, who represent nearly three-quarters of the rural population.

Table 12—Sources of Household Income at the base (percent)

	Urban						Rural					
	Salaried		Civil	Self-employed		Family	Salaried		Civil	Self-employed		Family
Sources	**low-ed**	**hi-ed**	**servants**	**low-ed**	**hi-ed**	**bus.**	**low-ed**	**hi-ed**	**servants**	**low-ed**	**hi-ed**	**bus.**
Skilled ag. labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.5	6.4	0.0	7.4	6.0
Unskilled ag. labor	0.0	0.0	0.0	0.0	0.0	0.0	61.9	0.0	0.8	18.9	0.0	7.5
Skilled prod. labor	0.0	66.3	62.2	0.0	26.1	8.6	0.0	51.1	59.8	0.0	20.2	4.9
Unskilled prod. labor	66.5	0.0	3.7	22.1	0.0	2.8	19.3	0.0	5.2	10.2	0.0	4.4
Capital in Agriculture	1.2	0.5	0.9	10.8	2.0	5.3	2.7	1.4	3.9	30.1	17.5	29.8
Capital in Industry	0.8	0.8	0.4	2.9	1.9	12.0	0.6	0.4	0.4	2.1	1.8	5.6
Capital in Service	17.7	15.2	18.5	38.2	34.9	54.0	7.0	8.8	9.5	16.7	22.3	22.9
Land Rent	0.6	0.4	1.3	1.8	1.4	1.1	0.9	0.9	3.0	3.1	3.1	2.9
Dividends	4.0	10.1	4.1	3.8	13.9	8.7	0.6	2.2	3.1	2.1	7.3	6.1
Government Transfers	5.1	3.2	3.7	9.9	7.0	3.3	3.3	3.2	3.6	7.8	8.3	3.9
Foreign Income	4.1	3.5	5.3	10.4	12.8	4.2	3.6	2.5	4.3	9.2	12.1	5.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Legend: Low-ed – zero education to third year high school; hi-ed – high school graduate and up; ag. – agriculture; prod. – production; bus. – business.

Household income changes for the various scenarios are summarized in Table 13. Rising factor remunerations under the two Doha scenarios translate into increases in income for all household groups. Rural households have slightly smaller income gains on average, although the sources – agriculture vs. non-agricultural income – of these gains are quite different. Urban and rural households headed by salaried workers, including civil servants, gain most given the high share of (non-agricultural) production wages in their income. The sole exceptions are households headed by low-educated rural salaried workers – the second poorest household category – who rely heavily on unskilled agricultural wages. Incomes of urban and rural households headed by the self/un-employed also have smaller nominal income gains, given the smaller share of production wages and high shares of agricultural and service capital remuneration in their income.

Poverty: In the FGT calculation, poverty effects come from two sources: (i) from the change in household income; and (ii) from the change in consumer prices, which affects the nominal value of the poverty line. The results of the calculations for the three poverty indices, headcount, gap, and severity, are presented in Table 14. Variations are presented with respect to initial values presented in Table 5. Recall, from table 5, that poverty in both rural and urban areas is highest for the low-educated households, which represent over 60% of the total population.

Table 13—Changes in Household Income and Sources (percent change from base)

	Doha-SDT				Doha-All				Free World Trade (indirect tax)			
Household Type	After tax	Total	Ag.	Non Ag.	After tax	Total	Ag.	Non Ag.	After tax	Total	Ag.	Non Ag.
URBAN	**0.37**	**0.37**	**0.02**	**0.35**	**0.38**	**0.38**	**0.02**	**0.36**	**-0.11**	**-0.11**	**-0.05**	**-0.07**
low-ed salaried	0.47	0.47	0.01	0.46	0.48	0.48	0.01	0.47	0.12	0.12	-0.03	0.13
hi-ed salaried	0.43	0.43	0.00	0.42	0.44	0.44	0.00	0.44	-0.07	-0.07	-0.01	-0.06
civil servants	0.44	0.44	0.01	0.42	0.45	0.45	0.01	0.44	-0.09	-0.09	-0.04	-0.06
low-ed self-employed	0.33	0.33	0.06	0.27	0.34	0.34	0.06	0.28	-0.19	-0.19	-0.13	-0.07
hi-ed self-employed	0.28	0.28	0.02	0.27	0.29	0.29	0.02	0.28	-0.17	-0.17	-0.04	-0.12
family business	0.35	0.35	0.04	0.32	0.36	0.36	0.04	0.33	-0.24	-0.24	-0.07	-0.16
RURAL	**0.36**	**0.37**	**0.18**	**0.18**	**0.36**	**0.36**	**0.18**	**0.19**	**-0.61**	**-0.60**	**-0.58**	**-0.02**
low-ed salaried	0.35	0.35	0.20	0.15	0.34	0.34	0.19	0.15	-0.93	-0.93	-0.96	0.04
hi-ed salaried	0.42	0.42	0.11	0.34	0.42	0.42	0.11	0.34	-0.50	-0.50	-0.45	-0.02
civil servants	0.45	0.45	0.07	0.37	0.46	0.46	0.07	0.37	-0.22	-0.22	-0.20	-0.02
low-ed self-employed	0.36	0.36	0.23	0.12	0.36	0.36	0.23	0.13	-0.61	-0.61	-0.59	-0.03
hi-ed self-employed	0.32	0.32	0.11	0.20	0.32	0.32	0.11	0.21	-0.39	-0.39	-0.31	-0.07
family business	0.38	0.38	0.21	0.16	0.38	0.38	0.21	0.16	-0.56	-0.56	-0.52	-0.02
Total	0.37	0.37	0.08	0.29	0.37	0.38	0.07	0.30	-0.28	-0.28	-0.23	-0.05

