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Gender dimensions and poverty implications of global trade liberalization in the Philippines

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Summary

This paper conducts a three-stage stage analysis to understand the gender dimensions and poverty implications of world trade liberalization in the Philippines. First, the standard GTAP model is used to simulate a multilateral trade liberalization scenario. Results from this GTAP simulation—i.e., vectors of changes in exports prices, exports volume and import volumes—are then used as shocks to a Philippine CGE model (PHILGEM) following the method of Horridge and Zhai (2006). The Philippine then identifies the effects: from gross domestic product and welfare to output and factor supplies and demands; from commodity and factor prices to employment by gender. Finally, vectors of changes in factor prices, employment levels and consumer prices from the Philippine model are used as inputs to a household survey-based micro-simulation module to identify impacts on the levels of poverty and income distribution.

Simulation results show that global trade liberalization helps reduce the gender-wage gap in the Philippines as females wages increase more than their male counterparts. The employment effects also show that women do a bit better than men as they are under-represented in contracting agriculture and processed food sectors but moderately represented in both expanding non-food manufacturing and services.

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1. Introduction

Two issues figure prominently in international trade negotiations—the liberalization of world trade and developing countries' welfare. For countries in the developing world, the impact that these issues will have on poverty is critical. Can world trade be liberalised without affecting the lives of millions who are living in poverty? This question is of increasing importance and has been the subject of policy debates since the launch of the World Trade Organization's (WTO) Doha Development Agenda (DDA) in 2001.

While assessments on the relationship between global trade liberalization and poverty levels have flourished during the last decade (Hertel and Winters 2006; Harrison 2007; Anderson *et al.* 2010), analyses on the differential impact of trade liberalization on men and women remain limited. This is surprising given that a number of governments have committed to incorporate gender-responsive policies during United Nations' World Conference on Women in Beijing in 1995; gender equality is listed as the third Millennium Development Goal (MDG); and there is growing recognition that liberalization of world trade affects men and women differently (Staveren et al 2007). Nonetheless, the recent world development report (World Bank 2012) highlighted the importance of accounting for the differing effects of economic policies on men and women.

Since trade liberalization is expected to result in a reallocation of resources toward export-intensive and globally competitive sectors, it is likely that men and women will be affected differently due to their varying labor market participation and sector of employment. The evidence so far suggests that trade may favour women in industrial and advanced developing economies owing to their exposure to high level service sectors and in export-oriented sectors (such as garments and light manufacturing). In contrast, trade is found to create a bias against women in agriculture-oriented economies as they are more likely to focus on import-competing food crops (Arndt et al. 2000; Fontana and Wood 2000; Fontana 2007; Cockburn *et al.* 2007; Cockburn *et al.* 2010). In summary, these previous studies highlight the importance of identifying transmission channels to assess how international trade may affect gender differences—for instance employment and gender wage gap.

Two methodologies have so far been used to analyze the gendered impacts of trade liberalization. The first is based on detailed household survey data that captures individual heterogeneity, while the other is undertaken within the context of a macro-economic model, mostly using computable general equilibrium (CGE) models which are based on consistent national accounts data but with the strong micro-economic assumption of one or a few

representative households. Recently however, the difference between the two approaches has diminished, as evaluating the gender differences of macro-economic shocks or trade liberalization within a CGE framework complemented by household survey data has flourished. Fontana and Rodgers (2005) suggest a gender-responsive checklist that each gender-aware CGE model should ideally have, namely: (1) production activities should differentiate male and female intensive sectors, as well as formal and informal sectors; (2) labor market should be segmented by male and female; (3) modelling the household economy through time use and intra-household allocation.

As gender dimensions and poverty implications of global trade liberalization are expected to be different across countries, within countries and across groups of households, it is necessary that an analysis that links global, national and household level perspective be made. This study therefore conducts a three-stage stage analysis to understand the gender dimensions and poverty implications of world trade liberalization in the Philippines. First, the standard GTAP model is used to simulate a multilateral trade liberalization scenario. Results from this GTAP simulation—i.e., vectors of changes in exports prices, exports volume and import volumes—are then used as shocks to a Philippine CGE model (PHILGEM) following the method of Horridge and Zhai (2006). The PHILGEM model (Corong and Horridge 2012) then identifies the effects: from gross domestic product and welfare to output and factor supplies and demands; from commodity and factor prices to employment by gender. Finally, vectors of changes in factor prices, employment levels and consumer prices from the PHILGEM model are used as inputs to a household survey-based micro-simulation module to identify impacts on the levels of poverty and income distribution.

