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Abstract: This paper uses a Computable General Equilibrium (CGE) framework and benchmark data from Uganda national household survey to estimate the impact of trade liberalisation on poverty in Uganda. Three simulations are performed: removal of EAC tariffs, removal of non-EAC COMESA tariffs and removal of all tariffs. Our results indicate that poverty falls in all cases, but poverty falls much more in the case of a complete removal of tariffs on all imports (2.94%), compared with the case of removal of EAC tariffs (2.76%) or non-EAC COMESA tariffs (1.08%).

JEL Classification: C68, D78, F13, F14, F15, F17.

Key words: Computable General Equilibrium Models, Micro-Simulation Analysis, Trade Policies, Poverty, Uganda.

1 INTRODUCTION

Trade liberalisation is seen by many governments as a vehicle to poverty alleviation in Africa. Yet, recent empirical evidence suggests that while trade liberalisation contributed to poverty reduction in some countries in the world, it actually worsened poverty in others (Winters et al, 2004; and Reimer, 2002). As such, there can be no general conclusion about the relationship between trade liberalisation and poverty, which suggests that we can only rely on country-specific evidences. This paper takes these concerns by examining the impact of trade liberalisation on the incidence of poverty in Uganda using a Computable General Equilibrium (CGE) framework. Uganda is a founding member of the World Trade Organisation (WTO), the East African Community (EAC) and the Common Market for Eastern and Southern Africa (COMESA). Since 2005, Uganda has largely eliminated tariffs on all imports from the EAC and adopted EAC Common External Tariff (CET) for trade with the outside world. Having joined the COMESA free trade area in December 2012, Uganda is also expected to implement a 100% tariff reduction on imports from the COMESA, beginning 2013. In November 2007, as a member of the East African Community, Uganda initiated an interim Economic Partnership Agreement (EPA) with the European Union to replace the trade section of African, Caribbean, and the Pacific (ACP)-EU Cotonou Agreement, which expired at

the end of 2007. This agreement when concluded will see Uganda liberalise over 80 percent of its trade with the EU.

This paper analyses what impact the reduction/removal of tariffs on Uganda's imports from the EAC, and the COMESA countries and the rest of the world (ROW) is likely to have on the level of poverty in Uganda. It shows how effects of tariff reduction are transmitted through the effects on prices, production, wages and other key macro variables that affect poverty. The paper adds some new dimension to the understanding of the effects of trade policies on poverty by going beyond the traditional fashion of modelling the relationship between trade and poverty, to actually distinguishing the impact of policies at national, regional and multilateral level, thus presenting policy makers with potentially interesting choices and options to consider.

The rest of the paper is organised as follows: Section 2 provides an overview of the CGE micro simulation approach used in trade and poverty analysis, and describes the model. The empirical results are presented in section 3, while section 4 concludes.

2 THE ANALYTICAL MODEL

2.1 An Overview of Micro Simulation Approach

Computable general equilibrium (CGE) models used in poverty analysis have taken one of the three forms: the *representative household* approach (the most widely used approach) pioneered by Adelman and Robinson (1978), the *integrated multi-household* approach (IMH) applied by Decaluwé et al (1999), or *top-down/micro-simulation sequential approach* (MSS). For detail review of these three approaches, see Savard (2005); Boccanfuso and Savard (2005), Chen and Ravallion (2004), Hertel and Reimer (2004), Bourguignon and Spadaro (2005). Decaluwe et al (1999) compare results of poverty and income distribution using the three CGE approaches. The results suggest that the IMH approach, that is, the use of household data in the CGE model itself is superior to all others in terms of comprehensive analysis of poverty. The results are also confirmed by Savard (2005). We applied the IMH approach because it accommodates intra-group changes (not fully captured by other approaches) and does not require household grouping or aggregation, thus, avoided the controversy associated with household aggregation. Its challenge is handling such a large size of a model (incorporating all households), numerical resolution as well as data reconciliation (Boccanfuso and Savard, 2005; Chen and Ravallion, 2004).

The same approach was used by Cockburn (2001) to analyse the impact of trade liberalisation on poverty in Nepal. He endogenises intra group variations by incorporating all the households from a nationally representative survey. Cockburn's findings, as seen by many analysts e.g. Chitiga et al (2005) –

lend support to the view that micro simulations are very important for poverty analysis. After him, Cororaton (2003) used the same approach for the Philippines with 24,797 households, and Chitiga et al (2005) in Zimbabwe with 14,006 households. They were able to carry out comprehensive poverty and income distribution analysis.

2.2 Structure of the model

A Computable General Equilibrium model is calibrated to a 2002 social accounting matrix (SAM) for Uganda (Alarcon et al, 2006). To keep the model tractable, we modified the SAM to 36 production branches/commodity sectors from 74 in the original SAM, and 3 factors of production (land, labour and capital) from 18. The rest of the world (ROW) account was decomposed into the EAC, COMESA and the ROW markets. The 9,711 households from the 2002/03 national household survey were incorporated into the SAM by entering data related to the final consumption of individual households (in terms of commodities), income by economic activity, etc from the survey, into the SAM (and balancing sum of consumption, income, etc over all households with the row/column totals for households in the SAM).

Government expenditures in the model are funded from tariff revenues and revenues from indirect taxes (modelled as a value added tax, 'VAT' and income tax, 'Ytax'). Tariffs and taxes on commodities, labour, capital, household income, and corporate income are given as fixed *ad valorem* rates. Tax revenues and income transfers received by government from the ROW, including international aid are used to meet government demand for commodities, to pay wages and capital and to deliver public goods, including transfers (pension) to households and other institutions. The government's budget balance (public savings) is endogenously determined. With expectation that tariff revenues will decline *ceteris paribus,* the model allows an increase in VAT and Ytax to ensure revenue neutrality. Each of the 36 production sectors of the domestic economy utilises a nested production technology. Commodities are produced using skilled and unskilled labour, intermediate inputs, capital and land. The value added is equal to the remunerations of the factors of production: capital, labour and land.