	Free World Trade (income tax)				Free World Trade, No Domestic Lib.				Domestic Lib, No Free Wolrd Trade			
Household Type	After tax	Total	Ag.	Non Ag.	After tax	Total	Ag.	Non Ag.	After tax	Total	Ag.	Non Ag.
URBAN	**-1.35**	**0.48**	**-0.02**	**0.50**	**1.64**	**1.64**	**0.12**	**1.52**	**-1.72**	**-1.73**	**-0.16**	**-1.57**
low-ed salaried	-0.94	0.84	0.00	0.85	1.92	1.92	0.04	1.87	-1.78	-1.78	-0.08	-1.72
hi-ed salaried	-1.29	0.61	-0.01	0.62	1.79	1.79	0.03	1.76	-1.83	-1.83	-0.03	-1.80
civil servants	-1.25	0.61	-0.04	0.62	1.86	1.86	0.06	1.79	-1.93	-1.93	-0.08	-1.84
low-ed self-employed	-1.44	0.33	-0.05	0.39	1.60	1.60	0.37	1.22	-1.75	-1.75	-0.48	-1.26
hi-ed self-employed	-1.50	0.30	-0.02	0.32	1.31	1.31	0.10	1.22	-1.45	-1.45	-0.14	-1.32
family business	-1.46	0.35	-0.02	0.37	1.66	1.66	0.20	1.47	-1.86	-1.86	-0.24	-1.61
RURAL	**-1.79**	**-0.04**	**-0.31**	**0.27**	**2.01**	**2.01**	**1.23**	**0.79**	**-2.55**	**-2.55**	**-1.75**	**-0.79**
low-ed salaried	-2.04	-0.33	-0.59	0.27	2.21	2.21	1.62	0.59	-3.04	-3.04	-2.50	-0.52
hi-ed salaried	-1.58	0.19	-0.27	0.46	2.09	2.09	0.79	1.33	-2.54	-2.54	-1.20	-1.29
civil servants	-1.32	0.49	-0.10	0.63	2.00	2.00	0.35	1.64	-2.18	-2.18	-0.52	-1.64
low-ed self-employed	-1.84	-0.11	-0.29	0.18	2.01	2.01	1.44	0.57	-2.55	-2.55	-1.96	-0.59
hi-ed self-employed	-1.67	0.09	-0.16	0.23	1.65	1.65	0.79	0.88	-2.00	-2.00	-1.05	-0.93
family business	-1.82	-0.02	-0.23	0.21	2.04	2.04	1.30	0.75	-2.54	-2.54	-1.77	-0.78
Total	-1.50	0.31	-0.12	0.43	1.77	1.77	0.49	1.28	-2.01	-2.00	-0.69	-1.31

Notes**:** Ag. = Agricultural income; Non-Ag = Income from non-agricultural sectors; Lib. = Liberalization; ind. tax = Indirect tax; inc. tax = Income tax; Low-ed – zero education to third year high school; Hi-ed – high school graduate and up.