2. Analytical framework

Hertel and Ivanic (2006) identify two issues that may arise when linking a global model and a national CGE model. The first is double-counting because global trade policy reforms must not be implemented twice—i.e., once in the global model and another in the national model. To prevent this, they suggest that a global trade liberalization policy that excludes the focus country, say Philippines, be first implement in the GTAP model. The resulting changes in world prices and quantities of the region “Philippines” in the GTAP model are then passed on to the Philippine model, which when combined with a tariff elimination scenario in the Philippine model allows the Philippines to implement its part of the global trade policy reform.

The second issue relates to linking both models via the trade channel. The import side of the link is relatively straightforward since it only entails passing the import price results for each commodity in the GTAP model to the same commodity[2] in the Philippine model as exogenous shocks. This is possible because: (a) the Philippine model takes import prices as given (small country or Armington assumption); and (b) the import supply facing regions (including Philippines) in GTAP model is very elastic.

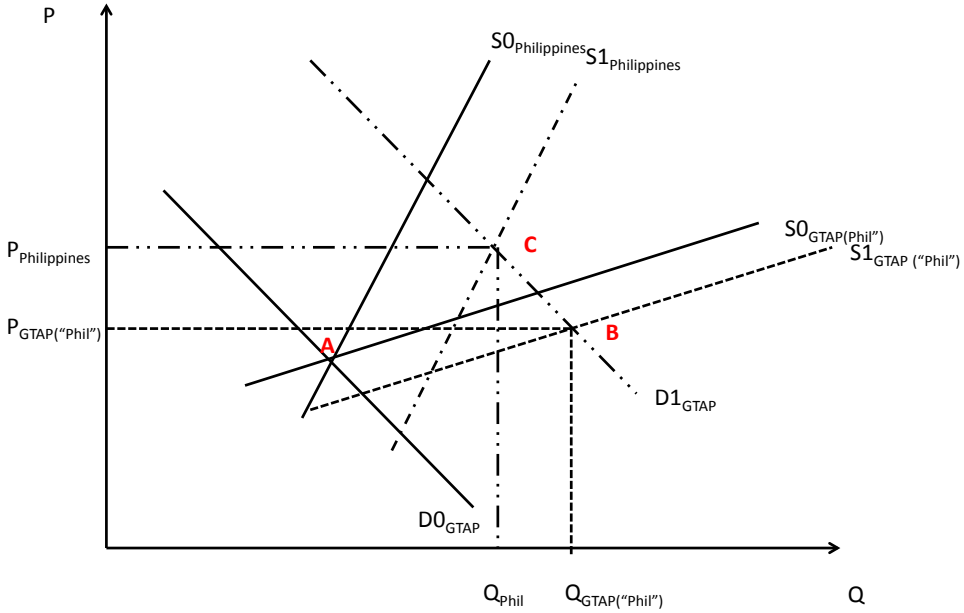
In contrast, the exports side of the story is more difficult to handle because the global GTAP model treats products as differentiated by origin (Armington assumption in the global model). With this, export prices for the Philippines are not exogenous even for commodities for which its market share is very small. More importantly, individual commodity export supply schedules of the region "Philippines" in GTAP model and the national Philippine model may be different. Often, national models of developing countries like the Philippines have less elastic export supply schedules due to domestic constraints on export capacities—which are not reflected in the global GTAP model.

Figure 1 illustrates the transmission of export-side results between GTAP and Philippine model for a particular tradeable commodity. We assume that the export demand schedule for the region "Philippines" in the GTAP model and national model of the Philippines have the same slope. Operationally, this is achieved by imposing the values of elasticity parameter ESUBM from the GTAP model into the export demand function of each commodity in the Philippine model We assume that initially, both the global economy (GTAP) and the Philippine economy (national model) are in equilibrium at point A. We now impose a demand shock that increases demand for tradeable commodity ***c*** as a result of global trade policy simulated in GTAP. With this, the demand curve for this commodity ***c*** will shift rightward to $D1_{GTAP}$. Similarly, assuming normal good, this shock will increase the demand for commodity ***c*** produced in the Philippine model.

