MEKONG ECONOMIC RESEARCH NETWORK

Welfare and Inequality Impacts of Tariff Reduction in Cambodia: Policy Implication to Protect Rural Poor Households

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Acknowledgement

Abstract

Since switching to the market economy in 1993, Cambodia has embraced a series of tariff reduction to fulfill its commitment for freer trade openness in line with the AFTA and WTO agreements and other regional trade negotiations. This study analyzes the welfare and inequality impacts on Cambodia's households (Phnom Penh, Urban, and Rural) from tariff reduction, using Computable General Equilibrium (CGE) calibrated to the Cambodia's Social Accounting Matrix (SAM) built for year 2008. Results show that welfare gains are beneficial mainly to households in Phnom Penh, followed by modest gains to urban households. Rural households are considered as a loser in terms of welfare gains. Overall, welfare gains are small, but positive for the country as a whole. Even with the most benefits accrued to households in Phnom Penh and Urban, their inequality situations are growing. VAT tax is recommended in terms of compensation for the loss of government revenues from the resulting tariff cut, as it is less distortion and less of a burden for revenue compensation. Tariff elimination should not be quickly implemented; and redistribution policy in terms of government transfer and income tax exemption should be given a priority to target those living in rural area.

Keywords: Tariff Reduction, Welfare, Inequality, Tariff Revenue, Computable General Equilibrium (CGE)

1.   Introduction

Cambodia started its trade reforms toward a market-oriented economy in the late 1980s by abolishing state monopoly of foreign trade. After the first UN-sponsored election in 1993, a number of reform programs have been continuously undertaken. Those reforms are clearly stated in *Cambodia MDGs, Cambodia National Poverty Reduction Strategy 2008-2013,* and *Rectangular Strategy 2009-2013.* Tariff reduction is one of the trade liberalization measures Cambodia has embraced to fulfill its commitment for freer trade openness. Amid strong economic growth partly resulting from trade liberalization measures over the past decade, there is an allegedly growing gap between poor households and rich households in terms of income distribution.

Though there is no strong evidence that trade liberalization will deepen poverty or vulnerability, there is no guarantee either that the poor will always benefit (McCulloch, Winters, & Cirera, 2001). While tariff reduction will normally affect income distribution, it is not likely to do so in a systematic way. A few studies related to the impacts of tariff reduction have been conducted in Cambodia. Naron (2003) provided a description of Cambodia's economy and trade structure and the potentials of trade liberalization. For Cambodia's garment industry, Neak (2006) assessed the impact of this industry on poverty reduction using descriptive data and interviews with policy makers, while Chan and Oum (2011) examined the impact of the US tariff exemption on garment on the Cambodian economy and livelihoods. These studies, however, focus on the export side, and they fall short of assessing potential impacts at different households groups.

They have not adequately assessed the income distributional impacts of tariff reduction. This raises a number of crucial issues pertaining to social goals such as: How are different household group especially the poor impacted by significant tariff cut? Are countervailing policies needed to promote trade liberalization in a more equitable manner?

To address all these concerns, this paper investigates welfare and inequality impacts on Cambodia's households (Phnom Penh, Urban, and Rural) from tariff reduction. Labor market effects and fiscal policies are highlighted as the main mechanism through which tariff reduction affects welfare of different Cambodian household groups. The study employs the computable general equilibrium (CGE) model, widely used for economic-wide impact studies and recognized as powerful tool in welfare and poverty analysis. A key contribute of this study is to illustrate the significance of policy choices for welfare improvement to Cambodian populations in the face of further tariff reduction. Such illustration can help contribute to the debates among policy makers and to the

formulation of policy options for Cambodia, where poverty remains high, especially in rural areas.

The paper is structured into five sections as follows. First section briefly reviews Cambodia's economy and measures affecting trade. Secondly, a review of poverty and inequality in Cambodia is provided, while the third section details the methodology and simulation designs in the study. The fourth and fifth sections summarize findings, conclusion, and policy recommendations accordingly.

2.   Cambodia's Economy and Measures Affecting Trade

Prior to the global economic crisis Cambodia has been a star growth performer in the East Asian region. The economic performance has been remarkably impressive between 1998 and 2007. Its annual economic growth stood at a high record of 9.4% on average. If calculated from 1994 to 2011, an average growth is around 7% and GDP per capita has tripled. The Cambodia's growth and export remain narrowly based, giving limited benefits to the vast needs of majority of people to move out of poverty. The concentration of growth and export are namely in the sectors of garment and tourism. During the crisis, it could prove that the competitiveness of these two sectors remain extensively low and fragile.

Figure1: Cambodia's GDP per capita and GDP growth 1994-2011
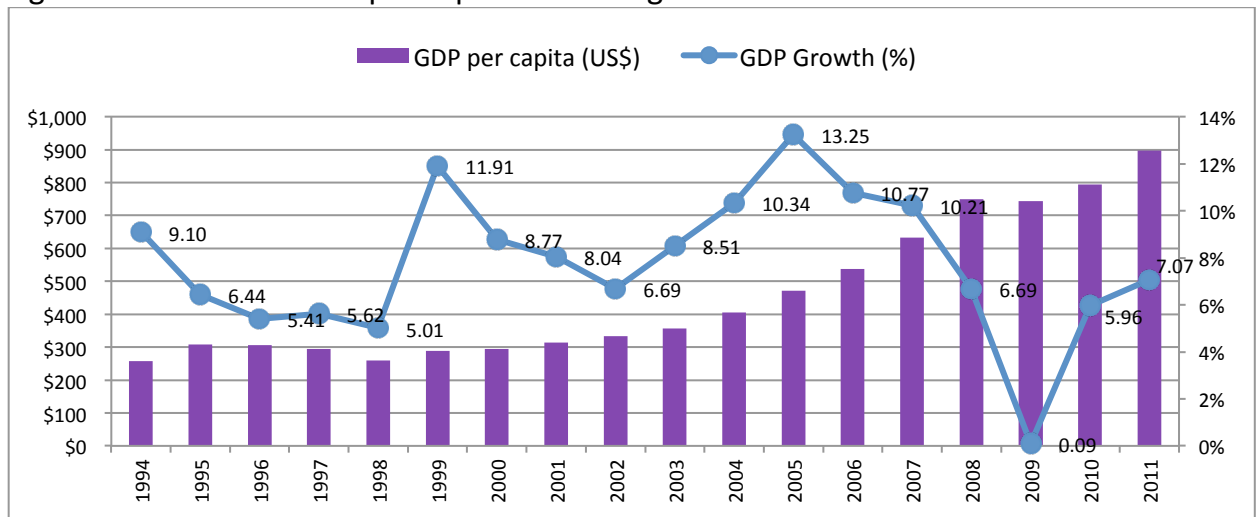
Source: WorldBank's WDI (2012)

Cambodia's trading regimes are affected from its membership in ASEAN and WTO and its unilateral trade liberalization. It joined ASEAN in 1999 and committed to implementing the so-called ASEAN Common External Preferential Tariff (CEPT) in 2000. In 2004, it was acceded to WTO and also committed to a number of reforms on its institutional and trading system in compliance with WTO regulations. The Customs Law was amended in 2007 to pay the way for fulfilling Cambodia's commitments to the ASEAN's CEPT, the 1999 revised Kyoto Convention, and the WTO's Customs Valuation Agreement. At the end of 2010, all imports to Cambodia are in line with the WTO valuation method. Cambodia also does not apply PSI-related laws from 2010.