Table 14—Poverty Indices (percent change from base)

	Doha		Full liberalization		Free world	Domestic
	SDT	All	Ind. tax	Inc. tax	trade	Liberalization
	1	2	3	4	5	6
			Headcount Index			
URBAN	**0.02**	**0.02**	**-0.46**	**0.26**	**0.10**	**-0.49**
low-ed salaried	0.00	0.00	-0.85	-0.33	0.00	-0.47
hi-ed salaried	-0.22	-0.22	-0.48	0.30	-0.43	-0.22
civil servants	0.00	0.00	0.00	0.00	0.00	0.00
low-ed self-employed	0.10	0.10	-0.27	0.50	0.15	-0.52
hi-ed self-employed	0.00	0.00	-0.43	0.76	0.76	-0.97
family business	0.00	0.00	0.00	0.80	0.00	0.00
RURAL	**0.05**	**0.05**	**0.20**	**0.65**	**-0.29**	**0.58**
low-ed salaried	0.00	0.00	0.30	0.83	-0.68	1.32
hi-ed salaried	0.00	0.00	1.02	1.55	-0.98	1.55
civil servants	0.00	0.00	-0.81	0.00	-1.36	0.00
low-ed self-employed	0.04	0.04	0.20	0.61	-0.17	0.40
hi-ed self-employed	0.32	0.32	0.00	0.73	0.32	0.00
family business	0.00	0.00	0.00	0.00	-0.19	0.00
Total	**0.04**	**0.04**	**-0.02**	**0.52**	**-0.16**	**0.21**
			Poverty Gap			
URBAN	**0.02**	**0.00**	**-0.55**	**0.26**	**0.07**	**-0.60**
low-ed salaried	-0.15	-0.16	-1.10	-0.62	-0.32	-0.74
hi-ed salaried	-0.16	-0.19	-0.67	0.62	-0.38	-0.27
civil servants	-0.16	-0.20	-0.56	0.52	-0.60	0.08
low-ed self-employed	0.10	0.09	-0.32	0.47	0.24	-0.57
hi-ed self-employed	0.23	0.23	-0.31	1.02	0.87	-1.16
family business	0.05	0.03	0.07	0.93	-0.08	0.15
RURAL	**0.09**	**0.09**	**0.47**	**1.17**	**-0.48**	**0.91**
low-ed salaried	0.12	0.13	1.01	1.56	-0.78	1.75
hi-ed salaried	-0.05	-0.05	0.29	0.86	-0.79	1.10
civil servants	-0.15	-0.15	-0.24	0.40	-0.71	0.50
low-ed self-employed	0.08	0.08	0.36	1.07	-0.40	0.72
hi-ed self-employed	0.15	0.14	0.05	1.03	0.12	-0.09
family business	0.05	0.04	0.45	1.45	-0.70	1.12
Total	**0.07**	**0.07**	**0.14**	**0.88**	**-0.30**	**0.42**
			Poverty Severity			
URBAN	**0.00**	**0.00**	**-0.66**	**0.28**	**0.08**	**-0.74**
low-ed salaried	-0.18	-0.20	-1.28	-0.71	-0.37	-0.87
hi-ed salaried	-0.15	-0.22	-0.74	0.67	-0.45	-0.30
civil servants	-0.22	-0.22	-0.65	0.54	-0.65	0.11
low-ed self-employed	0.13	0.12	-0.41	0.58	0.29	-0.71
hi-ed self-employed	0.24	0.19	-0.34	1.06	0.92	-1.26
family business	0.04	0.04	0.07	1.04	-0.11	0.18
RURAL	**0.11**	**0.11**	**0.58**	**1.47**	**-0.61**	**1.14**
low-ed salaried	0.15	0.16	1.27	1.96	-0.97	2.19
hi-ed salaried	-0.05	-0.05	0.35	0.99	-0.92	1.27
civil servants	-0.17	-0.17	-0.28	0.49	-0.84	0.59
low-ed self-employed	0.11	0.11	0.46	1.37	-0.51	0.94
hi-ed self-employed	0.20	0.20	0.08	1.36	0.16	-0.12
family business	0.06	0.04	0.50	1.64	-0.79	1.27
Total	**0.08**	**0.08**	**0.19**	**1.10**	**-0.39**	**0.55**

Overall, poverty slightly increases under the Doha scenarios, regardless of the indicator used (Table 14). This deterioration in poverty is due to the fact that consumption prices rise more on average than household nominal incomes, primarily due to the small deterioration in terms of trade[8]. In general, rural households are somewhat more affected than urban households, as their nominal incomes increase less (Table 13) and their consumer price indices (not shown) increase slightly more. There is a strong contrast between households headed by the self/un-employed and rural households, for whom poverty increases, and those headed by salaried workers (including civil servants but excluding rural low-educated workers), for whom poverty declines. This is due to strong increases in production worker wages. The sole exceptions are households headed by low-educated rural wage workers, for whom poverty increases as a result of their reliance on unskilled agricultural wages. Indeed, the greater increase in rural poverty can be primarily traced to the contrasting impacts on low-educated workers in rural and urban areas (Table 12).