In the Philippine model, assuming limited production of resources, the increase in the demand for tradeable commodity ***c*** will release factors used in the production of other goods into the production of ***c***. This will shift the supply curve of commodity ***c*** in the Philippine model from $S0_{Philippines}$ to $S1_{Philippines}$. Likewise in the GTAP model, the supply curve of commodity ***c*** in the region "Philippines" will increase from $S0_{GTAP("Phil")}$ to $S1_{GTAP("Phil")}$.

[2] Prior mapping between commodities in the GTAP model and national model is necessary.

Figure 1: Differences in the effects in the global and country models



We can see from Figure 1 that the new equilibrium points for both models are different, with the Philippine model attaining equilibrium at point C ($Q_{Philippines}$, $P_{Philippines}$), while the GTAP model attaining equilibrium at point B ($Q_{GTAP("Phil")}$, $P_{GTAP("Phil")}$). Hertel and Ivanic (2006) argue that point C is preferred because the Philippine model provides more country-specific details, thereby reflecting the supply shift arising from domestic constraints that are not captured in the global model.

Given that both models have the same export demand slope, the global GTAP model would then need to transmit, to the Philippine model, the extent of the export demand shift (**D0** to **D1**). How can this be implemented? Horridge and Zhai (2006) show that in the global (GTAP) model the export demand curve can be written as:

(1) $$Q = \left(\frac{FP}{P}\right)^{ESUBM}$$

where *FP* is defined below, *P* is the price, and *ESUBM* is the slope of the export demand curve, which is equal to the GTAP elasticity of substitution among imports. In proportional form (log-change, per cent) Equation (1) becomes

(2) $$q = -ESUBM \cdot (p - fp) \text{ or } p = fp - \frac{q}{ESUBM}$$

where the lower case variables represent the percentage changes of the upper case variables shown in Equation (1). The proportional change in the export demand shifter fp is:

(3) $$fp = p + \frac{q}{ESUBM}$$

With the value of *ESUBM* for each commodity the same in the global GTAP and Philippine model, we can compute for the export demand shift (fp) in Equation (4) by using the percentage changes in q and p are from the global model.

(4) $fp = 100 \cdot (a - 1)$, where $a = (1 + 0.01 \cdot p) \cdot (1 + 0.01 \cdot q)^{\frac{1}{ESUBM}}$

The Philippine model then uses this export demand shift as shock to solve for the necessary shift in export supply for each commodity (i.e., a supply shift to hit point **C**).

3. Simulation results

We simulate a multi-lateral elimination of all commodity tariffs. While this scenario is not likely to be implemented in the next few years simulation results arising from this experiment can be viewed as an upper bound of the likely impacts of global trade liberalization on the Philippine economy.

We conduct a three-stage stage analysis to understand the gender dimensions and poverty implications of world trade liberalization in the Philippines. First, the standard GTAP model is used to simulate a multilateral trade liberalization scenario. Results from this GTAP simulation—i.e., vectors of changes in exports prices, exports volume and import volumes—are then used as shocks to a Philippine CGE model (PHILGEM) following the method of Horridge and Zhai (2006). The Philippine CGE model then identifies the effects: from gross domestic product and welfare to output and factor supplies and demands; from commodity and factor prices to employment by gender. Finally, vectors of changes in factor prices, employment levels and consumer prices from the Philippine CGE model are used as inputs to a household survey-based micro-simulation module to identify impacts on the levels of poverty and income distribution.

3.1 Macro-economic effects

The macro-economic effects of global trade liberalization on the Philippine economy are shown in Table 1. Global trade liberalization leads to a decline in the local currency price of imports by 2.27 per cent. Imports go up by 5.6 per cent, while domestic demand falls due to substitution of cheaper imported products for the now relatively more expensive domestically-

produced commodities (0.59 per cent). The GDP price deflator—which measures the aggregate price of newly produced final goods and services in the economy—falls by 0.82 per cent mainly due to the declining price of investment goods (-2.09 per cent). This fall in the GDP price deflator causes the real exchange rate to depreciate by 2.07 per cent followed by a corresponding deterioration in terms of trade (-1.13 per cent) as Philippine exports become cheaper in the world market Total gross production increases by 1.16 per cent as it is lifted by higher exports sales which increase by 3.75 per cent.