As the result of Cambodia's import and export procedure streamlining, numbers of days needed for necessary administrative documents for imports and exports as well as export costs per container decreased. With the introduction of ASYCUDA World System, to clear a shipment it now takes an average 24 hours for both imports and exports. Within these 24 hours, almost 90% of import declarations are cleared, from a filing of goods declaration to a release of goods. A number of steps required for obtaining a certificate of origin and an export license at the Ministry of Commerce also reduced to 8 steps from 11 steps since 2004 through the new application of a single administrative document (SAD).

In regard to reforming tariff structure, before joining WTO tariff bands were reduced to 4 from 12. There were no highest tariff rates of 40%, 50%, 90%, and 120% anymore. Instead, the highest tariff rates have been reduced to 0%, 7%, 15%, and 35%. As of 2011, among all tariff lines, 13.7% are bound for duty free while 39.7%, 36.7%, and 9.9% are bound for highest rates of 7%, 15%, and 35% respectively. In addition, from the time of its accession to WTO, the numbers of tariff lines were reduced from 10,700 to 8,300 in 2011, based on HS 2007 nomenclature.

Cambodia has three types of duties for imported goods, i.e. customs duties (tariff), VAT, and Excise taxes. Additional taxes are to apply on gasoline and diesel oil, with a tax of US$0.02 per litre for gasoline and US$0.04 per litre for diesel oil. All tariffs are MFN bound and uniform for all countries except ASEAN Dialogue Partners under CEPT with incentives of lower tariff rates. There are also tariff exemptions for the imports of production materials for qualified investments approved by the Council for the Development of Cambodia (CDC), imports of some agricultural inputs and machinery, and the imports of aid-providing international organizations, embassies, and certain development projects. Cambodia applies the 10% VAT uniform tax covering goods and services through all stages of importation, production, and distribution. As for excise tax, it is levied on selected products whether they are locally produced or imported. Since the customs duties were in decline, excise tax has been increased to ensure revenue neutral for the country. In 2010, share of customs duties, VAT on imports, and excise tax to the total tax revenues accounted for 16.9%, 19.8%, and 14.6% respectively.

Table1: Share of international trade taxes in total tax revenue, 2004-2010

	2004	2005	2006	2007	2008	2009	2010
Total tax revenue (billion riels)	1656.2	1989.8	2391.6	3584.7	4688.7	4332.2	5070
of which (%)							
Customs duties (after exemption)	21.9	23.1	22.7	19.5	19.2	17.3	16.9
Excise duties on imports	15	16.3	14.9	14.7	16.5	13.7	14.6
Gasoline/diesel taxes	5.3	4	4.3	3.3	2.5	3.7	3.7
VAT on imports	24.4	24.3	24	20	20.3	21.4	19.8
Export taxes	1.2	0.9	1	0.6	0.5	0.3	0.4
Others (fees & penalties)	1.8	2	2.2	2	1.8	1.1	0.8
Total international trade taxes	**69.5**	**70.6**	**69**	**60.1**	**60.7**	**57.5**	**56.3**

Source: WTO Secretariat (2011), p.34

The challenge faced by Cambodia now is to reduce its reliance on trade-related revenues by simplifying and broadening domestic taxes. The introduction of tax on property (initially in the capital Phnom Penh) and the increase of road tax are the two tax policies currently implemented by the government. Even with the government's efforts to reduce revenue contribution from trade-related taxes, they still comprise 56.3% of total revenues in 2010, down from 69.5% in 2004. The total revenue to GDP still stagnated at around 10-11%, the level considered as one of the lowest in the world although Cambodia has enjoyed high growth rates.

This shows that revenue generation is irresponsive to the real economic activities which have very much improved in the last period, indicating that the country is significantly underperforming its revenue administration potential. To finance its fiscal deficit, Cambodia still needs to depend on foreign loans and grants to meet its huge demands for the country development investments. Foreign financing accounted for 5.3% of GDP in 2010. Given the currently growing globalization period, custom tax (trade tax) will eventually become less contributing to the country's tax revenues in the future. With 56.3% of the Cambodia's tax revenues coming from international trade, the country continues its long tradition of relying on more distortive import-based taxes. Thus, in the future prospect, it is believed that personal income tax, corporate income tax, and VAT would be a cornerstone for the Cambodia's tax revenue.

Figure2: Government's revenue 2004-2011 (% of GDP)
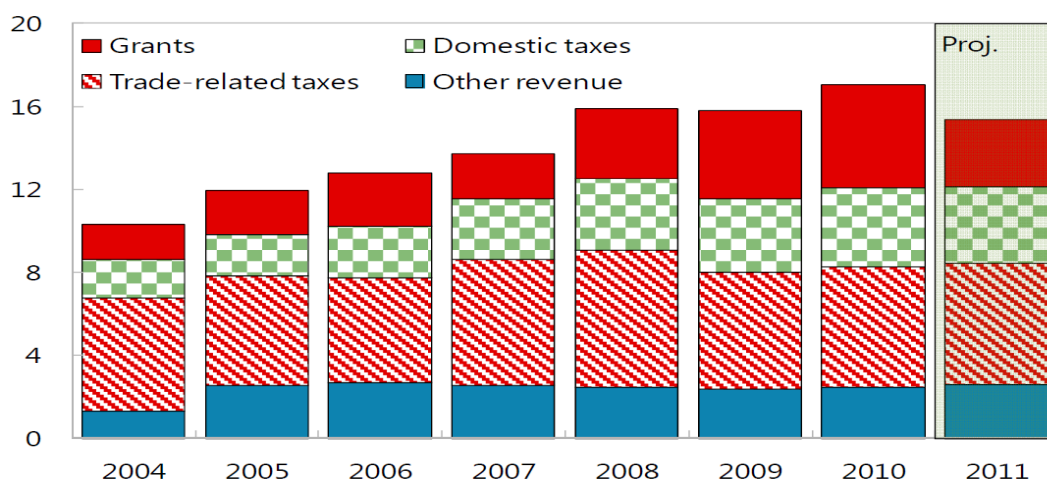
Source: IMF (2012), p.07

Cambodia also has to follow the established FTA agreement between ASEAN and its dialogue trading partners. Those partners include Japan, China, India, Australia/New Zealand, and South Korea. Cambodia has obligation to set its tariff at zero with China by 2015, South Korea and India by 2018, New Zealand/Australia by 2024, and Japan by 2026.

Table2: Tariff commitments under FTAs between ASEAN and its dialogue partners

ASEAN AFTAs with	Schedule of Zero Tariff Rates					
	2010	2011	2015	2018	2024	2026
China	ASEAN 6		CLMV			
India		ASEAN 5 (except the Philippines)		Cambodia		
South Korea	ASEAN 6			Cambodia		
Japan				ASEAN 6		CLM
Australia	ASEAN 6				Cambodia	
New Zealand					Myanmar	

Source: WTO Secretariat (2011), p.24

3.   Poverty and Inequality Reviews

Poverty Incidence

Poverty in Cambodia saw a moderate decrease from 39% in 1993 to 30.14% in 2007, reflecting the significant economic development having impacted on the poverty reduction since the start of economic liberalization. The poverty in Phnom Penh observed a sharp decline to just only 0.83% in 2007 compared to 11.4% in 1993. The reduction in other urban experienced a moderate attainment with the rate dropped from 36.6% to 21.85% for the same period. However, looking at poverty trends in rural area, the reduction was slow with the rate declined to 34.70% in 2007 from 43.1% in 1993, meaning that the reduction rate achieved was just around 0.6% per annum. With majority of the poor residing in rural area and the relatively slow reduction in poverty in the area, this can be said that poverty in Cambodia is mainly rural phenomenon. The latest poverty rate by government for year 2009 is 22.89%.

