Philippine-Japan Bilateral Agreements: Analysis of Possible Effects on Unemployment, Distribution and Poverty in the Philippines Using CGE-Microsimulation Approach

Caesar B. Cororaton

Abstract

The paper employs an integrated CGE-microsimulation approach to analyze the possible effects of the Philippine-Japan bilateral agreements on unemployment, income distribution and poverty. The results indicate contraction in agriculture but expansion in industry, particular in the nonfood manufacturing sector. Factor prices drop in agriculture while increase in industry. Unemployment in agriculture deteriorates while in industry improves. Thus income inequality worsens. However, poverty improves, but the improvement is much higher in the National Capital Region (NCR) than in other areas, especially rural. NCR has the least poverty incidence while rural has the highest. The generally favourable poverty effects are due to the overall increase in household income and the reduction in consumer prices.

Keywords: foreign trade, bilateral agreements, unemployment, distribution, poverty, microsimulation, computable general equilibrium, Philippines

JEL codes: O5, O2, N3, I3, F1

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Introduction

The ongoing negotiations on the possible bilateral agreements between the Philippines and Japan cover a number of issues. However, the scope of the paper limits only to analyzing the possible effects of reducing Philippine tariffs on imports from Japan of non-agricultural products and the potential impacts of increasing Philippine exports to Japan of non-agriculture products. In particular, the paper attempts to examine the possible effects of the agreements on unemployment, distribution and poverty in the Philippines using numerical simulation through the use of a computable general equilibrium (CGE) model calibrated to actual Philippine data.

The CGE model integrates the 1994 Family Income and Expenditure Survey (FIES), which consisted of 24,797 households in a microsimulation approach[2]. The income distribution effects are calculated using the Gini index, while the poverty impacts are measured using the Foster-Greer-Thorbecke (FGT) poverty indices, namely, poverty incidence or headcount index, poverty gap, and poverty severity.

Assumptions

Apart from the base run simulation, two more simulations are conducted. For purposes of the analysis, the simulations are (i) without FTA and (ii) with FTA.

Features of the simulation run without FTA include:

- Actual tariff reduction during the period 1994-2000 on imports of crops, livestock, fishing and marine products, other agriculture, and mining.

- Actual tariff reduction during the period 1994-1998 on imports of food manufacturing and non-food manufacturing.

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[2]See Cororaton (2003) and Cockburn (2001) for a description of integrated CGE-microsimulation.

On the other hand, features of the simulation run with FTA include:

- Actual tariff reduction during the period 1994-2000 on imports of crops, livestock, fishing and marine products, other agriculture, and mining.

- Zero tariff rates on imports of food manufacturing and non-food manufacturing from Japan. This is to capture the further opening of the economy to Japanese imports.

- Actual tariff reduction during the period 1994-1998 on imports of food manufacturing and non-food manufacturing from the rest of the world.

- Five percent increase in the Philippine export price to Japan on food manufacturing and non-food manufacturing. This is to capture the increased demand of Philippine exports to Japan for manufactured items.

Table 1 presents the tariff changes. The average import-weighted actual tariff change during the 1994-2000 period for non-manufacturing and the 1994-1998 period for manufacturing is –46.51 percent. This is the set of tariff changes used to simulate the without FTA scenario.

Table 1: Tariff Change

Sectors *	Period Covered	Tariff Change, %		
			With FTA **	
		Actual	Japan	ROW ***
Crops	1994-2000	-45.6	-45.6	-45.6
Livestock	1994-2000	-57.6	-57.6	-57.6
Fishing and Marine products	1994-2000	-76.4	-76.4	-76.4
Other Agriculture	1994-2000	-19.9	-19.9	-19.9
Mining	1994-2000	-88.9	-88.9	-88.9
Food Manufacturing	1994-1998	-16.3	-100.0	-16.3
Non-Food Manufacturing	1994-1998	-51.5	-100.0	-51.5
			-99.0	**-45.4**
Overall		**-46.51**	**-55.38**	

Source of data: Manasan and Querubin (1998)

* Note: Sectors not listed have zero tariffs

** Philippine-Japan FTA

*** ROW is rest of the world

The tariff changes used in the scenario with FTA contain two sets of changes: tariff rates on imports from Japan and on imports from the rest of the world (ROW). The actual tariff changes for the period 1994-2000 still hold for imports from Japan for crops, livestock, fishing and marine products, other agriculture and mining. However, tariffs on imports from Japan for both

food and non-food manufacturing are reduced by 100 percent to capture the zero tariffs. The average import-weighted tariff change on imports from Japan is –99.0 percent. This average tariff change comes significantly from the change in the tariff on imports of the non-food manufacturing sector, because there are practically no Philippine imports from Japan for the other sectors as shown in Table 2, except for the minimal import shares of 6.8 percent in fishing and marine products and 3.4 percent in mining and 1.1 percent in other agriculture. The Philippines sources 22.7 percent of its import requirements for non-food manufacturing from Japan.

The average change of the import-weighted tariff rates for ROW is –45.4 percent. The overall average change in tariff rates under the scenario with FTA is –55.4 percent, which is lower than the actual change. Thus, this scenario can be considered as an exercise of further reducing tariff rates.