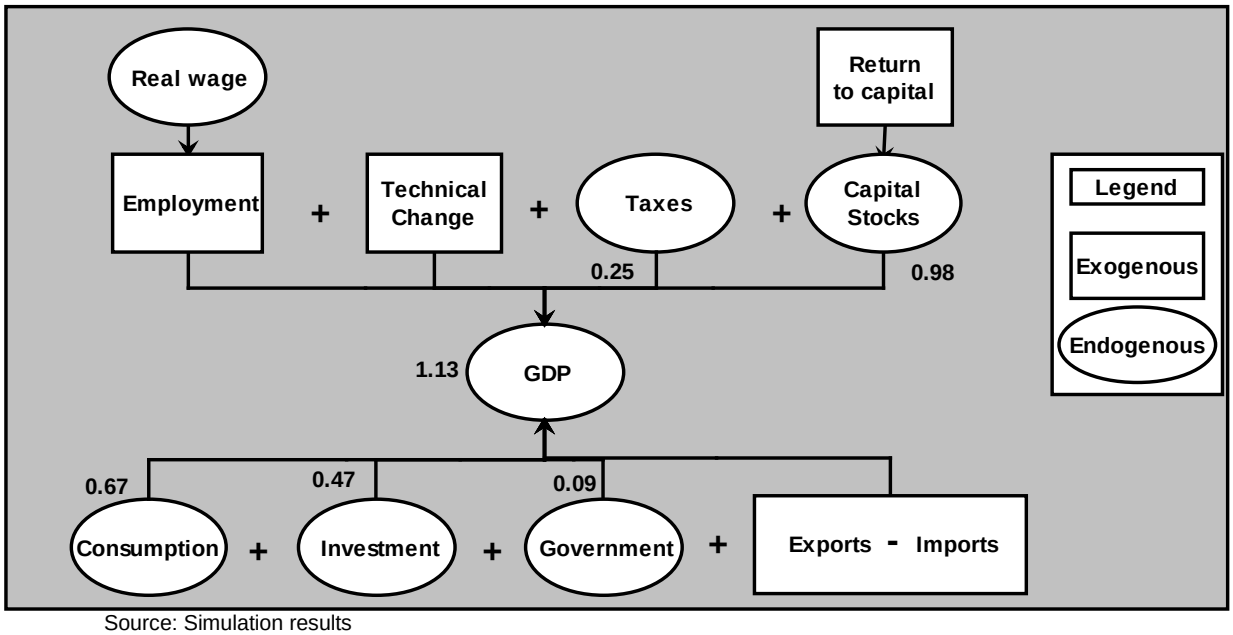
Table 1: Macro-economic Effects (% change from base)

Prices	
Consumer price index (CPI: numéraire)	-
Investment price index	-1.84
Government price index	2.86
Export price index	0.37
Imports (in c.i.f.)	1.52
GDP price deflator	-0.54
Imports (in local currency)	-2.27
Real exchange rate	2.07
Terms of trade	-1.13
Domestically-produced commodities	0.59
Intermediate input costs	-0.22
Primary factor costs	0.97
Nominal wage	3.37
Return to Capital	-1.84
Return to Land	2.59
Volume	
Household consumption	3.11
Investment demand	2.83
Government consumption	0.00
Exports supply	3.75
Import demand	7.01
GDP	1.54
Domestic demand	0.49
Gross production	1.16
Aggregate capital stock	2.91
Aggregate employment	-

Source: Simulation results

Global trade liberalization expands Philippine real GDP by 1.23 per cent. To trace the factors contributing to this change, we decompose in Figure 2 the changes in each aggregate that makes up GDP from both income- and expenditure-side. From the income-side, the GDP expansion is anchored on changes in capital stock and indirect taxes which respectively contribute 0.21 and 0.15 percentage points of total GDP growth of 0.36 per cent. On the expenditure side, the changes in GDP originate from a marginally higher household consumption (0.65 per cent), investment demand (0.47 per cent) and a slight increase in government consumption (0.09 per cent).

Figure 2: Contribution to changes in real GDP (in per cent)