Labour is assumed to be mobile across sectors. However, unskilled agricultural workers can be employed only in the agricultural sector, while skilled workers are mobile between agricultural and non-agricultural sectors. The combination of labour in production is modelled according to constant elasticity of substitution (CES) function. In equilibrium, wages serve to equate demand and supply of labour. Capital is considered to be sector-specific, and primary factor supplies are exogenous to the model. The demand for intermediate inputs and value added are modelled as fixed proportions of total output. The components of value added are aggregated using a CES function. The transformation of domestic

production into exports is modelled according to the CET function. Exports are shared between the EAC, COMESA, and the ROW markets. This relationship is characterised by three different CES functions.

$$\text{Export supply, } QE_c = QD_c\left(\frac{PE_c}{PD_c}.\frac{\left(1-\delta_c^q\right)}{\delta_c^q}\right)^{\frac{1}{\rho_c^t-1}} \qquad (4.1)$$

where QD_c is quantity sold domestically of domestic output *c*; PE_c is export price for commodity *c* (in domestic currency); PD_c is domestic price of domestic commodity c; δ_c^q is Armington function share parameter; and ρ_c^q is Armington function exponent. In each of the three foreign markets, export supply is determined by demand, and the price received by producers is given in domestic currency. Similarly, importers have the options to import commodities either from the EAC, COMESA, or the ROW according to CES function. Imported and domestic goods are assumed to be imperfect substitutes (Armington, 1969). Domestically produced and imported goods combine to form a CES aggregate:

$$QQ_c = a_c^q\left(\delta_c^q.QM_c^{-\rho_c^q} + \left[1-\delta_c^q\right]QD_c^{-\rho_c^q}\right)^{\frac{1}{\rho_c^q}} \qquad (4.2)$$

where, QQ_c is quantity of goods in domestic market; a_c^q is Armington function shift parameter for commodity *c;* and QM_c is quantity of import:

$$QM_c = QD_c\left(\frac{PD_c}{PE_c}.\frac{\delta_c^q}{\left(1-\delta_c^q\right)}\right)^{\frac{1}{1+\rho_c^q}} \qquad (4.3)$$

The domestic import price is the world price adjusted by the exchange rate and import taxes. Therefore, changes in tariffs cause changes in the composite prices of the traded goods. The model allows tariff rates to differ depending on whether the imports are from the EAC, COMESA or the ROW. Importers/consumers are expected to allocate their expenditure on EAC, COMESA and ROW imports, and each allocation decision is modelled as a CES function.

Output QX_c is distributed between the domestic market and export markets (EAC, COMESA and the ROW). In the domestic market, the goods are sold to households, government, or used as intermediate inputs or investment goods. Indirect taxes are added to the local (producer) price to form domestic prices, which, together with the import price, form the composite price of domestically consumed goods via a CES function (equation 4.4).

$$QX_c = \beta_c \left(\delta_c^t . QE_c^{-\rho_c^t} + \left[1 - \delta_c^t \right] QD_c^{-\rho_c^t} \right)^{\frac{1}{\rho_c^t}} \qquad (4.4)$$

where QX_c is aggregate domestic output of commodity c; β_c is CET scale parameter; δ_c^t is CET elasticity of transformation; QE_c is quantity of exports, and ρ_c^t is constant elasticity of transformation (CET) parameter. Export price is affected by output price, which in turn is affected by input prices. Export prices may vary across the three markets: EAC, COMESA and ROW. As referred to earlier, household income comprises wages, profits from rent of capital, and transfers from government, firms, other households and the rest of the world (remittances). Besides savings, households use part of their income to pay taxes, pay other households or institutions (transfers), and to pay for goods and services. Final demand by each household arises from nested constant elasticity of substitution (CES) utility function subjected to the budget constraint, determined via a linear expenditure system (LES), which allows different marginal budget shares for different households to be included.[2]

That is,

$$C_{ch} = \frac{p_c . b_c + \beta_{ch} \left(C_h - \sum_{j=1}^{J} p_j b_j \right)}{p_i} \qquad (4.5)$$

where C_{ch} is demand for commodity *c* by household h; p_c: price of commodity c; b_c: quantity of commodity c in household basic needs basket; β_{ch} is share of commodity c in the consumption of household h; C_h is total household consumption; p_j are unit prices of different commodities in the household basic needs basket; b_j: quantities of commodities in basic needs basket (these quantities are fixed, apply to all household groups and remain invariant from one simulation to another)[3]; and p_i: prices of composite commodities.

$\sum_{j=1}^{J} p_j b_j$ = the monetary value of the minimum consumption (monetary poverty line), determined endogenously within the CGE model. Each household is assumed to behave in such a way that it first satisfies its minimum consumption of the respective commodities. Changes in the composite prices induced by changes in tariff rates will affect the cost of the basic needs basket and therefore, the rate of

[2] The LES utility function restricts households to consuming a basket of subsistence goods. The minimum consumption of a good by one household is derived using the Frisch parameter and the income elasticity. For a detailed presentation, see Dervis et al (1982).

[3] This approach is consistent with Ravallion's (1994) approach to estimating absolute poverty, the "cost-of-basic needs" method.

poverty. A number of general equilibrium responses triggered by these price changes such as changes in wages, composition of output, exports and imports; and pattern of employment are captured in the model. The population below the poverty line remains at base level before a policy shock. However, if composite commodity prices (p_i) rise following an external shock, the cost of the basic needs basket, hence the poverty line will increase and the population below the poverty line will rise *ceteris paribus*. A Foster-Greer-Thorbecke (F-G-T) poverty measure due to Foster et al (1984) P_α is used to compare poverty (pre- and post-simulation experiment).[4].

Finally, demand for each composite good is assumed to equal supply of such good. Demand for exports equals supply of exports; and total investment equals savings. The world prices of imports and exports, the current account balance and nominal exchange rate are exogenous to the model. Flexible prices serve to clear the markets for all commodities and factors. The macro closures apply to the government, the savings-investment balance, and external markets (EAC, COMESA, and ROW).

2.3 Model Closure

Nominal government expenditure is equal to fixed quantities of consumption goods multiplied by their endogenous prices. Fixing real government expenditure insulates the poverty-related variable from the influence of government spending. Government income is held at base level, so that any reduction in government income from tariff cuts is compensated endogenously by additional revenue from value-added tax (VAT) and income tax (Ytax).

The basic needs basket of commodities for the poor in Uganda consists mainly of unprocessed foodstuffs. Introducing replacement taxes may not increase the cost of the unprocessed food component of the basic needs basket as this component does not attract taxes (i.e. are exempted from value-added tax). Total nominal investment is equal to fixed quantities of investment goods multiplied by their endogenous prices. The propensities to save by individual households adjust proportionately to

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4 That is, $P_\alpha = \frac{1}{n^*}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)^\alpha$

where y_i is adult equivalent consumption expenditures for those individuals below the poverty line, and zero for those above, z is the endogenous poverty line, n^* the total population, and q the number of poor people. The parameter α takes the value of zero for the headcount index (P_0), 1 for the poverty gap (P_1) and 2 for the squared poverty gap (P_2).

accommodate the fixed total real investment formulation. This is achieved through a factor in the household saving function, which adjusts endogenously.