Table 2: Philippines Exports and Imports with Japan and ROW, % shares

Sectors	Philippine Exports		Philippine Imports	
	Japan	ROW	Japan	ROW
Crops	56.4	43.7	0.0	100.0
Livestock	0.0	100.0	0.0	100.0
Fishing and Marine products	25.3	74.7	6.8	93.2
Other Agriculture	26.6	73.4	1.1	98.9
Mining	50.6	49.4	3.4	96.6
Food Manufacturing	5.9	94.1	0.5	99.5
Non-Food Manufacturing	14.1	85.9	22.7	77.3
Construction	25.9	74.1	18.1	81.9
Utilities	0.0	100.0	0.0	0.0
Wholesale and Retail	0.0	100.0	0.0	0.0
Other Services	0.0	100.0	0.0	100.0
Government Services	0.0	0.0	0.0	0.0

Source of basic data: DTI Tradeline Philippines statistics/Foreign Trade Statistics

Model Description

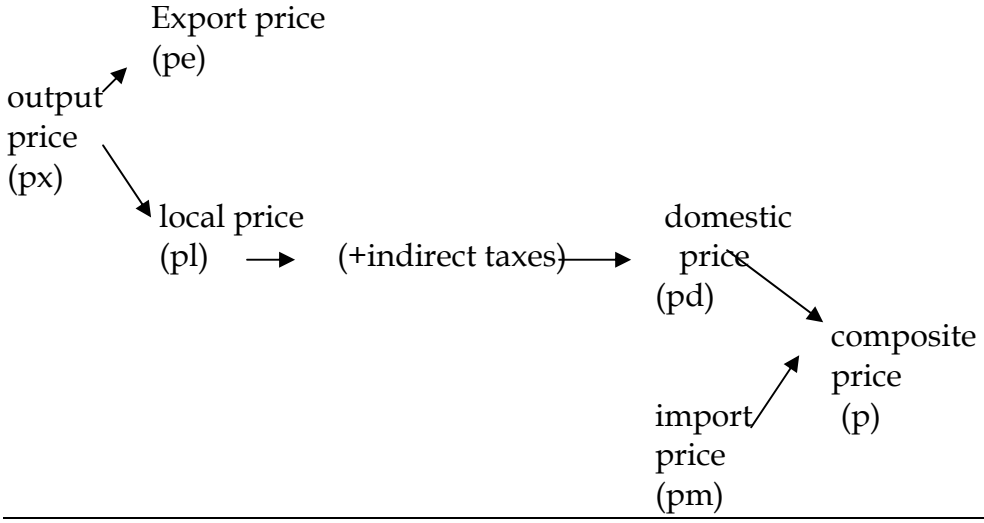
The complete set of equations is presented in Cororaton (2003). The model has 12 production sectors, 4 of which comprise agriculture, fishing and forestry. There 5 sectors in industry, including utilities and construction. The service sector is composed of 3 sectors, including government service sector. The model distinguishes two factor inputs, labor and capital, which determines sectoral value added using CES production function. The model incorporates 4 types of labor: skilled agriculture labor, unskilled agriculture labor, skilled production labor, and unskilled production labor. Agriculture labor is devoted to agriculture sector only. Although production labor is mobile across all sectors, majority of it is employed in non-agriculture sectors.

As defined earlier, skilled production workers include professionals, managerial, and other related workers with at least high school diploma.

Sectoral capital however is fixed. Value added, together with sectoral intermediate input, which is determined using fixed coefficients, determine total output per sector. In both product and factor market, prices adjust to clear all markets.

Figure 1 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, p. The composite price is the price paid by the consumers.

Figure 1: Basic Price Relationships in PCGEM



where pm = pwm*er*(1+tm)*(1+itx); pwm is world price of imports; er exchange rate; tm tariff rate; itx indirect tax

Import price, pm, is in domestic currency, which is affected by the world price of imports (pwm), exchange rate (er), tariff rate (tm), and indirect tax rate (itx). Therefore, the direct effect of tariff reduction is a reduction in pm. If the reduction in pm is significant enough, the composite price (p) will also decline. Note that in the market consumers face the composite price. Thus, the composite price is also the consumer price, but weighted using weights in the consumer basket.

Consumer demand is based on Cobb-Douglas utility functions. Armington-CES (constant elasticity substitution) function is assumed between local and imported goods, while a CET (constant elasticity of transformation) is imposed between exports and local sales.

Unemployment is incorporated into the model through the wage curve equations for each labor type. The equations are based on the original specification of Blanchflower and Oswald (BO, 1995), whose general idea is based on the relationship between unemployment rate and wages. BO discovered a strong international empirical regularity in the relationship between wages and unemployment across countries and overtime.

The relationship can be depicted on a graph with the level of unemployment rate on the horizontal axis and the level of wages on the vertical axis. Based on a set of international microeconometric evidence covering more than a dozen countries, the relationship between the level of unemployment rate and the level of wages depicts a downward sloping curve. The relationship therefore implies that if the level of unemployment rate increases in a particular location and time, the level of wages falls, all other things remain constant. This relationship is almost identical across different countries in the world and across different periods of time. Based on their empirical analysis, the estimated unemployment elasticity of pay is about –0.1. Because of this regularity, it has been claimed that the "uniformity runs counter to orthodox teaching (based on time-series analysis) which claims that countries have very different degrees of wage flexibility".