Source: Simulation results

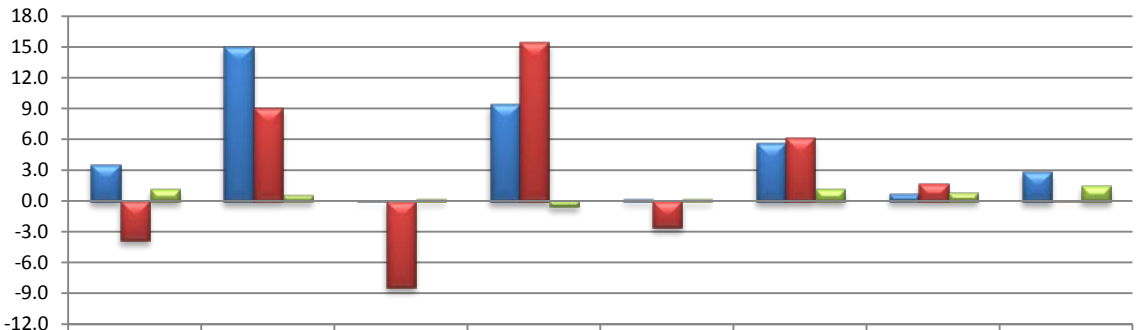
3.2 Sectoral effects

Figure 3 presents the aggregate effects on output, exports and imports classified into 4 broad sectors, namely: agriculture, food processing, non-food manufacturing and services. In general, Philippine exports expand as global trade liberalization results in greater international market access for Philippine-made commodities. At the same time, local demand for imports increase as global trade liberalization induces substitution of cheaper imported products for relatively more expensive domestic goods. An exception to this is services for reasons explained below.

Because of higher initial agricultural tariff rates, import prices fall more in both agriculture and food manufacturing (Figure 4.2: -3.85 and -8.39 per cent) relative to non-food manufacturing (-2.56 per cent). With this, imports of both processed food and agricultural products increase more than non-food manufactures. On the other hand, imports of services only increase marginally as domestically-produced services become relatively cheaper.

The average exports price of agricultural products increases the most, at 3.64 per cent followed by services, non-food manufactures and processed food which increases by 0.75, 0.22, and 0.05 per cent, respectively. Given these price changes, exports supply of agricultural products increase more at 15 per cent, while exports of processed food, non-food manufactures, and services expand by 9.4, 5.6 and 2.9 per cent, respectively. Note however that agriculture and processed food only account for 2.5 and 10 per cent of total exports in the base.

Figure 3: Effects on output, exports and imports (percentage change from base)



	Price	Volume	Price	Volume	Price	Volume	Price	Volume
	Agriculture		Processed food		Non-Food manufactures		Services	
exports	3.64	15.11	0.05	9.40	0.22	5.66	0.75	2.90
imports	-3.85	9.03	-8.39	15.52	-2.56	6.23	1.76	0.04
output	1.19	0.55	0.22	-0.56	0.21	1.21	0.90	1.53

Source: Simulation results

As shown in Figure 3, the output of food manufacturing contracts by 0.56 per cent, whereas the output of agriculture, manufacturing and services output expand by 1.19 and 1.21 and 1.53 per cent, respectively. To understand these results, we turn to Table 4.2 which decomposes the output changes into three demand-side effects, namely: (1) local market effect; (2) substitution effect; and (3) exports market effect. The local market or composite demand effect identifies the change in total domestic usage of a commodity regardless of the source (domestic and imported). The substitution effect identifies the change in domestic demand due to substitution between imported and domestic sources, while the exports market effect makes plain the changes in demand for exports.

Table 2 shows that gross economy-wide production increases by 1.07 per cent. This is because the contracting effect of cheaper imports being substituted for domestic goods (-1.03 per cent) is outweighed by both output-increasing effects of expanding local market (0.88 per cent) and increasing exports (1.21 per cent). The results for both agriculture and non-food manufacturing sector follow this pattern. Higher foreign demand for exports pulls up the supply curve of local producers, and so increases the price of domestically-produced goods relative to their imported counterparts. This facilitates additional import penetration with cheaper imports crowding-out the relatively more expensive domestic goods. Nonetheless, agriculture and non-food manufacturing output expands as higher imports are overwhelmed by both increasing exports and expanding local market.

Despite higher exports and expanding local market (1.14 and 0.46 per cent, respectively), total output of food processing contracts by 0.56 per cent due to heightened import competition

(-2.16 per cent) Total services output increases by 1.53 per cent as cheaper domestically-produced services: expand the local services market (1.2 per cent); increase exports volume (0.19 per cent); and induce substitution in favour of relatively cheaper domestically-produced services (0.14 per cent).