Table3: Poverty incidence by region, 1993-2007

Region	1993	1997	1999	2004	2007
Phnom Penh	11.4	11.1	9.7	4.6	0.83
Other Urban	36.6	29.9	24.73	24.73	21.85
Rural	43.1	40.1	40.1	39.18	34.7
Cambodia	39	36.1	35.9	34.68	30.14

Source: WorldBank (2009)

Inequality

While households in all regions experienced a rise in their real per capita consumption levels, the gains were not evenly distributed. The high economic growth from 1993 to 2007 has brought both the poverty reduction and the associated levels of rising inequality. The poverty reduction over time depends not only on the increased real per capita consumption (economic growth) but also on the equality in the size distribution of per capita consumption. Table4 shows that amongst all households in 1993, 20% richest segment held the consumption share of 46.6% and 20% poorest segment had 7.9%. Until 2007, the 20% richest gained to 52% while the 20% poorest decreased to only 6.5%, pointing the deteriorating inequality in the distribution of per capita household consumption during 1993-2007. Gini Coefficient and Lorenz Curve below are presented to further confirm that there was an increase of inequality in Cambodia from 1993 to 2007.

9

Table4: Distribution of consumption share (%)

Year	20% richest household	20% poorest household
1993	46.6	7.9
2004	49.4	6.9
2007	52	6.5

Source: WordBank's WDI (2011)

**Gini Coefficient and Lorenz Curve**

Cambodia as a whole saw the worsening inequality among populations as confirmed by the rise of Gini Coefficient from 0.396 in 2004 to 0.431 in 2007. By region, inequality in Phnom Penh slightly improved with a drop from 0.37 to 0.34 for the same period. Other urban, on the other hand, the situation was different, with the Gini Coefficient increased from 0.435 in 2004 to 0.468 in 2007. Even poverty declined in other urban, the consumption of richer households increased much higher than the poorest ones, which is the reason for worsening inequality. As for the rural area, inequality situation revealed a slight increase of Gini Coefficient from 0.342 to 0.360 for period 2004-2007. This can also imply that the benefits of economic growth are not equally shared to all rural households even the growth has actually helped reduce poverty in the rural area.

Table5: Gini Coefficient by region

Region	2004	2007
Phnom Penh	0.369	0.340
Other Urban	0.435	0.468
Rural	0.342	0.360
Cambodia	0.396	0.431

Source: JICA (2010), p.09

Figure3: Change in Lorenz curve in Cambodia, 1993/94-2007

10
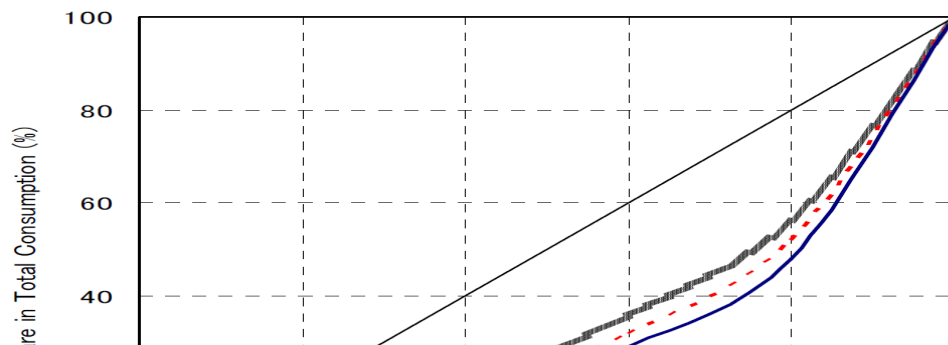
Source: JICA (2010), p.09

4.   Methodology and Simulation Designs

The study uses the computable general equilibrium (CGE) model, as it is widely used for economic-wide impact studies and recognized as powerful tool in welfare and inequality analysis. Using this framework analysis, consequences of several measures on allocation of resources, distribution of income, distribution of consumption, and inequality situation of different household groups are examined. The approach employed in this study is called a CGE-Microsimulation model, combining household data from Cambodia Socio-Economic Survey 2009 (CSES 2009) and EXTER (Extérieur) standard CGE model. The construction of a CGE-Microsimulation model is technically straightforward, with the objective is to integrate every household from a nationally representative household survey into the existing standard EXTER CGE model. To do this requires data of expenditure and income vectors of every household in the household survey to replace the ones of representative households in a SAM. The summation of expenditure and income of survey household data must be consistent and the same as the representative household's expenditure and income in the SAM at both the country's level and different household groups' level.

For the purpose of policy analysis, simulation exercises are conducted using the multi-sectoral, multi-factor, and multi-households computable general equilibrium (CGE) model calibrated to the social accounting matrix (SAM) of the Cambodia's economy. The Cambodia's Macro SAM and Micro SAM have been constructed by the author based on the 2008 Input-Output Table (Oum Sothea) of the Centre of Policy Studies, household survey data from CSES 2009, and data from the Ministry of Economy and Finance (MEF). After creating the Cambodia's Macro SAM and Micro SAM, for policy analysis, five simulations are carried out to examine the impacts of tariff reduction measures on welfare and income distribution of different household groups (Rural, Urban, and Phnom Penh):

Simulation1: proportional tariff reduction of 10% across the board with the pre-simulation government budgetary position is maintained. The loss of government revenues from tariff reduction are compensated for by the introduction of uniform increase in VAT tax, which is the tax that does not create much distortion like production tax and household income tax. Consumption tax is also less of a burden in terms of government revenue compensation, which accounts for 2.6% uniform increase compared to 2.8% and 6% for production and income taxes respectively.

Simulation2: it is the same scenario as in Simulation 1 but with complete tariff removal across the board.

Simulation3: the same simulation as in Simulation 2, but with capital considered as mobile across production activities when a long term view is adopted. In Simulation 2, labor is assumed to be mobile across sectors, while capital is sector-specific. To enable capital to be fully mobile in Simulation 3, two additional equations and endogenous variables are included in the model (refer to the mathematical equations in the Appendix).

To ensure that supply of capital equals demand for capital on the capital market, this equation is added.

49. $\overline{KS} = \sum_{tr} KD_{tr}$

Where $\overline{KS} = $ capital supply in the economy, $KD = $ demand for capital in activity tr

Another equation added to impose a uniform rate of return on mobile capital is:
50. $r_{tr} = rf$

Where r_{tr} = return rate to capital in activity tr, rf = uniform return rate on capital

Simulation4: partial trade liberalization with no tariff rate is higher than 5% in any sectors in order to comply with AFTA commitment

Simulation 5: international capital flow is adopted in simulation 3 by adding the changed current account balance (CAB) in the model. Since the current account balance is exogenous in the model, to assess the impact of international capital flow across border, a 10% increase in the value of CAB is assumed.

System Constraints and Macro Closure

Four constraints are basically included in the system. The real constraint refers to the commodity and factor markets, whereas the nominal constraint consists of two macro balances, i.e. the current account balance from the rest of world and saving-investment balance.