To capture this relationship in the CGE model the following equations are specified

$$\frac{w\_i}{pvaind\_j} = kt\_wage\_i \cdot unemp\_i^{elas\_wge}$$

where w_i is wage rate of labor type i; pvaindx_j is weighted index of value added price in major sector j; kt_wage_i is scale parameter; unemp_i is unemployment rate in labor type i, and elas_wge is wage curve elasticity, which is -0.1. There are four labor types: skilled agriculture labor, unskilled agriculture labor, skilled production labor and unskilled production labor. Furthermore, unemployment rate is determined by the following equation

$$unemp\_i = \frac{\left(ls\_i - \sum_s l\_i_s\right)}{ls\_i}$$

where ls_i is supply of labor of labor type i, and l_i_s labor demand in production sector s.

The model closure used has the following features:

i. Government account closure. Government consumption is held fixed, as well as government income. The tariff change is revenue-neutral in the sense that any change in tariff revenue as a result of the change in tariff rates is compensated automatically through a compensatory tax on household income. The compensatory tax is applied uniformly to those households who have been paying income taxes, while those households exempted from paying income taxes are not taxed with the compensatory tax.

ii. Current account closure. The current account balance is held fixed. This in effect avoids the possibility of foreign financing for the tariff reduction program. That is, foreign debt is not accumulated while the reform process is undertaken. Moreover, the nominal exchange rate is held fixed. Real exchange rate, which is defined as the ratio of the nominal exchange rate and local prices, is endogenous and is the clearing variable in the external sector.

iii. Total investment closure. Total savings is composed of government savings, foreign savings (both of which are held fixed) and private savings. The experiments conducted in the paper all assume a neoclassical closure wherein total savings is invested.

Table 3: Elasticities and Parameters

	Trade Elasticities		Exports,% *		Imports,% *		Lab-Cap
	Armington	CET	Share	Intensities	Share	Intensities	Ratio*, **
Crops	1.95	1.27	3.1	7.5	0.7	1.7	0.98
Livestock	1.40	0.40	0.0	0.1	0.6	2.6	0.99
Fishing	1.10	1.50	3.3	20.8	0.0	0.2	1.79
Other Agriculture	0.85	0.40			0.1	2.6	1.00
AGRICULTURE			**6.4**	**7.5**	**1.5**	**1.8**	**0.91**
Mining	1.10	1.50	2.4	43.1	6.5	66.3	1.15
Food Manufacturing	1.08	1.20	9.0	10.2	5.4	6.3	1.74
Non-food Manufacturing	0.92	1.37	48.0	34.7	76.1	45.3	1.23
Construction	1.20	1.20	0.3	0.8	0.9	2.6	1.28
Electricity, Gas and Water	1.20	1.20	0.2	1.2			2.97
INDUSTRY			**59.9**	**21.3**	**88.8**	**28.4**	**0.68**
Wholesale trade & retail	1.20	1.20	14.2	20.9			1.95
Other Services	1.20	1.20	19.4	14.6	9.7	7.8	1.64
Government services	-	-					
SERVICES			**33.7**	**14.3**	**9.7**	**7.8**	**0.58**
TOTAL			**100.0**	**16.6**	**100.0**	**17.4**	**0.68**

* Based on the 1994 SAM

** Lab-Cap is labor-capital ratio

Since the simulation runs involve changes in tariff rates, for purposes of the analysis it is important to highlight the structure of Philippine exports before discussing the simulation results. Table 3 presents the trade elasticities used in the model, which are based generally from another Philippine CGE model (Clarete and Warr, 1992).

The structure of both Philippine exports and imports based on the 1994 social accounting matrix (SAM) is dominated by the non-food manufacturing sector. In particular the sector captures 48 percent of total exports and 76.1 percent of total imports.

In terms of export intensity, defined as the ratio of export value and total value of production, it is also significant for the non-food manufacturing sector, with a ratio of 34.7 percent. The same thing is observed for the import intensity. The ratio for the sector is 45.3 percent.

Given the sizeable structure of the non-food manufacturing sector in the overall foreign trade flows of the economy, changes in tariff rates, real exchange rate, and world export prices would potentially have strong effects on the sector.

Simulation Results

Macro effects

The simulation results of the scenario with FTA will be compared with the results under the scenario without FTA. Table 4 presents the macro effects of both simulation runs.

Table 4: Macro Effects

	Actual Tariff Change, w/o FTA	With FTA
Change in overall nominal tariff rate, % (1994-2000 & 1994-1998)	-46.51	-55.38
Change in Prices, %:		
Import prices in local currency	-8.66	-10.17
Consumer prices	-2.36	-2.60
Local cost of production	-2.06	-2.19
Real exchange rate change, %	3.40	3.73
Change in import volume, %	4.88	6.14
Change in export volume, %	4.62	5.61
Change in domestic production for local sales, %	-0.46	-0.55
Change in consumption (composite) goods, %	0.56	0.72
Change in overall output, %	0.44	0.52

The relatively higher tariff reduction under the scenario with FTA can indeed be considered as an extension of the actual tariff reduction under the scenario without FTA as the macro effects would indicate. The level of change in the former is slightly higher than the latter. For example, the decline in the import prices in local currency is –10.2 percent for the former and –8.7 percent for the latter.