Table 2: Decomposition of output changes (percentage change from base)

	Per cent change in total output due to:			
Sector	Local market (1)	Substitution (2)	Exports (3)	Output (4)
Agriculture	0.00	-0.31	0.86	0.55
Processed food	0.46	-2.16	1.14	-0.56
Non-food manufactures	0.88	-2.17	2.50	1.21
Services	1.20	0.14	0.19	1.53
Gross production	0.88	-1.03	1.21	1.07

Source: Simulation results (Fan Decomposition)

3.3 Factor market effects

As can be seen in Table 3, the variations in the price of value added reflect the general increase in nominal wages (3.37 per cent) which outweigh the effects of falling nominal returns to capital (1.84 per cent). Because wages in services increase more, labor moves towards services and away from the contracting food processing sector. In general, the factor market results in Table 3 reveal that expanding industries increase their demand for value added through higher capacity to hire mobile capital. In contrast, the contracting food processing industry release labor and only slightly increases its capital usage.

Table 3: Factor market effects (percentage change from base)

	Value Added		Capital		Labor	
Sector	volume	Price	volume	Price	Wage	demand
Agriculture	0.53	1.50	2.42	-1.84	2.82	-0.22
Food processing	-0.48	0.47	0.57	-1.84	3.20	-1.68
Non-food manufacturing	1.05	0.53	2.28	-1.84	3.22	-0.30
Services	1.49	1.18	2.82	-1.84	3.58	0.47
ALL sectors	1.04	0.97	2.34	-1.84	3.37	-

We now look at how changes in employment as shown in Table 4. The employment effects show that women are under-represented in contracting agriculture and processed food sectors but moderately represented in both expanding non-food manufacturing and services, thereby causing them to do a bit better than men. On the whole, global trade liberalization helps reduce the gender-wage gap as females wages increase more than their male counterparts.

Table 4: Employment effects by gender (percentage change from base)

	Initial Shares		change in employment		change in wages	
	Female	Male	Female	Male	Female	Male
Agriculture	18.24	81.76	-0.37	-0.19	2.69	2.85
Food processing	25.02	74.98	-2.10	-1.54	3.63	3.06
Non-food manufacturing	37.06	62.94	0.11	-0.54	3.65	2.97
Services	42.28	57.72	0.21	0.66	3.86	3.38
ALL sectors	36.47	63.53	-	-	3.72	3.16

Source: Simulation results (Fan Decomposition)

3.4 Poverty effects

We now analyze the impacts of global trade liberalization on poverty and inequality in the Philippines. Table 5 shows the changes in income distribution (Gini coefficient) and poverty indices (headcount, gap, severity) for the entire country and for households classified by location and by the gender of the household head.

Table 5: Poverty and inequality effects (percentage change from base)

	Base Index	Base Index	Simulation Index	% Change Relative to 2009 Index
All - Philippines	Gini	0.5	0.5	-0.2
	P0	26.3	26.2	-0.5
	P1	7.2	7.2	-0.5
	P2	2.8	2.8	-0.3
All - Urban	P0	12.1	11.9	-1.5
	P1	2.7	2.7	-1.4
	P2	0.9	0.9	-1.4
All Rural	P0	40.3	40.2	-0.2
	P1	11.6	11.6	-0.3
	P2	4.6	4.6	-0.1
Male-headed	P0	28.7	28.6	-0.6
	P1	8.0	7.9	-0.5
	P2	3.1	3.1	-0.2
Female-headed	P0	15.4	15.4	-0.1
	P1	3.9	3.9	-0.7
	P2	1.4	1.4	-0.8

The national poverty headcount, gap and severity of poverty marginally decreases (respectively, -0.5, -0.5 and -0.3 per cent). Both the gap and severity of poverty decrease suggesting that the poorer households have become relatively better off. Overall inequality, measured by the Gini coefficient likewise decreases, albeit marginally, due to the higher increase in real income among the poorer households relative to their richer counterparts. Table 5 also shows that poverty indices fall more in urban areas compared to the urban areas where poverty is already low. Poverty headcount also fall more among households headed by male

relative to their female-headed counterparts. Nevertheless, poorer female-headed households benefit more than male.

4. Summary

This paper examined the gender dimensions and poverty implications of world trade liberalization in the Philippines in three stages. First, the standard GTAP model is used to simulate a multilateral trade liberalization scenario. Results from this GTAP simulation—i.e., vectors of changes in exports prices, exports volume and import volumes—are then used as shocks to a Philippine CGE model (PHILGEM) following the method of Horridge and Zhai (2006). The Philippine CGE model then identifies the effects: from gross domestic product and welfare to output and factor supplies and demands; from commodity and factor prices to employment by gender. Finally, vectors of changes in factor prices, employment levels and consumer prices from the Philippine CGE model are used as inputs to a household survey-based micro-simulation module to identify impacts on the levels of poverty and income distribution.

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