In summary, these scenarios suggest that the Doha accords will increase poverty for all household categories, as consumer prices rise more than household incomes. Poverty increases more among rural households and the urban- self/un-employed. These results can be traced back to the finding from the GTAP world model that the Doha accords are likely to increase world prices and demand for Philippines industrial exports,

[8] No major differences in consumption patterns are noted among household groups as all groups devote roughly 10 percent of their consumption to agricultural goods, 50-60 percent to industrial goods and 30-40 percent to services. Thus, we do not explore the differential consumption price effects for each household group.

while reducing world prices and demand for Philippines agricultural exports. As a result, the inward-oriented agricultural and service sectors contract, while the export-oriented industrial sector expands. Whereas rural households suffer from the resulting fall in relative returns to agricultural factors, the urban self/un-employed suffer from declining returns to service-sector capital.

FULL LIBERALIZATION SIMULATIONS

These simulations involve the complete elimination of import tariffs in the Philippines and the rest of the world. According to the GTAP world model, this would lead to increased world import prices and export demand, along with reduced world export prices (Table 7).

Macro Effects: The macro impacts of the full liberalization scenarios are substantially larger than those of the Doha scenarios, regardless of the choice of replacement tax (Table 8). The elimination of domestic tariffs reduces domestic import prices by 2.41 to 3.23 percent despite increasing world import prices. At the same time, increased world demand for Philippine exports offset falling world export prices such that domestic export prices rise by nearly one percent. In response, local producers reorient their production from the domestic market toward the export market at the same time as local consumers substitute toward cheaper imports. As local demand falls faster than local supply, local producer and consumer prices fall. The drop in local prices results in a depreciation in the real exchange rate of (1.68 percent), which reinforces the rise in exports and imports. When we compare the two replacement taxes, we note that import

and consumer prices fall more when lost tariff revenue is replaced by the introduction of a uniform income tax, but that volume responses are roughly the same.

Sectoral Trade, Output and Consumption: In order to compare sectoral results with those of the Doha simulations, Table 10 breaks down the price and volume effects by major sector for all scenarios. Full liberalization leads to a smaller contraction in agricultural exports, but a much larger increase in industrial exports (Table 10), due to greatly increased world demand for the Philippines' industrial exports (Table 7). This is the main force driving the larger reallocation of domestic output, value added and labor from the agricultural and service sectors toward the industrial sector. Output and, more starkly, value added prices also fall more in the agricultural sector, as a result of declining export prices. At the same time, full liberalization leads to substantial reductions in import prices, particularly for industrial imports. This leads to an increase in industrial imports and a strong reduction in consumer prices for industrial goods. In a more disaggregate analysis, we trace industrial output expansion primarily to the textile-garments sector and several food processing sectors (fish processing, coconut processing and fruit/vegetable canning).

When we experiment with a compensatory income tax, import, domestic sales and consumer prices all fall more given the absence of a price-increasing indirect tax. However, as producers no longer need to absorb part of the indirect tax, output and value added prices fall less and, indeed, actually increase in the case of industrial and service value-added prices. Domestic production is consequently reoriented more markedly from the service sector in favor of the industrial sector.

Factor Remuneration: In the full liberalization scenario with a replacement indirect tax, all but unskilled wages drop, with the greatest reductions among agricultural factors (Table 11). This result can be traced primarily to the fall in domestic prices resulting from the removal of import tariffs. Agricultural factors lose most, as output is reoriented from the agricultural and service sectors toward the export-expanding industrial sector. Nominal factor remunerations fall less, and indeed increase in some cases, with the introduction a compensatory income tax, although the pro-industrial nature of the results remains intact. This can be explained by smaller domestic price reductions in the absence of a new indirect tax.

Household Income: Under full liberalization with a compensatory indirect tax, all households suffer from declining nominal income with the exception of urban households headed by low-educated salaried workers (Table 13). This is the reflection of the general fall in factor remunerations (Table 11). The drop in income is more than five times greater for rural households than for urban households. This is due to their reliance on income from agricultural wages and/or agricultural capital (Table 12), for which the rates of remuneration both decline dramatically. Among rural households, it is precisely the poorest and most populous household categories – those with low-educated heads – who suffer most. Nominal income losses are even stronger when a compensatory income tax is used, despite the fact that nominal factor remuneration rates decline less and, in several cases, increase. This is due to the fact that the income tax is paid solely by households, whereas the indirect tax is shared among all domestic consumers. Although the difference

between urban and rural households is smaller, the pattern of impacts among urban and rural households remains the same.