Based on these macro effects, tariff reduction leads to declining prices. Import prices in local currency, consumer prices, and the local cost of production have declined as a result of the reduction in tariff rates. The impact of lower import prices is higher import volume, while the effect of lower cost of local production is an effective real exchange rate depreciation, which in turn drives up export volume growth in both scenarios.

Higher growth in import volume crowds out domestic production for local sales marginally by –0.45 percent under the scenario without FTA and by –0.55 percent under with FTA. However, higher import volume growth increases the consumption goods available in the local market. The overall production level increases in both scenarios.

At this juncture, it is important to highlight the drop in consumer prices as a result of the reduction in tariff since this will be relevant in the poverty analysis later. This drop will lead to a reduction in the nominal value of the poverty threshold, which in turn will affect the FGT measures of poverty as discussed below.

Table 5: Effects on Prices and Volumes (without FTA)

	Price Changes (%)					Volume Changes (%)				
	δpm_i	δpd_i	δpq_i	δpx_i	δpl_i	δm_i	δe_i	δd_i	δq_i	δx_i
Crops	-5.9	-0.6	-0.7	-0.5	-0.6	10.0	-0.4	-1.2	-1.0	-1.1
Livestock	-3.2	-0.7	-0.8	-0.7	-0.7	2.5	-0.7	-1.0	-0.9	-1.0
Fishing	-18.8	-1.3	-1.3	-1.0	-1.3	22.9	0.8	-1.1	-1.0	-0.7
Other Agriculture	-1.2	0.6	0.6	0.6	0.6	1.8		0.3	0.3	0.3
AGRICULTURE	**-4.5**	**-0.7**	**-0.7**	**-0.6**	**-0.7**	**6.2**	**0.2**	**-1.0**	**-0.9**	**-0.9**
Mining	-26.0	-9.1	-21.9	-5.0	-9.1	10.7	1.8	-11.7	4.3	-5.7
Food Manufacturing	-9.5	-1.4	-2.1	-1.3	-1.4	8.4	0.5	-1.2	-0.4	-1.0
Non-food Manufacturing	-8.4	-4.9	-6.7	-3.1	-4.9	5.3	8.9	1.7	3.5	4.2
Construction	0.0	-1.2	-1.1	-1.2	-1.2	-0.2	2.7	1.2	1.2	1.2
Electricity, Gas and Water		-1.6	-1.6	-1.6	-1.6	-4.0	2.1	0.1	0.1	0.2
INDUSTRY	**-9.7**	**-2.9**	**-5.0**	**-2.3**	**-2.9**	**5.8**	**7.3**	**0.3**	**2.0**	**1.8**
Wholesale trade & retail		-0.6	-0.6	-0.5	-0.6		0.3	-0.4	-0.4	-0.3
Other Services		-2.1	-1.9	-1.8	-2.1	-4.0	1.0	-1.5	-1.7	-1.1
Government services				-0.2						0.2
SERVICES		**-1.6**	**-1.5**	**-1.3**	**-1.6**	**-4.0**	**0.7**	**-1.2**	**-0.9**	**-0.9**
TOTAL	**-8.7**	**-2.1**	**-3.3**	**-1.6**	**-2.1**	**4.9**	**4.6**	**-0.5**	**0.6**	**0.4**

where

mi : imports
ei : exports
di : domestic sales
qi : composite commodity
xi : total output
pmi : import (local) prices
pdi : domestic prices
pxi : output prices
pli : local prices
pqi : composite commodity prices

Sectoral Effects

Table 5 presents the sectoral effects of the scenario without FTA. The reduction in tariff results in reallocation effects favoring the manufacturing sector, in particular the non-food manufacturing sector. Overall agriculture contracts, while industry expands. One of the major driving forces behind this reallocation is the real exchange rate depreciation as a result of the lowering of the local cost of production discussed earlier. Since the non-food manufacturing sector has the highest share in exports and since its export intensity is also high, the real exchange rate depreciation drives up its exports volume by 8.9 percent. In fact, this is the only sector with a relatively significant growth in exports.

Table 6: Effects on Prices and Volumes (with FTA)