Commodity Market: total supply of goods must be equal to the demand for goods and zero profits are made in all industries. Sectoral supply comprises of imported goods and domestic goods sold in the domestic market, while the composite demand made up of final demand (private consumption, government consumption, and investment) and intermediate demand in production. Equilibrium between supply and demand of goods is determined through the variation in sectoral prices.

Factor Market: normally it is assumed that the total quantity supply of factors are fixed and thus to ensure equilibrium between factor supply and demand, the variation in factor returns (wage and return to capital and land) is adopted. In the short run, it is assumed that labor is mobile across production activities, while capital is sector-specific. In the long-run, however, capital is also adopted to be mobile across all production activities.

Current Account Balance: exports and imports are endogenously determined in the model, while transfer to and from domestic institutions are fixed. Foreign saving is fixed, adjusting through the nominal exchange rate acting as numeraire in the model.

Saving-Investment Balance: due to the static nature of the model, investment volume is treated exogenously to avoid temporal accounting for dynamic welfare/poverty effects. To ensure equality to the fixed investment volume, total domestic savings adjust to finance investment through variation in household marginal propensity to save.

Summary of Model Closure

Labor is mobile across producing activities
Capital is immobile and sector-specific (mobile in case of the long-run view)
The world prices of exports and imports are exogenous invoking the small country assumption
Primary factor supplies are exogenous and fixed
Public expenditure and transfer are fixed
Public saving is fixed in case of neutrality government revenue analysis
Foreign transfer payments to household is fixed
Current account balance or deficit is fixed
Savings of domestic institutions adjust to equate given investment
Imports and domestically produced goods are imperfect substitutes
Output produced for domestic and export market reflects difference in quality
Nominal exchange rate acts as the numeraire.

5. Findings and Conclusion

Simulation Results:

To better understand and track the channel through which tariff reduction has impacts on welfare and inequality, six sections have been analyzed in the following manner, starting from the influence of tariff reduction on resource allocation, factor market, household income, household consumption, household welfare, and finally inequality.

Resource Allocation

The initial effect of tariff reduction will immediately translate into the decrease of import price in each sector. Considering baseline structure of tariff rates, it is the industry sector which sees the highest reduction of import price. In Simulation 1, the proportional 10% reduction of tariff rate across the board leads to a 0.7% decrease in the industrial import price compared to 0.19 and 0.23 decline in agriculture and service sectors respectively. Overall, import price decreases about 0.67%. It is also the same case for complete tariff removal in the following simulations. Industry still has the highest reduction in import price of 6.98%. This means industry is more elastic to tariff reduction relative to agriculture and service sectors in term of their import prices.

In response to these declines in import prices, the total demand for imports increase in each simulation. At the sectoral level, given the higher rates in initial tariff and import penetration in industry sector, the import volume response is also higher in industry

sector. However, it is noteworthy that in Simulation 1 and Simulation 3, imports decrease in service sector and in Simulation 4 imports decrease both in agriculture and service sectors. The situation in Simulation 1 and Simulation 3 can be explained partly by the fixed current account balance in the model and the effect of consumers switching from import to cheaper local product given the greater fall in domestic price relative to the reduction in import price in service sector. In Simulation 4, the results are explained by the limit of 5% maximum tariff rate applied only to the industrial sector (in accordance with AFTA commitment), as two other sectors already have the initial tariff rates below 5%, leading to the unchanged of import prices for these two sectors.

Table6: Effect of tariff reduction on imports/exports, sectoral output, and domestic sales

		Volume Change				Price Change			
		Imports	Dom. Sales	Exports	Output	Imports	Dom. Sales	Exports	Output
Sim1	agriculture	0.13	0.04	0.13	0.05	-0.19	-0.12	0	-0.11
	industry	0.11	-0.21	0.14	-0.04	-0.7	-0.43	0	-0.22
	services	-0.03	-0.05	0.13	-0.02	-0.23	-0.22	0	-0.18
	Total*	0.1	-0.08	0.13	-0.01	-0.67	-0.26	0	-0.18
Sim2		Imports	Dom. Sales	Exports	Output	Imports	Dom. Sales	Exports	Output
	agriculture	0.34	-0.23	0.96	-0.14	-1.94	-1.47	0	-1.35
	industry	1.37	-1.87	1.75	-0.08	-6.98	-4.42	0	-2.24
	services	0.04	-0.14	1.64	0.17	-2.34	-2.19	0	-1.81
	Total*	1.29	-0.73	1.68	-0.01	-6.68	-2.72	0	-1.83
Sim3		Imports	Dom. Sales	Exports	Output	Imports	Dom. Sales	Exports	Output
	agriculture	0.3	-0.24	0.97	-0.15	-1.94	-1.49	0	-1.38
	industry	1.37	-1.9	1.7	-0.12	-6.98	-4.41	0	-2.23
	services	-0.07	-0.13	1.74	0.19	-2.34	-2.29	0	-1.89
	Total*	1.28	-0.74	1.67	-0.02	-6.68	-2.76	0	-1.86
Sim4		Imports	Dom. Sales	Exports	Output	Imports	Dom. Sales	Exports	Output
	agriculture	-0.5	-0.03	0.28	-0.01	0	-0.39	0	-0.36

		Imports	Dom. Sales	Exports	Output	Imports	Dom. Sales	Exports	Output
	industry	0.43	-0.68	0.46	-0.12	-2.33	-1.42	0	-0.72
	services	-0.79	-0.02	0.5	0.07	0	-0.65	0	-0.53
	Total*	0.35	-0.24	0.46	-0.03	-2.33	-0.83	0	-0.56
Sim5		Imports	Dom. Sales	Exports	Output	Imports	Dom. Sales	Exports	Output
	agriculture	1.81	0.04	0.43	0.07	-1.94	-0.49	0	-0.45
	industry	1.77	-3.12	-0.66	-1.91	-6.98	-3.09	0	-1.57
	services	1.97	0.77	1.9	0.97	-2.34	-1.38	0	-1.14
	Total*	1.78	-0.7	-0.1	-0.52	-6.68	-1.68	0	-1.11

* Average variation for volumes; Laspeyres index variation for prices
Source: Author's computation

The next consequence of increased volume of imports causes local producers to face with a fall in domestic demand, which later results in the decline in price for domestic sales. In each simulation, the fall in domestic sales prices follows the same tendency. However, Simulation 5, when international capital flow is added to the Simulation 3, shows that the decline in domestic sales prices is smaller than in Simulation 3.

As the current account balance is fixed, the increase in the import demand is only financed by the increase in export. The exports can be easily sold on the foreign market due to the assumption that elasticity of export demand is infinite. Since international prices are fixed, the fall in domestic price index suggests that the real exchange rate depreciates. With the effect of this depreciation, it is enough to allow exports to achieve the required level. In short, local producers reallocate parts of their production to foreign market in response to the falling domestic prices. Relatively, it is industry sector which sees higher export response because of stronger import competition on domestic market. Only in Simulation 5 is the industrial export response negative.

For the domestic output, it reveals that agriculture output is only positive in simulation1 and simulation5. From Simulation 2 to Simulation 5, it is service sector which is the relative winner. As such, in terms of resource allocation resulted from tariff reduction, it can be said that agriculture and service sectors benefit most from the resulting export expansion in a way that its outputs increase relative to industrial output. The effect of tariff reduction moves the resources from capital-intensive industry to labor-intensive agriculture and service. If the country's policy prioritizes the promotion of industry, there is still a need to protect it for the time-being through the very gradual reduction of tariff in this sector.