The current account balance is exogenous (foreign savings is equal to foreign account deficit) and the nominal exchange rate is the model's *numéraire*. Flexible foreign savings serve to clear the current account balance. As long as the nominal foreign exchange rate is fixed, the presence of foreign savings/exchange rate does not influence the savings-investment closure of the model, according to which the savings value determines the investment value. Real exchange rate is equal to nominal exchange rate multiplied by the world export prices, divided by domestic price index. Changes in real exchange rate (due to variations in export prices) effectively clear the foreign trade sector.

In the factor markets, wages clear the labour market, and a fixed capital use for each activity is assumed. We assume some unemployment with fixed, activity-specific real wages for labour. Besides capital, land is fixed in the short run, and technical change and other shift variables are assumed to remain constant. Walras law is satisfied since private consumption equals the income from primary factors plus net transfers to households (consumers) by government from domestic and international trade taxes.

2.4 Data Limitations

The household survey exhibited some gaps in data on wage rates and income by economic activity, net savings of the households, and inter-household transfers within the domestic household sector. These were estimated basing on other related survey information. Some of the commodities in SAM (e.g. trade services, railway transport, road transport and other transport services) and factor income transfers from the ROW to the domestic household sector were not accounted for in the household survey. Expenditures on these commodities have been allocated to each household according to some expenditure share criteria. Second, reconciling data was very challenging as a result of incorporating a large number of households into the SAM. This led to adjusting some figures (especially inter-household transfers, consumption expenditures, income, etc.) in view of considerations to balance the SAM. However, the order of magnitude of missing/unreliable data and related adjustments made are within reasonable limits, and as such, we do not expect it to affect the model/results significantly.

3 EMPIRICAL RESULTS AND DISCUSSIONS

3.1 Policy Simulations

Three types of policy simulations are performed in line with the model closure described above. First, the weighted average of EAC tariffs is set at zero i.e. imports from EAC enter Uganda free of duty - including category B goods exports from Kenya. The reason for including category B goods is to avoid the modelling difficulties associated with isolating these goods in the model. Since the 10% tariff on category B goods was a temporary measure, applying uniform condition to EAC imports is appropriate. In the second simulation, the average weight of non-EAC COMESA tariffs is set at zero (i.e. imports from COMESA countries enter Uganda free of tariffs) to demonstrate the likely impact that Uganda's membership to COMESA free trade area would have on the poor in Uganda. In the third simulation, tariffs are set at zero across the board (i.e. EAC, COMESA and ROW imports, including sensitive products). Although this simulation is not identical to what happens in the real world, the purpose is to demonstrate the potential effect of complete tariff reduction.

In what follows, we first present the sectoral and macro results arising from these simulations such as the reaction of imports, domestic prices, output and wages in the economy as they are key variables that affect poverty, and then results related to poverty.

3.2 Reduction in EAC Tariffs by 100%

A 100% tariffs reduction on EAC imports results into a rise in EAC imports across all sectors (Table 1) (see Table A1 for full sector coverage). The highest increase in imports occurs in the highly protected sectors: dairy, beverages and textile sectors. This implies that, with complete phase-out of intra-EAC tariffs, sectors that were highly protected are likely to contract due to rise of imports. Food imports from the COMESA are predicted to decline, while imports of beverages, sugar and manufactured products from COMESA and ROW are likely to rise, at least in the short run. Cereals imports from the EAC are predicted to increase by 1.1%, and imports of other food commodities (e.g. vegetables, legumes, sesame), by 2.6%.

The 1% rise in cereal imports from the EAC is more than compensated by a 3% fall in imports of cereals from COMESA. The fall in COMESA imports suggests that the complete phase-out of intra-EAC tariffs is likely to suppress imports of cereals and agricultural food from countries outside EAC that are members of COMESA (non-EAC COMESA countries). Imports of cereals from the rest of the world are predicted to rise by 1.8%.

Table 1. Changes in imports by region sector after policy simulation

Sector	Base level EAC imports	Per cent change in EAC imports relative to the base	Variation in imports from other region (%)	
			COMESA	ROW
Livestock, livestock products	1.32	9.1	6.9	-2.1
Milk, dairy	0.40	13.3	4.3	-1.0
Fish, fish products	0.06	7.6	0.1	-7.8
Cereals	12.72	1.1	-3.1	1.8
Other food commodities 1/	17.84	2.6	-0.5	-0.1
Sugar	9.82	6.5	5.9	18.4
Agricultural, cash-based commodities /2	13.37	12.7	-0.3	6.1
Beverages	5.34	21.3	3.7	12.9
Textiles	11.3	38.4	-7.8	7.3
Manufactures	48.0	4.3	2.5	11.4

Note: 1/ sesame, vegetables, fruits, spices, groundnut, and other foodstuff 2/ coffee, tea, tobacco, cotton/textile

Manufactured imports from the EAC are predicted to grow by over 4.3% (Table 1) as the manufacturing sector is relatively protected. As such, the adverse effects on the manufacturing sector in Uganda arising from EAC tariff reforms will be minimal. The effect of the complete phase-out of intra-EAC tariffs also remains positive for domestic production and domestic prices in most sectors (Table 2). Overall, two sectors face a fall in production, partly due to rising level of imports: beverages (-17.1%) and fish sectors (-2.4%). Incidentally, the beverages sector happens to be among the sectors that were highly protected and relatively subsidised. Besides beverages, prices fall for traditional cash crops: coffee, tea, tobacco and cotton, but remain nearly unchanged for dairy. The quantities of dairy imports as share of composite supply in the domestic market (production) are not significant enough to induce change on domestic production and prices in the dairy sector.

Similarly, cereals/food imports account for less than 3% of total composite supply of cereals/food in the domestic market and have had little influence on the domestic prices and production after this simulation. The neutrality (or near neutrality) of Uganda's food sector to EAC tariff reforms is helped by the fact that Uganda is a net food exporter in the EAC. The rise in domestic prices of fish is attributed to a fall in fish production.