	Price Changes (%)					Volume Changes (%)				
	δpm_i	δpd_i	δpq_i	δpx_i	δpl_i	δm_i	δe_i	δd_i	δq_i	δx_i
Crops	-5.9	-0.4	-0.5	-0.4	-0.4	10.2	-0.8	-1.3	-1.1	-1.3
Livestock	-3.2	-0.6	-0.7	-0.6	-0.6	2.5	-1.0	-1.2	-1.1	-1.2
Fishing	-18.8	-1.3	-1.4	-1.0	-1.3	22.6	0.7	-1.3	-1.2	-0.9
Other Agriculture	-1.2	1.0	0.9	1.0	1.0	2.2		0.3	0.4	0.3
AGRICULTURE	**-4.5**	**-0.5**	**-0.6**	**-0.5**	**-0.5**	**6.3**	**0.0**	**-1.2**	**-1.0**	**-1.1**
Mining	-26.0	-8.8	-21.8	-4.9	-8.8	11.6	1.9	-11.3	5.1	-5.4
Food Manufacturing	-10.6	-1.4	-2.2	-1.2	-1.4	9.7	0.7	-1.4	-0.5	-1.2
Non-food Manufacturing	-10.3	-5.5	-7.9	-3.3	-5.5	6.8	11.0	1.8	4.3	5.1
Construction	0.0	-1.1	-1.1	-1.1	-1.1	0.1	2.9	1.5	1.4	1.5
Electricity, Gas and Water		-1.7	-1.7	-1.7	-1.7	-4.4	2.3	0.2	0.2	0.2
INDUSTRY	**-11.4**	**-3.2**	**-5.7**	**-2.3**	**-3.2**	**7.3**	**9.0**	**0.3**	**2.5**	**2.2**
Wholesale trade & retail		-0.5	-0.5	-0.4	-0.5		0.1	-0.5	-0.5	-0.4
Other Services		-2.2	-2.1	-1.9	-2.2	-4.4	0.9	-1.8	-2.0	-1.4
Government services				0.0						0.0
SERVICES		**-1.7**	**-1.6**	**-1.4**	**-1.7**	**-4.4**	**0.6**	**-1.4**	**-1.1**	**-1.0**
TOTAL	**-10.2**	**-2.2**	**-3.7**	**-1.6**	**-2.2**	**6.1**	**5.6**	**-0.5**	**0.7**	**0.5**

where
mi : imports
ei : exports
di : domestic sales
qi : composite commodity
xi : total output
pmi : import (local) prices
pdi : domestic prices
pxi : output prices
pli : local prices
pqi : composite commodity prices

Table 6 presents the results of the with FTA scenario. The sectoral results are largely similar, except that the percentage changes are relatively higher here than in the previous simulation run. The contraction in agriculture is higher as well as the expansion of industry, particularly the non-food manufacturing sector. The slightly higher real exchange rate depreciation as a result of the further cut in tariff rates plus the 5 percent increase in the Philippine export price of manufacturing in Japan leads to a relatively higher growth in exports volume of manufacturing, particularly the non-food manufacturing sector.

Factor Market Effects

Table 7 shows the effects on the factor market under the with FTA scenario. The factor that drives the effects in the factor market is the sectoral reallocation discussed earlier wherein agriculture contracts while industry expands, particularly the non-food manufacturing sector. It can be observed from Table 7 that the value added, the price of value added, the return to capital and the overall demand for labor in the non-food manufacturing sector all expand.

Table 7: Effects on the Factor Market (without FTA)

	Value Added Changes (%)		Change (%) in Return	Change (%) in Labor Demand				
	δva_i	δpva_i	to Capital	L*	L1**	L2**	L3**	L4**
Crops	-1.1	0.1	-1.0	-2.2	-0.8	-0.7	-2.1	-3.3
Livestock	-1.0	0.2	-0.9	-2.0	-0.6	-0.5	-1.9	-3.2
Fishing	-0.7	-0.1	-0.7	-1.9	-0.5	-0.4	-1.8	-3.0
Other Agriculture	0.3	1.4	1.7	0.5	1.9	2.1	0.6	-0.7
AGRICULTURE	**-0.9**	**0.2**	**-0.7**	**-0.5**	**-0.4**	**-1.8**	**-3.0**	**-0.7**
Mining	-5.7	-5.5	-10.9	-11.9			-11.8	-13.0
Food Manufacturing	-1.0	-0.6	-1.6	-2.7			-2.6	-3.8
Non-food Manufacturing	4.2	6.5	11.0	9.7			9.8	8.4
Construction	1.2	2.8	4.1	2.9			3.0	1.7
Electricity, Gas and Water	0.2	1.7	1.8	0.7			0.8	-0.5
INDUSTRY	**1.6**	**3.1**	**4.4**	**4.0**			**4.0**	**2.9**
Wholesale trade & retail	-0.3	0.6	0.3	-0.8			-0.7	-2.0
Other Services	-1.1	-0.7	-1.9	-3.0			-2.9	-4.1
Government services	0.2	1.2		0.2			0.3	
SERVICES	**-0.8**	**-0.2**	**-1.1**	**-1.5**			**-1.3**	**-4.0**
TOTAL	**-0.02**	**1.0**	**0.9**		**-0.6**	**-0.4**	**0.1**	**0.9**
Change in average wage, % -->				**1.2**	**-0.2**	**-0.4**	**1.1**	**2.4**
Change in umemployment rate, % -->					**3.9**	**6.2**	**-1.4**	**-13.4**

where
vai : value added
pvai : value added prices
li : labor
*L aggregate labor
**L1, L2, L3, & L4: Labor type 1, 2, 3, & 4

Furthermore, agricultural wages decline, while wages of production workers increase. Also, unemployment rate in agricultural labor deteriorates, while unemployment rate in production workers improves.

Table 8 presents the results of the without FTA scenario. Again the results are generally similar, except that the changes are relatively larger.