Poverty: The poverty effects with full (world and domestic) trade liberalization and a compensatory indirect tax (scenario 3) are interesting (Table 14). While the headcount index declines marginally by -0.02 percent, both the poverty gap and the severity indices increase (Table 8). The urban-rural contrast is dramatic with urban poverty declining and rural poverty increasing in roughly the same proportions as a result of the anti-agricultural impacts of full liberalization. Indeed, poverty declines for most urban household groups, which are less tied to declining agricultural incomes, while it increases for most rural household groups. When a compensatory income tax is introduced instead, poverty increases for both urban and rural households, although more so among rural households.

In conclusion, full liberalization generally increases poverty more than the Doha agreement. However, poverty actually falls among urban households. Once again, this is primarily due to the anti-agricultural nature of the world export price/demand and import price shocks resulting from full liberalization. The introduction of an income tax instead of an indirect tax to compensate lost tariff revenue results in greater poverty increases, as household bear the full weight of this tax.

WORLD AND DOMESTIC FREE TRADE SIMULATIONS

In simulations 5 and 6, we break down the effects of eliminating all tariffs in the rest of the world (free world trade) and in the Philippines (domestic liberalization) from simulation 3.

Macro Effects: We observe dramatically opposing price effects in these two scenarios (Table 8). While prices uniformly increase under free world trade, primarily as a result of increased export demand and prices, they fall under the domestic liberalization scenario as a result of falling import prices. However, both simulations result in increased trade, due to increased export demand under free world trade and increased import competition and real exchange rate devaluation under domestic liberalization. Whereas world free trade boosts trade through increased world export prices and demand, domestic liberalization does so through reduced domestic import prices. These contrasting price effects generally offset each other when free world trade and domestic liberalization are combined in simulation 3, whereas the export, import and consumption volume effects reinforce each other.

Sectoral Trade, Output and Consumption: Contrasting results are also found in the sectoral analysis (Table 10). Free world trade leads to a reallocation of production from services to industry with agricultural output practically unchanged, whereas domestic liberalization pushes production from agriculture and, to a lesser extent, industry toward services. These contrasting effects can be linked to the strong increase in industrial export prices under free world trade, and increased competition from cheaper

agricultural and industrial imports under domestic trade liberalization. Rising agricultural import prices lead to a greater increase in agricultural prices under free world trade. In contrast, greater reductions in agricultural import and export prices bring down agricultural prices more than industrial and service prices with domestic liberalization.

Factor Remuneration: The most dramatic contrast is observed in comparing the isolated nominal factor remuneration effects of free world trade and domestic liberalization (Table 11). Free world trade leads to strong increases in nominal factor remunerations, particularly for agricultural factors, as a result of increased import prices and export demand. In contrast, falling output and value added prices, particularly in the agricultural sector, under domestic liberalization lead to strong reductions in nominal factor remunerations that affect agricultural factors most.

Household Income: Free world trade has strong positive effects on the nominal income of all household categories, particularly in rural areas, as agricultural factors are the biggest gainers (Table 12). In contrast, domestic liberalization reduces nominal income for all household categories, especially rural households. Once again, these results can be traced to the fall in factor remunerations, particularly among agricultural factors.

Poverty: When we attempt to disentangle the impacts of free world trade (5) and full domestic liberalization (6), it becomes clear that free world trade is poverty-reducing, whereas domestic liberalization is poverty-increasing. This is due to the fact that the increases in nominal income (Table 13) outstrip the increase in the household CPI (Table 8) under free world trade, whereas nominal income falls more than the household CPI

with domestic liberalization. Free world trade and domestic liberalization also have contrasting urban-rural effects. Whereas free world trade reduces rural poverty and increases urban poverty, the contrary is true of the domestic liberalization scenario. These results can be traced to the anti-agricultural impacts of domestic liberalization and the pro-agricultural effects of free world trade.

10. CONCLUSION

The series of policy experiments conducted in this paper show mixed effects. Poverty increases slightly with the implementation of expected Doha agreements, especially among rural households and the agricultural self/un-employed. These household categories include the poorest and most populous households in the Philippines. These results can be traced to the Doha-generated reduction in world prices and demand for Philippines' agricultural exports and the resulting increase in industrial output and, consequently, production worker wage rates.