The fall in fish production could have been triggered by changes in relative prices but not necessarily the rise in fish imports (7.6% reported in Table 1). The increase in domestic price of sugar despite the rise in domestic production and imports is due to increase in export demand helped by depreciation of the Uganda shilling against most of the EAC and major currencies (Table A2 reports a 45.2% rise in sugar exports to EAC market).

Table 2. Effect of tariff change on domestic prices (composite) and production by sector

Sector	Index of composite prices base (average)	Production level of domestic firm, base (average)	Variation in domestic prices and production (%)	
			Prices	Production
Livestock, livestock products	1.02	118.2	0.9	1.9
Milk, dairy	1.07	83.0	0.01	0.0
Fish, fish products	1.00	67.2	16.1	-2.4
Cereals	1.02	59.1	6.3	2.7
Other food commodities 1/	1.03	70.0	7.9	0.9
Sugar	1.00	88.3	15.0	3.5
Agricultural, cash-based commodities /2	0.95	161.8	-1.3	5.0
Beverages	1.03	48.0	-10.1	-17.1
Manufactures	1.01	84.0	8.5	0.4

Note 1/ and /2 as in Table 1

Following a complete phase-out of the EAC tariffs, demand for unskilled labour increases in all sectors, except in fish and beverages sectors where demand for unskilled labour falls by 2.5% and 2.1%, respectively. Unskilled sector wage drops in the beverages sector, livestock, and traditional agricultural cash crops sector. Demand for skilled labour also drops in primary sectors (livestock, cereals, and other food production sectors) that are intensive in unskilled labour.

Where the relative price of unskilled labour intensive goods have increased, the wages of unskilled workers are likely to go up, as it is the case of an increase in sector wages for unskilled workers in the food crop sector (cereals, sesame, vegetables, fruits, spices, groundnuts, soy beans, etc). The highest cut in sector wages (5% skilled wages and 9% unskilled) occurs in the beverages sector. The reform of EAC tariffs has relatively marginal effect on skilled sector wages, which remained within an average range of -2.4 to 5% change (except for beverages). Exports to the EAC markets rose in 27 out of the 36 sectors reported in Table A1. The top five export growth sectors are: sugar (with 45% rise in exports), wheat (39%), cooking oil/oil seed (38.5%), manufactures (38%), and rice (35.4%).

Uganda's top exports growth sector in the COMESA market as predicted by the model is sugar. In the ROW market, coffee tops growth in Uganda's export sector at 38.7%, followed by tobacco (30.5%), and cooking oil (21.9%). The rise in exports is likely to spur domestic production in the medium term to long term, which will benefit unskilled wage employment especially in rural areas. The general rise in level of production across sectors is largely export-driven.

Table 3. Simulated effect of tariff change on labour demand by sector

Sector	Variation in labour demand (%)		Variation in wages (%)	
	unskilled	*skilled*	*unskilled*	*skilled*
Livestock, livestock products	0.89	-6.04	-0.05	1.93
Fish, fish products	-2.54	0.02	0.05	-2.40
Cereals	1.00	-2.01	9.03	0.00

Other food commodities 1/	1.05	-0.01	2.40	0.90
Sugar	6.02	0.30	7.08	0.50
Agricultural, cash-based commodities /2	0.03	-0.01	-2.23	4.91
Beverages	-2.15	-0.57	-5.01	-9.06
Manufactures	0.79	0.32	0.10	0.17

Note: 1/ and 2/ as in Table 1

A complete phase-out of intra-EAC tariffs could offer new avenues for poverty reduction through its potential to stimulate exports, increase unskilled sector wages and lower prices of other importable goods consumed by the poor.

3.3 Reduction in COMESA Tariffs by 100%

On simulating a 100% reduction in COMESA tariffs, Uganda's imports from COMESA increased, but the increases are modest in scope for a number of sectors (Tables 4 and A1). Imports of tobacco from COMESA grew by 19.8% after the shock, manufactures by 16.5%, sugar 15.9%, poultry and poultry products 15.3%, and bottled water 13%. Most imports from COMESA are growing from small bases. Any small change tends to be magnified. While reducing tariffs on COMESA imports will invite more imports from the COMESA region, these imports are likely to be concentrated in few sectors, outside the sensitive tariff lines (Table A1).

Table 4. Import reaction to reduction in COMESA tariffs

Sector	Base level COMESA imports	Index of composite/domestic prices (Base level)	Variation in imports and domestic prices (%)	
			imports from COMESA	Domestic prices
Livestock, livestock products	1.32	1.02	5.67	0.00
Poultry, poultry products	0.38	1.00	15.3	-0.01
Fish, fish products	0.01	1.02	0.10	0.00
Cereals	0.91	1.03	-5.25	0.00
Other food commodities 1/	0.98	1.00	2.94	0.00
Sugar	47.84	0.95	15.09	0.00
Agricultural, cash-based commodities /2	1.37	1.03	0.23	0.02
Tobacco	29.57	1.01	19.81	-0.01
Beverages	0.32	1.02	7.70	0.00
Textiles	1.30	1.00	9.23	0.00
Manufactures	33.56	1.02	16.50	0.00

Note: 1/ sesame, vegetables, fruits, spices, groundnut, and other foodstuff 2/ coffee, tea, tobacco, cotton/textile

The rise in imports from COMESA due to tariff changes does not impact the level of domestic production/supply significantly so to exert pressure on domestic prices (Table 4). It follows therefore, that the gain that the poor derive from changes in COMESA tariffs in terms of reduced prices is relatively

small compared with price reduction arising from removal of intra-EAC tariffs. The gain to the economy comes from the rise in exports (Table A2) of rice (35%), cooking oil (40%), sugar (46%) and wheat (39%). The poor employed in this sector are likely to benefit from a rise in their incomes.

3.4 Reduction Across the Board of Import Tariffs by 100%

First, we set tariffs at zero on all imports from EAC, COMESA and ROW, including sensitive products.[5] Imports increase for most sectors after setting overall tariffs at zero (Table 5). The rest of the world imports grew faster than EAC or COMESA imports. For example, sugar imports from the ROW rose by 26.5% after simulation, compared with a 5.9% and 18.4% rise in sugar imports from the EAC and the COMESA, respectively. Again, higher increases in imports are associated with sectors that were highly protected (sensitive products) such as sugar, rice, wheat, textile, and manufactures (Table 5).