Table 8: Effects on the Factor Market (with FTA)

	Value Added Changes (%)		Change (%) in Return to Capital	Change (%) in Labor Demand				
	δva_i	δpva_i		L*	L1**	L2**	L3**	L4**
Crops	-1.3	0.4	-0.9	-2.6	-1.0	-0.8	-2.4	-4.0
Livestock	-1.2	0.5	-0.7	-2.4	-0.7	-0.6	-2.2	-3.8
Fishing	-0.9	0.1	-0.7	-2.4	-0.7	-0.6	-2.2	-3.8
Other Agriculture	0.3	2.0	2.3	0.7	2.3	2.5	0.8	-0.8
AGRICULTURE	**-1.1**	**0.5**	**-0.6**	**-0.6**	**-0.5**	**-2.1**	**-3.6**	**-0.6**
Mining	-5.4	-4.7	-9.8	-11.3			-11.2	-12.6
Food Manufacturing	-1.2	-0.4	-1.5	-3.2			-3.0	-4.6
Non-food Manufacturing	5.1	8.0	13.5	11.7			11.8	10.0
Construction	1.5	3.6	5.1	3.4			3.5	1.9
Electricity, Gas and Water	0.2	2.3	2.5	0.9			1.0	-0.6
INDUSTRY	**1.9**	**4.0**	**5.7**	**4.9**			**5.0**	**3.6**
Wholesale trade & retail	-0.4	0.9	0.5	-1.1			-1.0	-2.6
Other Services	-1.4	-0.6	-2.0	-3.6			-3.5	-5.0
Government services	0.0	1.7		0.0			0.1	
SERVICES	**-1.0**	**-0.1**	**-1.1**	**-1.8**			**-1.6**	**-4.9**
TOTAL	**-0.03**	**1.4**	**1.3**		**-0.6**	**-0.5**	**0.1**	**1.1**
Change in average wage, % -->				**1.7**	**0.0**	**-0.2**	**1.5**	**3.2**
Change in umemployment rate, % -->				**4.8**	**7.8**	**-1.4**	**-16.7**	

where
vai : value added
pvai : value added prices
li : labor
*L aggregate labor
**L1, L2, L3, & L4: Labor type 1, 2, 3, & 4

Household Income Effects

To have a clearer look at the impact of the above results on household income, at look at the sources of sources of income may be necessary. Table 9 shows that households in the National Capital Region (NCR) and in the other urban areas rely marginally on factors employed in agriculture. In fact, 99.5 percent of households in the NCR rely on income from factors employed in non-agriculture sectors. In contrast, rural households source a major part of their income on factors used in agriculture (39.2 percent).

Table 9: Sources of Household Income, % share

Household Location	Income from agricultural factors	Income from non-agricultural factors
NCR *	0.5	99.5
Urban, excluding NCR	6.6	93.4
Rural	39.2	60.8

Source: 1994 Family Income and Expenditure Survey
* NCR is National Capital Region

Table 10 summarizes the effects on factor incomes of households in both simulation runs. Because of the decline in agricultural wages and the drop in the returns to capital in agriculture in both scenarios, labor and capital income of all households drops. Conversely, because of the improvement in factor prices employed in non-agricultural sector, labor and capital income in the sector improves. However, in both scenarios, factor income improves.

There are, however, slight differences in the magnitude of change. The without FTA scenario has slightly higher drop in agriculture factor income than the with FTA scenario. Also, the overall factor income in the former is slightly lower than the latter.

Table 10: Overall Household Factor Income Effects, % change

All Households	Labor and capital income in agriculture	Labor and capital income in non-agriculture	Total
Without FTA	-0.50	1.40	1.05
With FTA	-0.30	1.80	1.41

Income Distribution Effects

The impact of the above results on income distribution is computed using the following Gini coefficient

$$\text{Gini coefficient} = \left(\frac{1}{2\times n^2}\right)\times\left[\sum_i w_i \times \sum_j w_j \left|\left(y_i - y_j\right)\right|\right]$$

where n is the overall population as estimated in the FIES, w the household weights and y is household income. The results are presented in Table 11.

Table 11: Gini Coefficient

	base	Without FTA	With FTA
Gini	0.46443	0.46507	0.46511
% difference from base		0.136%	0.145%
Difference, Without and with FTA			0.009%

The Gini coefficient in the base is 0.46443. The Gini increases to 0.46507 in the without FTA scenario, which indicates that income inequality worsens by 0.136 percent. The Gini coefficient in the scenario with FTA increases

slightly to 0.46511, or 0.145 percent from the base, which indicates further worsening of income inequality. These effects are largely driven by the contraction in agriculture and the expansion of industry and the adverse effects on factor prices in agriculture.

Poverty Effects

The paper assesses the effects of tariff reduction on poverty through the use of poverty measures based on the Foster-Greer-Thorbecke (FGT) poverty indices. In general, the FGT poverty index is given by[3]

$$P_\alpha = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{z - y_i}{z}\right]^\alpha$$

where n is population size, q number of people below poverty line, y_i is income, z is poverty line or poverty threshold. Poverty threshold is equal to the food threshold plus the non-food threshold, where threshold refers to the cost of basic food and non-food requirements. The parameter α can have three possible values, each one indicating a measure of poverty.

a. Head count index of povery (α = 0). This is the common index of poverty which measure the proportion of the population whose income (or consumption) is below the poverty line

b. Poverty gap (α = 1). This index measures the depth of poverty. That is, it depends on the distance of the poor below the poverty line.

c. Poverty Severity (α = 2). This index measures the severity of poverty.