Factor Market

Given the higher initial tariff rate in industry, following tariff reduction, it shows that output price of industry falls greater relative to output prices of agriculture and service. The manner in which the decline in output prices leads to the change of value-added prices will subsequently determine household income variation. Usually, it is expected that production factors used intensively in sectors with declining relative value-added prices will experience a fall in relative factor prices.

Table7: Effect of tariff reduction on value-added and factor prices

		Change in		Change in price of:		
		VA price	VA	Labor	Capital	Land
Sim1	agriculture	-0.1	0.05	-0.11	-0.06	-0.07
	industry	-0.15	-0.04	-0.11	-0.19	0
	services	-0.13	-0.02	-0.11	-0.14	0
	Total*	-0.12	0	-0.11	-0.15	-0.07
Sim2		VA price	VA	Labor	Capital	Land
	agriculture	-1.35	-0.14	-1.32	-1.47	-1.44
	industry	-1.4	-0.08	-1.32	-1.47	0
	services	-1.19	0.17	-1.32	-1.06	0
	Total*	-1.3	0	-1.32	-1.24	-1.44
Sim3		VA price	VA	Labor	Capital	Land
	agriculture	-1.37	-0.15	-1.36	-1.29	-1.47
	industry	-1.32	-0.12	-1.36	-1.29	0
	services	-1.33	0.19	-1.36	-1.29	0
	Total*	-1.34	0	-1.36	-1.29	-1.47

		Change in		Change in price of:		
		VA price	VA	Labor	Capital	Land
Sim4	agriculture	-0.35	-0.01	-0.35	-0.36	-0.36
	industry	-0.47	-0.12	-0.35	-0.56	0
	services	-0.29	0.07	-0.35	-0.24	0
	Total*	-0.35	0	-0.35	-0.36	-0.36
Sim5		VA price	VA	Labor	Capital	Land

agriculture	-0.36	0.07	-0.35	-0.5	-0.31
industry	-0.43	-1.91	-0.35	-0.5	0
services	-0.42	0.97	-0.35	-0.5	0
Total*	-0.4	0	-0.35	-0.5	-0.31

* Average variation for volumes; Laspeyres index variation for prices
Source: Author's computation

It is observable that a greater fall in industrial output price translates into greater decline in industrial value-added price relative to agriculture and service. As capital is used intensively in industry, this can explain why the average change in return to industrial capital sees a greater fall. Due to the assumption that labor is mobile across production activities, variation in wage rate is uniform. Capital is assumed to be fully mobile in Simulation 3 and Simulation 5. In Simulation 1, it is the agriculture land and capital to experience the relative increase as the value-added price in this sector is less affected by the decline in the competing import price. As for Simulation 2 and Simulation 4, it is service capital that sees the relative increase, and this is also the case for capital in Simulation 3. A relative increase in labor and land are observed in Simulation 5.

Household Income
The next consequence of value-added price change is the variation in household income. In case of Simulation 1 and Simulation 4, when partial tariff reduction is applied, households' nominal incomes seem to be relatively unchanged among rural, urban, and phnom penh households. In Simulation 1, the percentage change is roughly the same of 0.12, while the change is 0.34 in Simulation 4.

However, when tariff is completely eliminated, there are little changes among those households' group. It is likely that urban and phnom penh households are thus relative winner in Simulation 2 and Simulation 3 in terms of income changes due to their bigger reliance on capital income. Urban and phnom penh households benefit at the expense of rural households from the relative increase in return to capital.

In Simulation 5, on the other hand, when the viewpoint of international capital flow is included by assuming the 10% increase of CAB, rural households emerge as a relative winner instead. This is mainly due to their greater dependency on wages and return to land, which see the relative increase compared to return to capital following tariff reduction. The result is consistent to the Stolper-Samuelson theorem which predicts that by engaging in international trade, there will be an increase in labor wage for developing countries.

Table8: Effect of tariff reduction on household income

Change in rate	Income Change

		rural	urban	phnom penh	rural	urban	phnom penh
Sim1	Wage rate	-0.11	-0.11	-0.11	-0.07	-0.06	-0.05
	Rate of return to capital	-0.15	-0.15	-0.15	-0.04	-0.05	-0.07
	Rate of return to land	-0.07	-0.07	-0.07	0	0	0
	Other income	-0.13	-0.13	-0.13	-0.01	-0.01	-0.01
	Total	-	-	-	-0.12	-0.12	-0.12
Sim2		rural	urban	phnom penh	rural	urban	phnom penh
	Wage rate	-1.32	-1.32	-1.32	-0.81	-0.69	-0.58
	Rate of return to capital	-1.24	-1.24	-1.24	-0.37	-0.46	-0.56
	Rate of return to land	-1.44	-1.44	-1.44	-0.07	-0.08	-0.1
	Other income	-1.2	-1.2	-1.22	-0.05	-0.06	-0.05
	Total	-	-	-	-1.25	-1.23	-1.24
Sim3		rural	urban	phnom penh	rural	urban	phnom penh
	Wage rate	-1.36	-1.36	-1.36	-0.83	-0.71	-0.6
	Rate of return to capital	-1.29	-1.29	-1.29	-0.39	-0.48	-0.58
	Rate of return to land	-1.47	-1.47	-1.47	-0.07	-0.08	-0.1
	Other income	-1.24	-1.24	-1.27	-0.05	-0.06	-0.05
	Total	-	-	-	-1.29	-1.28	-1.28
Sim4		rural	urban	phnom penh	rural	urban	phnom penh
	Wage rate	-0.35	-0.35	-0.35	-0.21	-0.18	-0.15
	Rate of return to capital	-0.36	-0.36	-0.36	-0.11	-0.13	-0.16
	Rate of return to land	-0.36	-0.36	-0.36	-0.02	-0.02	-0.02
	Other income	-0.34	-0.34	-0.35	-0.01	-0.02	-0.01
	Total	-	-	-	-0.34	-0.34	-0.34
Sim5		rural	urban	phnom penh	rural	urban	phnom penh
	Wage rate	-0.35	-0.35	-0.35	-0.21	-0.18	-0.15
	Rate of return to capital	-0.5	-0.5	-0.5	-0.15	-0.19	-0.23
	Rate of return to land	-0.31	-0.31	-0.31	-0.01	-0.02	-0.02
	Other income	-0.45	-0.45	-0.46	-0.02	-0.02	-0.02
	Total	-	-	-	-0.38	-0.4	-0.4

Source: Author's computation

Household Consumption

The preceding analysis shows that tariff reduction is neutral to each household group in Simulation 1 and Simulation 4, pro-urban and phnom penh in Simulation 2 and Simulation 3, and pro-rural in Simulation 5 in terms of its impacts on nominal income. Following tariff reduction, however, the decline in import and domestic prices will also lead to the fall in consumer prices. The analysis of households' welfare and poverty ultimately needs to take into account both the effects of nominal income and consumer prices changes.