Next, we set tariffs at zero on all imports, except sensitive products. The increase in imports especially of sensitive products was about 50% lower than the case of a complete removal of tariffs on sensitive products. For example, 19% increase in sugar imports resulted from zero tariffs on sugar imports, against 9.2% increase in sugar imports when the duty on sugar stayed at the original rate of 100% (Table 5). Sector that is resilient to tariffs is textiles. Textile imports are estimated to increase by 35.1% with zero tariffs on textile imports and by 32.4% with 35% (average) duty on textiles. Increase in imports particularly of manufactured products, textile, and beverages push the prices of domestically produced import-competitive products down (Table 5).

Table 5. Changes in imports across sectors, after tariffs reduction

	Overall % change in imports with 100% tariff reduction		% change in ROW imports with 100% tariff reduction (with/without protection to special product		% change in EAC and COMESA imports with 100% tariff reduction	
Sector	including tariffs on SP	Excl. tariffs on SP	SP protected	SP not protected	EAC	COMESA*
Livestock, livestock products	11.0	n/a	0.0	0.0	9.0	7.1
Fish	7.7	n/a	n/a	-2.9	7.6	-0.1
Cereals	1.9	1.9	1.8	1.8	-3.1	1.8
Wheat	4.5	3.8	4.0	7.7	-5.6	-6.8
Rice	12.5	11.9	0.6	2.6	10.5	-3.0
Other food commodities	1.0	n/a	n/a	1.6	-0.1	-0.1
Sugar	19.0	9.2	18.3	26.5	5.9	18.4
Agricultural, cash-based commodities /2	1.3	n/a	n/a	2.7	-0.3	6.1
Beverages	21.0	n/a	n/a	15.3	20.9	2.7
Textile	35.1	32.4	7.1	15.2	29.4	0.6
Manufactures	21.6	n/a	n/a	23.3	2.3	1.3

Notes: SP: sensitive products. * Tariffs on sensitive products maintained on imports from COMESA
1/ sesame, vegetables, fruits, spices, groundnut, and other foodstuff 2/ coffee, tea, tobacco, cotton

5 Uganda, being an LDC is not expected to take on WTO liberalisation commitments of cutting down its tariffs. The purpose of these simulations is to demonstrate the potential impact of fully liberalising Uganda's imports.

The 5.5% fall in production in manufacturing sector (Table 6), 5% fall in textile production and 18.7% fall in beverages production predicted by the model suggests an increased competition from cheaper imports.

Table 6. Effect on domestic prices and output

Sector	Index of composite prices base (average)	Domestic output of firm, base (average)	Percentage change in	
			Domestic prices	production
Livestock, livestock products	1.02	118.2	0.9	1.9
Fish, fish products	1.00	67.2	16.1	-2.4
Cereals	1.02	59.1	6.3	5.3
Other food commodities 1/	1.03	70.0	7.0	1.6
Sugar	1.00	88.3	0.9	0.8
Agricultural, cash-based commodities /2	0.95	161.8	-1.3	5.0
Beverages	1.03	48.0	-17.0	-29.0
Textile	1.00	98.2	-11.0	-5.0
Manufactures	1.01	84.0	-1.9	-5..5

Note: /1 and 2 as in Table 1

The results presented in this table are derived from simulating a 100% reduction in import tariffs (except for tariffs on sensitive products). Original tariffs on sensitive sectors are maintained since we expect these sectors to be excluded from future liberalisation commitments, including that under EPA arrangement.

Some poor households may gain from the price fall especially if the share of these imports in the consumption basket of the poor is large enough. However, there is a decline in the wages of the poor employed in the manufacturing, textile, and beverages sectors as we shall see later in Table 7. They may become worse off as a result unless the cost of the consumption bundle falls more than their wages. Domestic prices of sugar, livestock/livestock products, fish, cereals, and other food commodities went up due to increase in their exports and domestic demand. For all these products, except fish, domestic production also increased. Domestic price of sugar increases by 1% (Table 6), in contrast with 15% price increase in the previous simulation (Table 2). Sugar production increases by 0.8% under the 100% tariff reduction scenario on all imports (Table 6), compared with a 3.5% increase under the EAC tariff reduction (Table 2). The poor rely very much on their labour, and thus defines their condition after a shock. Table 7 shows increase in demand for unskilled labour and fall in demand for skilled labour in primary agricultural sectors (cereals, other food production sector, and livestock).

As expected, wages for unskilled labour employed in the livestock sector, cereals, sugar and other food sectors improve. These sectors use more unskilled labour than the manufacturing, and beverages sectors which have seen their production contract after the shock. As expected, manufacturing wages drop and skilled labour wages fall in primary sectors. The rise in unskilled labour wages and a fall in skilled labour wages suggest a narrowing of the wage gap between skilled and unskilled labour.

Table 7. Effects of tariff reduction on labour demand and sector wages

	Changes in labour demand (%)				Changes in wages (%)			
	unskilled labour		*skilled labour*		*unskilled labour*		*skilled labour*	
Sector	rural	urban	rural	urban	rural	urban	rural	urban
Livestock	3.10	0.89	0.05	-0.04	9.06	0.55	1.88	-0.03
Fish	-0.10	0.54	-0.49	0.20	-10.5	1.15	0.00	1.22
Cereals	12.10	3.50	-0.01	-2.01	5.70	6.03	0.00	-0.01
Other food com sector	2.40	1.05	-0.90	-0.01	2.98	2.40	-0.05	-0.03
Sugar	4.50	6.02	0.10	1.30	5.10	7.08	0.09	3.65
Agricultural, cash-based commodities /1	-0.01	0.03	0.00	-0.01	-2.03	1.01	0.00	-5.91
Beverages	-15.07	-2.15	-1.07	-0.17	-0.02	-19.02	0.01	-18.50
Manufactures	-10.32	0.79	-1.10	-0.56	-0.01	-19.17	0.00	-11.11

Note: /1 as in Table 1

It can be expected that the poor in rural areas benefit from 100% reduction in tariffs because demand for their labour rises hence increasing their wages. At the same time the prices of the goods they produce increase. The poor who are employed primarily in the export sector and consume importable goods gain more than those who are primarily employed in the import-competing sector and consume primarily exportable goods. In the long run, as labour and capital become mobile across sectors, labour should pay across sectors. Import sector is expected to contract in relative terms while the export sector expands and domestic industries are able to adjust.