Poverty as measured by the FGT indices are affected by changes in the household income and in the poverty threshold. Household income in turn is affected by changes in factor incomes of households because of factor price changes and unemployment rate changes. On the other hand, the level of poverty threshold would change with the change in consumer prices, given the fixed level of the minimum basic needs of households. Thus, to analyze the poverty impacts, one should recall the results on consumer prices and household income.

[3]See Ravallion (1992) for detailed discussion.

To recall, consumer prices drop by –2.36 percent under the without FTA scenario and –2.60 percent under the with FTA scenario. Overall factor income of households improves by 1.05 percent in the former and 1.41 percent in the latter. These results would clearly indicate favorable effects on poverty, since the income and consumer price effects are reinforcing. Furthermore, one would expect that since the drop in consumer prices is relatively higher in the latter than in the former, and since the improvement in factor income is higher in the latter also than in the former, the favorable impact on poverty should be higher in the latter than in the former. The results of the computations of the poverty indices are presented in the appendix. The presentation in Table12 however compares the poverty indices in both scenarios.

Table 12: Poverty Indices without FTA versus with FTA, percentage change

TABLE 1: All Philippines							
Index	**all**	**tot_fem**	**fem_l**	**fem_h**	**tot_mal**	**mal_l**	**mal_h**
pov_hdcnt	-0.9%	-1.0%	-1.1%	0.0%	-0.9%	-0.8%	-1.1%
pov_gap	-1.1%	-1.1%	-1.1%	-1.4%	-1.1%	-1.0%	-1.3%
pov_sev	-1.2%	-1.2%	-1.2%	-1.4%	-1.2%	-1.2%	-1.4%
TABLE 2: National Capital Region (NCR)							
pov_hdcnt	-3.8%	-2.1%	-2.9%	0.0%	-4.0%	-4.8%	-2.9%
pov_gap	-3.2%	-2.9%	-3.1%	-1.8%	-3.2%	-3.6%	-2.6%
pov_sev	-3.4%	-2.7%	-3.1%	-2.1%	-3.7%	-4.1%	-3.2%
TABLE 3: All Urban							
pov_hdcnt	-1.4%	-2.0%	-2.3%	0.0%	-1.6%	-1.3%	-1.3%
pov_gap	-1.2%	-1.3%	-1.2%	-2.0%	-1.1%	-1.2%	-1.4%
pov_sev	-1.4%	-1.6%	-1.5%	-1.8%	-1.3%	-1.3%	-1.5%
TABLE 4: All Rural							
pov_hdcnt	-0.5%	-0.4%	-0.5%	0.0%	-0.5%	-0.5%	-0.6%
pov_gap	-1.0%	-0.9%	-0.9%	-0.9%	-1.0%	-0.9%	-1.1%
pov_sev	-1.1%	-1.0%	-1.1%	-1.1%	-1.1%	-1.1%	-1.3%
TABLE 5: Population and difference in number of poor people: (-) less/(+) more							
population	67,430,864						
poor	(- 227,377)						

where: tot_fem is total female
fem_l is female with low education
fem_h is female with high education
tot_mal is total male
mal_l is male with low education
mal_h is male with high education
pov_hdcnt is headcount index
pov_gap is poverty gap
pov_sev is poverty severity

The comparison indicates that indeed the overall favorable poverty effects in the with FTA scenario is relatively higher than in the without FTA scenario. The headcount index, poverty gap, and poverty severity all indicate higher poverty reduction. These are indicated by the negative percentage changes between the two scenarios. In fact, as a result of the further decline in tariff in the with FTA scenario, about 227,377 people will move up the poverty threshold.

However, across various locations of households, the results vary quite considerably. Households in the NCR, where the incidence of poverty is the least, benefit the most. Conversely, households in the rural areas, where poverty incidence is very high, benefit the least. Again, the driving forces here are the contraction of agriculture and the expansion of industry.

Summary and Conclusion

The possible Philippine-Japan bilateral agreements can to a large extend can be considered as an extension of the tariff reduction program of the government. In fact, the computations in the paper show that the average reduction in the import-weighted tariff rates is –46.5 percent in the without FTA scenario and –55.4 percent in the with FTA scenario.

Tariff reduction results in lowering of prices, which in turn increases export competitiveness through the depreciation of the real exchange rate. Exports move up, especially in those sectors with high export intensities and substantial export share. In the case of the Philippines, it is the non-food manufacturing sector that is favorably affected. This triggers reallocation effects that contracts agriculture and expands industry. Factors employed in agriculture receive lower income, while those used in industry enjoy higher factor income. Since rural households rely heavily on factors used in agriculture, this effect worsens the income inequality problem.

However, in both scenarios, the overall household income improves because the increase in payments to factors employed in non-agriculture sector more than offset the decline in payments to factors used in agriculture. This, together with the relatively significant drop in consumer prices, has favorable effects on poverty in terms of incidence, gap and severity. However, the drop in poverty is largest in the NCR and smallest in rural areas.