Table9: Effect of tariff reduction on consumer prices

		Consumer Price		Household Price
Sim1	agriculture	0.13	rural	-0.02
	industry	-0.35	urban	-0.05
	services	0.03	phnom penh	-0.07
	Total	-0.16	Total	-0.16
Sim2		Consumer Price		Household Price
	agriculture	1.09	rural	-0.25
	industry	-3.58	urban	-0.58
	services	0.35	phnom penh	-0.71
	Total	-1.68	Total	-1.68
Sim3		Consumer Price		Household Price
	agriculture	1.06	rural	-0.3
	industry	-3.57	urban	-0.63
	services	0.25	phnom penh	-0.75
	Total	-1.71	Total	-1.71
Sim4		Consumer Price		Household Price
	agriculture	0.44	rural	-0.01
	industry	-1.18	urban	-0.13
	services	0.22	phnom penh	-0.17
	Total	-0.51	Total	-0.51
Sim5		Consumer Price		Household Price
	agriculture	2.06	rural	0.53
	industry	-3.09	urban	0.17
	services	1.12	phnom penh	0.03
	Total	-1.02	Total	-1.02

Source: Author's computation

It is noteworthy that consumer price falls in industry sector while agriculture's consumer price relatively rises in each simulation. It can be expected that rural households who consume a larger share of agriculture goods would suffer from this relative increase in agriculture's consumer price. On the other hand, urban and phnom penh households can enjoy the relative decline in the consumer price of industrial goods

due to their greater consumption shares of these goods. Therefore, in terms of tariff reduction effects on consumer prices, it can be seen that urban and phnom penh households benefit from general falling consumer prices. The household consumption impacts of tariff reduction are, thus, pro-urban and phnom penh.

Household Welfare

Putting together the variation in households' nominal incomes and consumer prices, a welfare effect, as measured by equivalent variation (EV) is calculated in Table10. Generally, it can be said that welfare impacts from tariff reduction is positively very small, as it is a consequence of a greater reduction in consumer prices to offset the decline in households' nominal incomes. At each household group, it is phnom penh households who benefit most in terms of welfare gain, followed by the modest gain from urban households. Rural households are, thus, thought to be relative losers as their EVs show a negative number except in Simulation 5, in which the welfare of rural households is improved when including international capital flow. However, even with a positive number in Simulation 5, rural households' welfare gain is still smaller than that of urban and phnom penh households.

Therefore, tariff reduction will lead to be pro-urban and phnom penh in terms of welfare gains due to the greater reduction in consumer prices of goods they consume, contrasting to the general presumption that income effect will dominate consumption effect and the poor will thus benefit from tariff reduction. In Cambodia's tariff reduction, consumption effect far outweighs income effect.

Table10: Effect of tariff reduction on household welfare

		rural	urban	phnom penh	All
Sim1	Change in nominal income	-0.12	-0.12	-0.12	-0.12
	Change in household consumer price	-0.02	-0.05	-0.07	-0.16
	Equivalent variation	-0.04	0.05	0.22	0.03
		rural	urban	phnom penh	All
Sim2	Change in nominal income	-1.25	-1.23	-1.24	-1.24
	Change in household consumer price	-0.25	-0.58	-0.71	-1.68
	Equivalent variation	-0.55	0.22	1.63	0.01
		rural	urban	phnom penh	All
Sim3	Change in nominal income	-1.29	-1.28	-1.28	-1.29
	Change in household consumer price	-0.3	-0.63	-0.75	-1.71

		rural	urban	phnom penh	All
	Equivalent variation	-0.55	0.22	1.62	0.01
Sim4		rural	urban	phnom penh	All
	Change in nominal income	-0.34	-0.34	-0.34	-0.34
	Change in household consumer price	-0.01	-0.13	-0.17	-0.51
	Equivalent variation	-0.17	0.1	0.6	0.03
Sim5		rural	urban	phnom penh	All
	Change in nominal income	-0.38	-0.4	-0.4	-0.38
	Change in household consumer price	0.53	0.17	0.03	-1.02
	Equivalent variation	0.31	1.9	5.73	1.67

Source: Author's computation

Inequality

In regard to inequality effects, it reveals that the impacts are also small. However, it can be observed that the inequality situation following tariff reduction is worse compared to pre-tariff reduction measures. The increases of Gini index are seen in both national and household group level. Looking in more details at each household group, urban and phnom penh households experience the deteriorating inequality situation compared with rural households. Therefore, although in terms of welfare effects phnom penh seems to be a relatively winner, they would face the situation of further unequal income distribution within their population. Urban households are also a particular concern in terms of their income distribution.

Table11: Effect of tariff reduction on inequality

		Base	Sim1	Change1	Sim2	Change2	Sim3	Change3	Sim4	Change4	Sim5	Change5
Gini Index	rural	0.4324	0.4324	**0.00005**	0.4332	**0.00082**	0.4332	**0.00081**	0.4326	**0.00024**	0.4329	**0.00055**
	urban	0.4722	0.4723	**0.00010**	0.4736	**0.00136**	0.4736	**0.00135**	0.4726	**0.00043**	0.4734	**0.00114**
	phnom penh	0.4833	0.4833	**0.00008**	0.4844	**0.00117**	0.4844	**0.00116**	0.4836	**0.00037**	0.4842	**0.00099**
	Total	0.4831	0.4832	**0.00009**	0.4844	**0.00125**	0.4844	**0.00124**	0.4835	**0.00039**	0.4842	**0.00103**

Source: Author's computation

Conclusion

The study found the dominant effects of household consumptions over household incomes in the Cambodia's case. It can be explicitly said that welfare gains are beneficial

mainly to households in Phnom Penh, followed by modest gains to urban households. Rural households are considered as a loser in terms of welfare gains. However, welfare of rural households sees a better position in the partial tariff reduction and a positive sign in case of international capital flow. Overall, welfare gains are small, but positive for country as a whole. Even with the most benefits accrued to households in Phnom Penh, their inequality situation is growing, as it is the same case for urban household. Overall, there is a slight increase in inequality among population as a whole.

6. Policy Recommendations

The following policies are suggested to address this issue:

1. The introduction of VAT tax is recommended in terms of compensation for the loss of government revenues from the resulting tariff reduction, as it is less distortion and less of a burden for revenue compensation compared to production and income taxes
2. Tariff elimination should not be quickly implemented, for it can further hurt rural households' welfare. Therefore, partial tariff reduction is preferable to be undertaken, as the country's industry sector also needs to be protected for the time-being until this sector is thought to be competitive enough for the full trade opening
3. Government's complementary policies including building physical infrastructures of road, bridge, telecommunication, providing water and electricity access, etc. in rural area should be continuously implemented so that rural households can be connected to the international trade
4. Domestic tax codes need to be restructured and simplified in order to increase or at least maintain government revenues stemming from the revenue loss of trade-related taxes so that government can have ability to sustain its complementary and compensatory policies against poverty and vulnerability
5. Redistribution policy in terms of government transfer and income tax exemption should be given a priority to target those living in rural area.