3.5 Analysing Revenue Impact of Tariff Reductions

As discussed before, our model ensures revenue neutrality; any reduction in government revenue from tariff cuts is compensated endogenously by additional VAT and income tax. However, we are also interested in the revenue impact of tariff reduction. We relaxed the neutrality assumption, changed some closure rules and re-ran the simulations (that is, a 100% tariffs reduction on EAC imports, a 100% reduction on COMESA tariffs, and a 100% reduction of tariffs on all imports). The results show an overall loss in government revenue, but more so under full liberalisation as reported in Table 8. Revenue falls by 13.2% on removing EAC tariffs (simulation 1), by 8% on removing COMESA tariffs (simulation 2) and by 19.6% on removing all tariffs (simulation 3). Across sectors, tax revenue declines in all sectors. Most of the revenue losses are from manufactured imports. EAC tariffs reform accounts for about 16% of revenue lost from manufactured imports, COMESA tariff reduction for 11% and complete tariff removal for 43% revenue loss.

This means that without wide bases for consumption and income taxes to compensate for the decline in tariffs revenues, full liberalisation has the potential to stifle government expenditure: government

demand for commodities, payment of wages and capital and delivery of public goods, including expenditure on poverty reduction programmes and transfers (pension).

Table 8. Impact on government revenue (by sector) due to tariffs reduction

Sector	Base	**Simulation 1:** *100% reduction in EAC weighted average tariffs*	**Simulation 2:** *100% reduction in COMESA weighted average tariffs*	**Simulation 3:** *100% reduction in tariffs*
		Change in sector revenue collection (%)		
Livestock, livestock products	628.2	-4.65	-6.13	-14.42
Fish, fish products	16.9	-17.00	-0.90	-35.20
Food, agric primary com	1,289.4	-9.43	-8.03	-48.65
Agricultural cash commodities /3	757.7	-4.48	-0.22	-11.13
Manufacturers, and others	2,276.2	-15.87	-11.44	-43.10
Effect on revenue (%)		-13.24	-7.91	-19.6

Note: 3/ coffee, tea, tobacco, cotton/textile, vanilla, cocoa, flowers

3.6 Poverty Impact of the Tariff Reductions

Following a tariff reduction (Simulations 1–3), the monetary poverty line decreases in all cases as reported in Table 9, but it falls more in the case of a complete removal of tariffs (by 2.94%), than in the case of removal of EAC tariffs (2.76%, or removal of non-EAC COMESA tariffs (1.08%).

Table 9. Monetary poverty line

		Simulation 1 *100% reduction in EAC weighted average tariffs*	**Simulation 2** *100% reduction in COMESA weighted average tariffs*	**Simulation 3** *100% reduction in tariffs*
	Base	New poverty line after simulation	New poverty line after simulation	New poverty line after simulation
Poverty line / 1 NHS	137,568.0			
Poverty line (model) /2	137, 694.84	133,894.46	136,207.73	129,957.96
Poverty line /3	137, 694.84	133,894.06		
Change in monetary poverty line (%)		-2.76	-1.08	-2.94

Note: *
/1 NHS: monetary poverty line published in the Uganda National Household Survey 2002/2003;
/2 monetary poverty line (Base) generated by the model is much the same with food poverty line in 1/;
Household Survey (the poverty line allows for some limited expenditure on non-food items that constitute the basic needs.
3/ poverty line generated by the model within 10-15% change in elasticity parameters.

The fall in the poverty line in each of these cases is induced by a combination of factors, including a fall in composite prices of commodities comprising the basic needs basket of the poor. The decrease in composite prices is attributed to a fall in relative prices of imports (in domestic currency) following a removal of tariffs. The results suggest that all the three liberalisation strategies (removing EAC tariffs,

non-EAC COMESA tariffs, and all tariffs) are likely to facilitate poverty reduction in Uganda. However, greater poverty reduction is likely to be achieved with a complete removal of tariffs on all imports: from EAC, COMESA and ROW.

We explore this further by applying the Foster, Greer and Thorbecke (1984) *(FGTα)* decomposable indices (P_0 and P_1) focussing on changes in P_α indices after the shocks. Table 10 shows the changes in poverty headcount index (P_0) – the proportion of people living below the poverty line, and the poverty gap index (P_1) – the depth of poverty, the minimum cost of eliminating poverty through perfectly targeted transfers. National poverty headcount (including poverty in rural and urban areas) falls in all cases (removal of EAC tariffs, removal of non-EAC COMESA tariffs, and removal of all tariffs), but it falls more in the case of a complete removal of tariffs by 3.2%, and least in the case of removal of non-EAC COMESA tariffs (1.3 percent). These results reinforce the findings in Table 9, which shows the potential poverty (reduction) impact of fully liberalising trade as opposed to regional trading arrangement.

Table 10. FGT Poverty indices $(P_0$, P_1 and $P_2)$

	Base	Sim1	Variation (%)	Sim2	Variation (%)	Sim3	Variation (%)
			Poverty head count, $\alpha = 0$				
All (National)	38.800	37.837	-2.482	38.283	-1.333	37.546	-3.232
Rural	42.700	41.901	-1.871	42.392	-0.721	41.842	-2.010
Urban	14.400	13.978	-2.933	14.130	-1.874	13.903	-3.450
			Poverty gap index, $\alpha = 1$				
All (National)	11.900	11.626	-2.301	11.729	-1.433	11.530	-3.111
Rural	13.100	12.913	-1.425	12.981	-0.912	12.842	-1.970
Urban	3.900	3.827	-1.861	3.837	-1.610	3.761	-3.554
			Severity of poverty, $\alpha = 2$				
All (National)	4.84	4.643	-4.070	4.738	-2.103	4.556	-5.870
Rural	5.027	4.9218	-2.093	4.972	-1.091	4.917	-2.198
Urban	2.659	2.569	-3.371	2.583	-2.867	2.498	-6.043

Table 10 further indicates that poverty headcount index falls more in urban areas than in rural areas, in all the cases. For example, poverty headcount falls by 3.4% in urban areas after removal of all tariffs (simulation 3) against a 2% fall in rural areas.

The depth of poverty (as measured by poverty gap index, P_1) has gone down in all the cases and in both urban and rural areas. Like the case of headcount index, poverty gap index shows more improvement in the case of removal of all tariffs (where it declined by 3.1%) than the case of removal of EAC or non-EAC COMESA tariffs (simulations 1 and 2, respectively). P_1 falls more in urban areas than in rural

areas, for example, a 3.5% fall in urban poverty gap compared with a 1.9% fall in rural poverty gap after a removal of all tariffs (simulation 3, Table 10). The results suggest that the cost of lifting the poor (all households below the poverty line) out of poverty through transfers will be lower under multilateral trade liberalisation than under regional integration (removal of tariffs on EAC or non-EAC COMESA tariffs). The severity of poverty, measured by P2, falls in all cases; by 4% with removal of EAC tariffs, 2 percent with removal of non-COMESA EAC tariffs and by 6% with removal of all tariffs. Severity of poverty falls more in urban areas than in rural areas.