Appendix

Table 1A: Poverty Indices at the base run

TABLE 1a: All Philippines							
Index	**all**	**tot_fem**	**fem_l**	**fem_h**	**tot_mal**	**mal_l**	**mal_h**
pov_hdcnt	40.6	26.6	35.9	9.1	42.6	54.2	20.4
pov_gap	13.5	8.4	11.6	2.2	14.2	18.7	5.8
pov_sev	6.1	3.7	5.2	0.9	6.4	8.6	2.3
TABLE 2a: National Capital Region (NCR)							
pov_hdcnt	10.4	5.8	10.7	2.8	11.4	18.9	7.7
pov_gap	2.0	1.2	2.4	0.4	2.2	3.8	1.4
pov_sev	0.6	0.4	0.8	0.1	0.7	1.1	0.4
TABLE 3a: All Urban							
pov_hdcnt	34.7	23.3	31.5	9.5	35.5	48.8	19.6
pov_gap	11.4	6.9	9.9	1.9	12.0	17.0	5.4
pov_sev	5.2	2.9	4.2	0.7	5.5	7.9	2.2
TABLE 4a: All Rural							
pov_hdcnt	53.1	40.1	44.9	18.9	54.6	60.6	31.6
pov_gap	18.2	13.4	15.1	5.8	18.7	21.1	9.7
pov_sev	8.3	6.1	6.9	2.4	8.5	9.7	4.1
TABLE 5a: Population and number of poor people at the base							
population	67,430,864						
poor	27,372,971						

where: tot_fem is total female
fem_l is female with low education
fem_h is female with high education
tot_mal is total male
mal_l is male with low education
mal_h is male with high education
pov_hdcnt is headcount index
pov_gap is poverty gap
pov_sev is poverty severity

Table 2A: Poverty Indices after the simulation (without FTA)

TABLE 1b: All Philippines							
Index	**all**	**tot_fem**	**fem_l**	**fem_h**	**tot_mal**	**mal_l**	**mal_h**
pov_hdcnt	38.9	25.3	34.3	8.2	40.8	52.2	19.2
pov_gap	12.8	7.9	11.0	2.0	13.5	17.7	5.4
pov_sev	5.7	3.5	4.9	0.8	6.1	8.1	2.2
TABLE 2b: National Capital Region (NCR)							
pov_hdcnt	9.2	5.1	9.7	2.2	10.2	16.9	6.8
pov_gap	1.7	1.0	2.1	0.3	1.9	3.2	1.2
pov_sev	0.5	0.3	0.7	0.1	0.5	0.9	0.3
TABLE 3b: All Urban							
pov_hdcnt	33.0	22.1	30.2	8.5	33.3	46.5	18.4
pov_gap	10.7	6.4	9.3	1.7	11.3	16.1	5.0
pov_sev	4.8	2.7	3.9	0.6	5.2	7.4	2.0
TABLE 4b: All Rural							
pov_hdcnt	51.4	38.5	43.1	17.9	52.8	58.7	30.4
pov_gap	17.3	12.7	14.3	5.5	17.8	20.1	9.2
pov_sev	7.8	5.8	6.5	2.3	8.1	9.2	3.8
TABLE 5b: Population and number of poor people after the simulation							
population	67,430,864						
poor	26,257,230						

where: tot_fem is total female
fem_l is female with low education
fem_h is female with high education
tot_mal is total male
mal_l is male with low education
mal_h is male with high education
pov_hdcnt is headcount index
pov_gap is poverty gap
pov_sev is poverty severity

Table 3A: Poverty Indices after the simulation (with FTA)

TABLE 1c: All Philippines							
Index	**all**	**tot_fem**	**fem_l**	**fem_h**	**tot_mal**	**mal_l**	**mal_h**
pov_hdcnt	38.6	25.1	34.0	8.2	40.5	51.7	19.0
pov_gap	12.7	7.8	10.9	2.0	13.3	17.6	5.3
pov_sev	5.7	3.4	4.8	0.8	6.0	8.0	2.1
TABLE 2c: National Capital Region (NCR)							
pov_hdcnt	8.9	5.0	9.4	2.2	9.8	16.1	6.6
pov_gap	1.7	1.0	2.0	0.3	1.8	3.1	1.2
pov_sev	0.5	0.3	0.7	0.1	0.5	0.9	0.3
TABLE 3c: All Urban							
pov_hdcnt	32.53	21.653	29.524	8.515	32.728	45.885	18.195
pov_gap	10.615	6.355	9.15	1.689	11.2	15.874	4.964
pov_sev	4.744	2.614	3.813	0.613	5.089	7.302	2.014
TABLE 4c: All Rural							
pov_hdcnt	51.1	38.3	42.9	17.9	52.6	58.5	30.2
pov_gap	17.2	12.6	14.2	5.4	17.7	19.9	9.1
pov_sev	7.7	5.7	6.5	2.2	8.0	9.1	3.8
TABLE 5c: Population and number of poor people after the simulation							
population	67,430,864						
poor							

where: tot_fem is total female
fem_l is female with low education
fem_h is female with high education
tot_mal is total male
mal_l is male with low education
mal_h is male with high education
pov_hdcnt is headcount index
pov_gap is poverty gap
pov_sev is poverty severity