Appendix

CGE EXTER MODEL

A. Equations

Production

1. $XS_j = \min\left[\dfrac{CI_j}{io_j}, \dfrac{VA_j}{V_j}\right]$

2. $VA_{nag} = A_{nag}^{kl}\left[\alpha_{nag}^{kl}LD_{nag}^{-\rho_{nag}^{kl}} + (1-\alpha_{nag}^{kl})\overline{KD}_{nag}^{-\rho_{nag}^{kl}}\right]^{-1/\rho_{nag}^{kl}}$

3. $VA_{agr} = A^{cl}\left[\alpha^{cl}CF^{-\rho^{cl}} + (1-\alpha^{cl})\overline{LAND}^{-\rho^{cl}}\right]^{-1/\rho^{cl}}$

4. $CF = A_{agr}^{kl}\left[\alpha_{agr}^{kl}LD_{agr}^{-\rho_{agr}^{kl}} + (1-\alpha_{agr}^{kl})\overline{KD}_{agr}^{-\rho_{agr}^{kl}}\right]^{-1/\rho_{agr}^{kl}}$

5. $VA_{ntr} = LD_{ntr}$

6. $CI_j = io_j XS_j$

7. $DI_{tr,j} = aij_{tr,j}CI_j$

8. $\overline{LAND} = \left(\dfrac{1-\alpha^{cl}}{\alpha^{cl}}\right)^{\sigma^{cl}}\left(\dfrac{rc}{rl}\right)^{\sigma^{cl}}CF$

9. $LD_{tr} = \left(\dfrac{\alpha_{tr}^{kl}}{1-\alpha_{tr}^{kl}}\right)^{\sigma_{tr}^{kl}}\left(\dfrac{r_{tr}}{w}\right)^{\sigma_{tr}^{kl}}\overline{KD}_{tr}$

10. $LD_{ntr} = \dfrac{P_{ntr}\overline{XS}_{ntr} - \sum_{tr}PC_{tr}DI_{tr,ntr}}{w}$

Income and savings

11. $YH_h = \lambda_h^w.w\sum_j LD + \lambda_h^r\sum_j r_{tr}\overline{KD}_{tr} +$

$\lambda_h^l.rl.\overline{LAND} + Pindex.\overline{TG}_h + \overline{DIV}_h + \overline{e}.\overline{TRH}_h$

12. $YDH_h = YH_h - DTH_h$

13. $SH_h = ADJ.\psi_h.YDH_h$

14. $YF = \lambda^{rf}\sum_{tr}r_{tr}\overline{KD}_{tr} + \lambda^{rf}.rl.\overline{LAND}$

15. $SF = YF - \sum_h\overline{DIV}_h - \overline{e}.\overline{DIV}^{row} - DTF$

16. $YG = \sum_{tr} TI_{tr} + \sum_{tr} TIE_{tr} + \sum_{tr} TIM_{tr} + \sum_h DTH_h + DTF$

17. $\overline{SG} = YG - G - Pindex \sum_h \overline{TG}_h$

18. $TI_{tr} = (tx_{tr} + CTC).(P_{tr}XS_{tr} - Pe_{tr}EX_{tr}) +$

$(tx_{tr} + CTC).(1 + tm_{tr})ePwm_{tr}M_{tr}$

19. $TIM_{tr} = tm_{tr}.\overline{e}.\overline{Pwm}_{tr}M_{tr}$

20. $TIE_{tr} = te_{tr}Pe_{tr}EX_{tr}$

21. $DTH_h = tyh_h YH_h$

22. $DTF = tyf.YF$

Demand

23. $CTH_h = YDH_h - SH_h$

24. $Pc_{tr}C_{tr,h} = Pc_{tr}c_{tr,h}^{min} + \gamma_{tr,h}\left(CTH_h - \sum_h Pc_{tr}\, c_{tr,h}^{min}\right)$

25. $G = \overline{XS}_{ntr}P_{ntr}$

26. $INV_{tr} = \frac{\mu_{tr}IT}{Pc_{tr}}$

27. $IT = \overline{ITVOL}.Pinv$

28. $DIT_{tr} = \sum_j DI_j$

Prices

29. $Pv_j = \frac{P_j XS_j - \sum_{tr} PC_{tr}DI_{tr,j}}{VA_j}$

30. $r_{nag} = \frac{Pv_{nag}VA_{nag} - wLD_{nag}}{\overline{KD}_{nag}}$

31. $r_{agr} = \frac{rc.CF - wLD_{agr}}{\overline{KD}_{nag}}$

32. $rc = \frac{Pv_{agr}VA_{agr} - rl.\overline{LAND}}{CF}$

33. $Pd_{tr} = (1 + tx_{tr})PI_{tr}$

34. $Pm_{tr} = (1 + tx_{tr})(1 + tm_{tr}).\overline{e}.\overline{Pwm}_{tr}$

35. $Pe_{tr} = \frac{\overline{e.Pwe}_{tr}}{1 + te_{tr}}$

36. $Pc_{tr}Q_{tr} = (1 + CTC).[Pd_{tr}D_{tr} + Pm_{tr}M_{tr}]$

37. $P_{tr}XS_{tr} = PI_{tr}D_{tr} + Pe_{tr}Ex_{tr}$

38. $\text{Pinv} = \prod_{tr} \left[\frac{Pc_{tr}}{\mu_{tr}}\right]^{\mu_{tr}}$

39. $\text{Pindex} = \sum_j \delta_j Pv_j$

International Trade

40. $XS_{tr} = B_{tr}^e \left[\beta_{tr}^e EX_{tr}^{\kappa_{tr}^e} + (1 - \beta_{tr}^e)D_{tr}^{\kappa_{tr}^e}\right]^{\frac{1}{\kappa_{tr}^e}}$

41. $EX_{tr} = \left[\left(\frac{Pe_{tr}}{PI_{tr}}\right)\left(\frac{1-\beta_{tr}^e}{\beta_{tr}^e}\right)\right]^{\tau_{tr}^e} D_{tr}$

42. $Q_{tr} = A_{tr}^m \left[\alpha_{tr}^m M_{tr}^{-\rho_{tr}^m} + (1 - \alpha_{tr}^m)D_{tr}^{-\rho_{tr}^m}\right]^{\frac{-1}{\rho_{tr}^m}}$

43. $M_{tr}^m = \left[\left(\frac{Pd_{tr}}{Pm_{tr}}\right)\left(\frac{\alpha_{tr}^m}{1-\alpha_{tr}^m}\right)\right]^{\sigma_{tr}^m} D_{tr}$

44. $\overline{CAB} = \sum_{tr} \overline{Pwm}_{tr}M_{tr} + \frac{\lambda^{row}\sum_{tr} r_{tr}\overline{KD}_{tr}}{\bar{e}} +$

$\frac{\lambda^{row}rl.\overline{LAND}}{\bar{e}} + \overline{DIV}^{row} - \sum_{tr} \overline{Pwe}_{tr}EX_{tr}$

Equilibrium

45. $Q_{tr} = DIT_{tr} + \sum_h C_{tr,h} + INV_{tr}$

46. $\overline{LS} = \sum_j LD_j$

47. $IT = \sum_h SH_h + SF + \overline{SG} + \bar{e}.\overline{CAB}$

48. $EV_h = \left(CTH_h - \sum_{tr} Pc_{tr} c_{tr,j}^{min}\right) \prod_{tr} \left[\frac{\overline{Pco}_{tr}}{Pc_{tr}}\right]^{\gamma_{tr,h}} - \left(\overline{CTHO}_h - \sum_{tr} \overline{Pco}_{tr}c_{tr,j}^{min}\right)$

B. Endogenous variables

ADJ   =   Adjustment variable for household's saving

$C_{tr,h}$ = Household h's consumption of good tr (volume)

CF = Composite agricultural capital-labor factor (volume)

CI_j = Total intermediate consumption by activity j (volume)

CTC = Uniform compensatory tax rate on sales

CTH_h = Household h's total consumption (value)