Full liberalization – involving free world trade and complete domestic liberalization – with a compensatory indirect tax (to offset lost tariff revenue) reduces the incidence of poverty marginally, but increases the poverty gap and poverty severity substantially. Poverty increases in rural areas and falls in urban areas, as full liberalization favors non-agricultural sectors over agricultural sectors. When an income tax is used instead of an indirect tax, poverty increases more and in both rural and urban areas, although the increase is larger in rural areas.

In order to understand our full liberalization results, we run separate simulations for free world trade and domestic liberalization. We discover that free world trade is poverty reducing and favors rural households, whereas domestic liberalization is poverty-increasing and favors urban households. Under free world trade, income gains outstrip consumer price increases, particularly for rural households, who derive most of their income from agricultural factors. Agricultural factor remuneration increases as consumers turn away from increasingly expensive agricultural imports and bid up the price of locally produced agricultural goods. In contrast, domestic liberalization leads to increased poverty as household income falls more than consumer prices. Here, the anti-rural bias stems from the fact that import prices fall more for agricultural goods than for industrial goods, as initial import-weighted average tariffs rates are higher for the former.

In conclusion, the current Doha agreement appears likely to slightly increase poverty, especially in rural areas and among the unemployed, self-employed and rural low-educated. The Philippines is found to have every interest in pushing for more ambitious world trade liberalization, as free world trade holds out strong promise for reducing poverty. In contrast, domestic liberalization is found to likely increase poverty, suggesting that accompanying policies should be considered such as tying domestic liberalization to progress in free world trade. Whereas free world trade favors rural households and actually increases urban poverty, the opposite is true of domestic liberalization. This suggests that some regional compensatory policies should be considered. Similar contrasting effects are noted according to the employment status of

the household head – salaried vs. unemployed or self-employed; skilled vs. unskilled – implying that targeted accompanying policies may be important.

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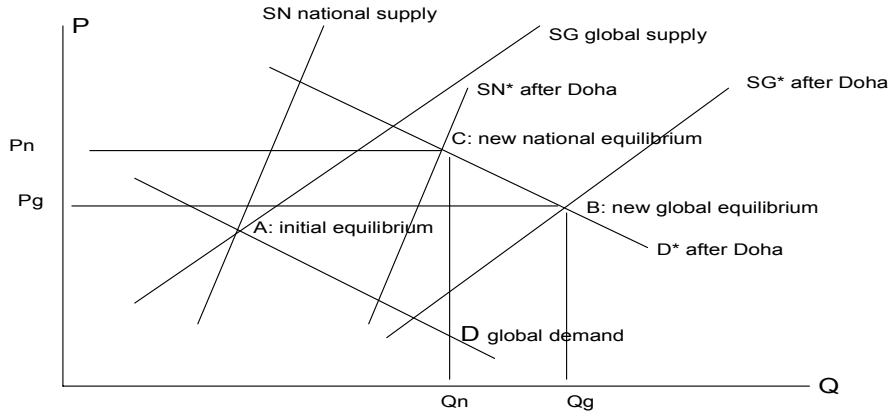
APPENDIX A

The link was conceptualized by Horridge and Zhai (2005). The figure below shows graphically the initial equilibrium (point A) in both the GTAP and the Philippine model for agriculture. With Doha agreements, global demand expands to D*. This is due to the improvement in market access and the elimination of export subsidies and domestic support. If agriculture is freed from such market distortions, some resources would move to agriculture from other sectors. This would correspondingly expand the global supply to SG*, giving rise to a new global equilibrium at point B, where the price is Pg and quantity is Qg. On the other hand, for the Philippine model, supply will shift to SN*, giving rise to a new equilibrium at point C, where the price is Pn and the quantity is Qn. Therefore, GTAP model would generate sets of equilibrium points which are different from the Philippine model.

Linking of GTAP and Philippine Model



Note: price and quantity changes from national models not same as from global model

To implement this link in the simulation exercises, we did the following:

1. Impose the new set of sectoral Armington elasticities of the GTAP model (Hertel, et al 2004) into the sectoral export demand elasticities in the Philippine model.
2. Impose one-half the values of the Armington elasticities of the GTAP into the CES and CET elasticities in the Philippine model.
3. Impose as shocks the GTAP results on sectoral changes in world prices of Philippine exports and imports, and demand for Philippine exports into the Philippine model.

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