3.7 Sensitivity Analysis

The simulation results are influenced by the choice of parameters in the model. This section highlights the impact (on the results) of varying the values of some of the key parameters. There are three parameters that have had a strong impact on the results: the elasticities of substitution between imports of different origin; elasticities of substitution between domestic and imported goods; and elasticities of transformation (in CET function). All parameters retained their standard (original) values, except the parameter in question. Variables associated with welfare improvements, for example, domestic output, and wages reacted positively to an increase in substitution elasticities. This is not surprising, since higher elasticities imply that agents are able to shift to sectors, products and sources that are cheaper and economically more rewarding.

By varying the elasticity estimates (from about 10 to 50 percentage point below and above the standards GTAP elasticity indexes), the poverty line index varied between -0.01 to about -1.2 percentage points in the three simulations. And, the effects were much stronger for the third policy scenario (100% reduction in tariffs) than any of the two simulations performed separately.

4 CONCLUSIONS AND POLICY IMPLICATIONS

In this paper, we outlined the developments in trade policies in Uganda since the 1980s and provided empirical evidence on how tariff reduction can impact on poverty. Evidence from a CGE evaluation of trade policies at regional level (EAC and COMESA) reveals differences in impact of these policies on key macro variables and poverty level. However, it shows that both of them will reduce poverty. A complete phase-out of tariffs on EAC imports is likely to reduce poverty as shown in the decrease in poverty threshold (-2.76%) and poverty headcount index. Tariff reduction on COMESA imports is also likely to facilitate poverty reduction (as poverty line decreased by 1.08% on implementing a tariff reduction on COMESA imports, poverty headcount decreased in rural and urban areas). Still, it can be concluded that greater poverty reduction is likely to be achieved with liberalisation that is wider in scope than regional

arrangements under EAC and COMESA alone (as evidenced by 2.94% fall in poverty threshold with wider tariff reduction). However, noting the reaction to tariff reduction of the sectors that are currently classified as 'sensitive' in Uganda, care is needed when opening up these sectors to free trade due to vulnerability from increased imports.

One of the most influential channels of trade policy in Uganda is the first order effect transmitted through the price of imports. This implies that to reduce poverty, policies need to pay more attention to enhancing output in import-competing sectors, and stimulating production and exports in the agricultural sector. This will minimise the long run price effects of rising imports when these sectors are fully open to competition.

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Table A1. Simulation results: Effects of tariff reductions on imports

	Simulation 1: *100% reduction in tariffs on imports from EAC*				Simulation 2: *100% reduction in COMESA tariffs*		Simulation 3: *100% reduction in tariffs*	
Sector	EAC imports	% change in imports from			Imports from COMESA		Imports from ROW	
	Base	EAC	COMESA	ROW	Base	Change, %	Base	Change, %
sec1	0.07	-8.7	7.8	-19.0	0.02	1.9	0.10	11.0
sec2	0.75	12.4	1.2	9.8	0.10	2.2	0.04	10.1
sec3	0.10	-30.8	4.3	10.8	0.38	15.3	0.01	12.3
sec4	0.40	13.3	4.3	-1.0	0.07	3.3	0.82	-9.9
sec5	0.06	7.6	0.1	-7.8	0.01	0.1	0.40	7.7
sec6	0.01	6.4	0.0	-8.9	0.01	0.0	0.01	0.0
sec7	0.91	19.1	-0.5	0.5	0.01	-1.5	16.00	11.9
sec8	0.90	-9.2	-2.3	-9.8	0.01	2.3	3.12	-7.9
sec9	0.40	16.1	-0.5	1.1	0.01	0.1	0.76	1.0
sec10	5.90	1.8	-0.9	10.1	0.01	-2.5	52.75	1.8
sec11	0.70	5.0	5.3	1.8	0.47	7.3	1.32	9.0
sec12	0.03	2.3	-2.0	-5.7	0.01	-5.0	0.01	0.0
sec13	0.01	0.0	0.0	-8.4	0.01	0.0	0.22	0.0
sec14	0.01	0.0	-10.0	-10.0	0.43	10.0	0.15	4.0
sec15	9.82	6.5	5.9	18.4	47.84	15.9	12.55	9.2
sec16	6.20	-4.5	-6.9	4.1	0.00	4.9	72.61	3.8
sec17	0.40	0.0	0.0	11.6	0.00	0.0	3.04	-0.3
sec18	4.31	0.4	-5.8	2.7	1.82	-12.8	4.05	1.9
sec19	0.00	-2.7	0.0	0.1	0.01	0.0	0.01	0.0
sec20	0.60	1.4	-7.8	8.7	0.19	-8.8	7.11	0.9
sec21	0.01	0.0	0.3	0.0	0.01	0.3	0.01	0.0
sec22	1.06	1.4	4.3	9.7	0.06	3.3	0.16	6.7
sec23	8.54	-1.4	4.9	-1.9	0.98	2.9	7.13	1.0
sec24	1.10	2.9	33.6	11.3	1.00	13.1	0.23	8.5
sec25	5.34	21.3	32.7	20.9	0.32	7.7	1.40	21.0
sec26	0.20	-6.3	-2.9	10.0	0.01	-2.0	0.74	-5.3
sec27	0.17	9.0	16.1	7.8	0.01	-10.1	0.87	8.0
sec28	0.82	10.0	-9.8	2.5	29.57	19.8	0.18	1.3
sec29	0.88	12.3	2.8	3.1	4.08	12.8	0.17	1.0
sec30	11.30	38.4	-7.8	7.3	1.30	9.2	73.05	32.4
sec31	0.01	1.9	7.1	3.4	0.01	-0.8	0.04	0.0
sec32	0.06	0.6	-5.2	-8.3	0.01	-5.1	0.01	-3.9
sec33	0.01	1.6	-8.7	1.5	0.01	-9.9	0.01	1.7
sec34	0.61	4.2	0.1	2.4	0.01	-7.1	0.53	2.5
Sec35	48.8	4.3	2.5	11.4	33.56	16.5	81.36	21.6
Sec36	1.85	27.4	-8.4	11.4	0.76	11.4	0.16	13.5