D_{tr} = Demand for domestic good tr (volume)

$DI_{tr,j}$ = Intermediate consumption of good tr in activity j (volume)

DIT_{tr} = Intermediate demand for good tr (volume)

DTF = Receipts from direct taxation of firm income

DTH_h = Receipts from direct taxation of household h's income

EV_h = Equivalent demand for good tr (volume)

EX_{tr} = Exports of good tr (volume)

G = Public expenditures

INV_{tr} = Investment demand for good tr (volume)

IT = Total investment

LD_j = Activity j demand for labor (volume)

M_{tr} = Imports of good tr (volume)

P_i = Producer price of good i

Pc_{tr} = Consumer price of composite good tr

Pd_{tr} = Domestic price of good tr including taxes

Pe_{tr} = Domestic price of exported good tr

Pindex = GDP deflator

Pinv = Price index of investment

Pl_{tr} = Domestic price of good tr excluding taxes

Pm_{tr} = Domestic price of imported good tr

Pv_j = Value added price for activity j

Q_{tr} = Demand for composite good tr (volume)

r_{tr} = Rate of return to capital in activity tr

rc = Rate of return to composite agricultural factor

rl = Rate of return to agricultural land

SF = Firm Saving

SH_h = Household h's savings

TI_{tr} = Receipts from indirect taxes on tr

TIE_{tr} = Receipts from taxes on export tr

TIM_{tr} = Receipts from import duties on tr

VA_j = Value added for activity j (volume)

w = Wage rate

XS_{tr} = Output of activity tr (volume)

YDH_h = Household h's disposable income
YF = Firm Income
YG = Government Income
YH_h = Household h's income

C. Exogenous variables

CAB = Current account balance
DIV_h = Dividends paid to household h
DIV^{ROW} = Dividends paid to the rest of the world
e = Exchange rate
ITVOL = Total Investment (volume)
KD_{tr} = Demand for capital in activity tr (volume)
LAND = Land supply (volume)
LS = Total labor supply (volume)
Pwm_{tr} = World price of export tr
Pwe_{tr} = World price of import tr
SG = Government's saving
TG_h = Public transfers to household h
TRH_h = Foreign transfers to household h
XS_{ntr} = Output of activity NTR (volume)

D. Parameters

Production Functions

A_j = Scale coefficient (Cobb-Douglas production function)
$\text{aij}_{tr,j}$ = Input-output coefficient
α_j = Elasticity (Cobb-Douglas production function)
io_j = Technical coefficient (Leontief production function)
v_j = Technical coefficient (Leontief production function)

CES function between capital and labor

A^{kl}_{tr} = Scale coefficient
α^{kl}_{tr} = Share parameter
ρ^{kl}_{tr} = Substitution parameter
α^{kl}_{tr} = Substitution elasticity

CES function between composite factor and land

A^{cl}_{tr} = Scale coefficient
α^{cl}_{tr} = Share parameter
ρ^{cl}_{tr} = Substitution parameter
α^{cl}_{tr} = Substitution elasticity

CES function between imports and domestic production

A^m_{tr}	=	Scale coefficient
α^m_{tr}	=	Share parameter
ρ^m_{tr}	=	Substitution parameter
α^m_{tr}	=	Substitution elasticity

CES function between domestic production and exports

B^e_{tr}	=	Scale coefficient
β^e_{tr}	=	Share parameter
κ^e_{tr}	=	Transformation parameter
τ^e_{tr}	=	Transformation elasticity

LES consumption function

$\gamma_{tr,h}$	=	Marginal share of good tr
$c^{min}_{tr,h}$	=	Minimum consumption of good tr

Tax rates

te_{tr}	=	Tax rate on exports tr
tm_{tr}	=	Tariff rate on good tr
tx_{tr}	=	Sales tax rate on good tr
tyh_h	=	Direct tax rate on household h's income
tyf	=	Direct tax rate on firm income

Other parameters

δ_j	=	Share of activity j in total value added
λ^l_h	=	Share of total land income received by household
λ^{lf}	=	Share of total land income received by firms
λ^{lrow}	=	Share of total land income received by foreigners
λ^r_h	=	Share of total capital income received by household h
λ^{rf}	=	Share of total capital income received by firms
λ^{row}	=	Share of total capital income received by foreigners
λ^w_h	=	Share of total labor income received by household h
Ψ_h	=	Propensity to save
μ_{tr}	=	Share of the value of good tr in total investment

E. Sets

$i, j \, \epsilon \, I = (AGR, IND, SER, NTR)$ All activities and goods (AGR: agriculture, IND: industry, SER: service, NTR: non-tradable services)

$tr \, \epsilon \, TR = (AGR, IND, SER)$ Tradable activities and goods

$nag \, \epsilon \, NAG = (IND, SER)$ Non-agricultural tradable activities and goods

$h \, \epsilon \, H = (rural, urban, phnom)$ Households (Rural, Urban, Phnom Penh)

Reference

Chan and Oum (2011). Impact of garment and textile trade preferences on livelihoods in Cambodia. Research Background Paper, Oxfam America, Cambodia.

Cockburn, J. (2005). Procedures for conducting poverty/distribution analysis of CGE simulation results with DAD. Centre Interuniversitaire sur le Risque, les Politiques Économiques et l'Emploi, Université Laval, Québec. Retrieved from http://www.pep-net.org/fileadmin/medias/pdf/microsim.pdf

Cockburn, J., Decaluwé, B., & Robichaud, V. (2008). Trade Liberalization and Poverty: A CGE Analysis of the 1990s Experience in Africa and Asia. Poverty and Economic Policy (PEP) Research Network. Retrieved from http://www.pep-net.org/fileadmin/medias/pdf/promotionnal_material/TradeLiberalization_Poverty-final.pdf

Fofana, I., & Cockburn, J. (2003). Microsimulations in Computable General Equilibrium: Procedures for analysing and reconciling data. Poverty and Economic Policy Network and Centre Interuniversitaire sur le Risque, les Politique Economiques et l'Emploi, Université de Laval. Retrieved from http://www.pep-net.org/fileadmin/medias/pdf/Reconciliation.pdf

JICA. (2010). Kingdom of Cambodia study for poverty profiles in the Asian region. JICA, OPMAC Corporation.

IMF. (2012). Cambodia: Staff Report for the 2011 Article IV Consultation (Country's Report No.12/46). Washington: International Monetary Fund.

McCulloch, N., Winters, L. A., & Cirera, X. (2001). Trade Liberalization and Poverty: A Handbook. Centre for Economic Policy Research.

Naron (2003). Trade Liberalization: a Cambodia Perspective. Working Papers 03-8, Asia Pacific School of Economics and Government.

Neak (2006).Trade and Poverty Link: The Case of the Cambodian Garment. EIC report, Cambodia.

Oum (2008). Input-Output Table 2008, Centre of Policy Studies.

WorldBank (2009). Poverty Profile and Trend in Cambodia : Findings from the 2007 Cambodia Socio-economic Survey (CSES). (No. 48618-KH). Poverty Reduction and Economic Management Sector Unit, East Asia and Pacific Region, World Bank.

WordBank's WDI (2012). WordBank's WDI 2012-Cambodia Data. Retrieved April 26, 2013, from http://data.worldbank.org/country/cambodia

WTO Secretariat (2011). Trade Policy Review: Cambodia (No. WT/TPR/S/253). World Trade Organization.