Notes :
See Table A3 for definition of sectors

Table A2. Simulation results: Effects of tariff reduction on Uganda's exports

	Simulation 1: 100% reduction in EAC tariffs				*Simulation 2: 100% red in COMESA tariffs*		*Simulation 3: 100% reduction in tariffs*	
	Exports to EAC		% change in exports to		Exports to COMESA		Exports to ROW	
	Base	% change	COMESA	ROW	Base	% change	Base	% change
sec1	0.08	17.67	4.9	-26.1	0.01	16.07	0.01	-26.5
sec2	0.75	-9.7	8.8	3.6	0.01	-8.0	0.07	-1.0
sec3	0.23	-4.8	-2.4	-8.7	0.01	-4.8	0.01	-9.4
sec4	0.22	4.2	29.9	9.2	0.09	4.2	0.01	11.1
sec5	4.42	-8.0	-24.0	4.8	3.96	-7.9	2.60	-5.7
sec6	0.01	16.1	0.6	3.3	0.01	19.4	0.01	3.5
sec7	0.92	35.4	5.5	6.6	2.78	35.0	0.29	7.9
sec8	11.47	-1.1	35.0	15.4	0.78	-1.0	0.07	22.2
sec9	1.08	7.7	15.8	-6.9	2.62	7.1	7.09	-6.0
sec10	5.57	38.5	27.5	21.9	4.19	40.5	0.62	15.0
sec11	0.47	11.1	29.9	21.7	0.14	12.1	0.12	13.8
sec12	0.00	9.0	4.1	1.7	0.02	9.0	0.01	4.0
sec13	0..06	3.9	2.3	8.1	0.01	3.0	0.01	10.6
sec14	0.12	9.4	13.0	1.0	0.01	9.4	0.01	-1.2
sec15	1.11	45.2	39.4	15.0	5.30	46.2	3.95	14.0
sec16	0.85	39.2	1.5	17.3	0.37	39.4	0.03	16.9
sec17	0.04	-5.0	-5.0	-1.0	0.11	-5.8	0.01	4.4
sec18	2.56	10.3	24.3	-9.4	7.12	10.5	0.21	5.0
sec19	0.01	0.0	0.9	-2.0	0.01	0.8	0.01	3.4
sec20	5.21	-21.0	9.1	13.1	3.30	-1.0	0.48	11.1
sec21	0.22	-6.6	-1.1	24.5	0.01	-4.9	0.05	21.2
sec22	0.02	31.5	5.6	-7.2	0.05	29.5	0.02	-13.0
sec23	2.55	8.2	-19.4	21.2	0.95	8.1	0.08	22.6
sec24	0.07	29.6	12.2	7.5	0.43	29.8	0.24	5.8
sec25	1.01	5.0	29.1	4.4	4.43	2.0	1.24	-16.1
sec26	1.24	5.1	43.7	38.7	25.59	5.1	6.85	38.7
sec27	34.20	38.8	33.4	15.9	0.01	38.7	0.80	10.9
sec28	3.16	68.6	-9.3	30.5	7.11	55.1	1.06	29.9
sec29	0.00	12.7		31.1	0.01	13.3	5.60	30.8
sec30	5.34	32.1	9.1	-26.9	4.04	32.1	3.24	-6.7
sec31	0.01	0.8	-1.2	-7.5	0.01	0.8	1.60	3.0
sec32	0.42	-22.2	-9.0	13.5	0.01	-22.1	6.46	1.9
sec33	0.01	0.9	3.4	2.2	0.03	0.1	3.43	1.9
sec34	0.50	-33.3	4.1	-10.0	0.50	-9.6	3.56	-5.0
Sec35	56.75	38.0	15.1	9.7	42.61	46.0	12.40	1.4
Sec36	4.92	9.7	4.7	16.7	0.10	2.7	4.70	9.5

Notes
See Table A3 for definition of sectors

Table A3. Sectors included in the model , and substitution elasticities

		Elasticity 1/		
Name used in GAMS code	Meaning of the name	Domestic/ imported (σD)	Sourcing of imports (σM)	Value-added (σVA)
sec1	Live Animal	2.00	4.00	0.24
sec2	Beef, other meat	3.85	7.70	1.12
sec3	Poultry, poultry product	1.30	2.60	0.24
sec4	Milk, diary	3.65	7.30	1.12
sec5	Fish/fish products	1.25	2.50	0.20
sec6	Potatoes	2.50	5.00	0.24
sec7	Rice	2.60	5.20	1.12
sec8	Maize	1.30	2.60	0.24
sec9	Bread	2.00	4.00	1.12
sec10	Cooking oil, oil seeds	3.30	6.60	1.12
sec11	Fruits, fruit juice	1.85	3.70	0.24
sec12	Ground nuts	2.45	4.90	0.24
sec13	sesame	2.45	4.90	0.24
sec14	Soy beans	2.45	4.90	0.24
sec15	Sugar	2.70	5.40	1.12
sec16	Wheat	4.45	8.90	0.24
sec17	Sorghum	1.30	2.60	0.24
sec18	Other cereals	1.30	2.60	0.24
sec19	Cassava	2.50	5.00	0.24
sec20	Vegetables	1.85	3.70	0.24
sec21	Matooke/ other banana	1.85	3.70	0.24
sec22	Spices	2.00	4.00	1.12
sec23	Other foods	2.00	4.00	1.12
sec24	Water	2.80	5.60	1.26
sec25	Beverages	1.15	2.30	1.12
sec26	Coffee	1.15	2.30	1.12
sec27	Tea	1.15	2.30	1.12
sec28	Tobacco	1.15	2.30	1.12
sec29	Cocoa	3.25	6.50	0.24
sec30	Cotton, textiles	3.75	7.50	1.26
sec31	Flowers	3.25	6.50	0.24
sec32	Hides & skins	4.05	8.10	1.26
sec33	Vanilla	1.15	2.30	1.12
sec34	Seeds	2.45	4.90	0.24
Sec35	Manufactures	3.75	7.50	1.26
Sec36	Other commodities	4.05	8.10	1.26

Notes: 1/ Source: GTAP Data Base - Dimaranam, B.V., McDoutall, and Hertel, T.W. Behavioral Parameters, GTAP Data Base.
σD = Armington elasticity of substitution between domestic and imported goods
σVA = Elasticity of substitution between primary factors in the production of commodity