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Abstract

The paper examines the projected impacts of agricultural trade liberalisation by OECD countries on poverty in Uganda and compares them to the poverty impacts of all merchandise trade liberalisation. The overall impact of OECD agricultural trade liberalisation on welfare in Uganda from this simulation is positive in contrast to previous research, nevertheless, the poor appear to be made worse off. The liberalisation of all OECD merchandise trade including non-agricultural commodities reduces welfare for all deciles irrespective of household poverty status, residence and region. The results for global partial merchandise trade liberalisation are similar to those for total trade liberalisation with an overall welfare decline of about 0.5 percent. More specifically, even the modest welfare gains for producers from increased prices seem to be offset by welfare losses from increases in consumer goods. Overall, because of the large subsistence agricultural sector, households tend to experience little or no change in total welfare arising from agricultural price changes. Increases in market value of their agricultural based output tend to be offset by changes in the opportunity cost of their subsistence consumption of the bulk of that output.

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I INTRODUCTION

Since the beginning of its economic reform programme in 1987, Uganda has become more integrated into the world economy. Exports and imports of goods and services as a share of GDP rose from 33.8 percent in 1986/87 to 35.0 percent in 2004/05. Uganda's narrow export base (over 90 percent of export earnings came from the main traditional exports – coffee, cotton, tea and tobacco – in 1986/87 although this has fallen to 25 percent in 2004/5) has meant that its economic performance is strongly affected by world market conditions, and particularly world market prices for its major export crops as well as for its major import item, oil.

World market prices are mainly determined by underlying supply-demand conditions on the global market, but for a number of commodities agricultural trade policy, particularly in OECD countries, also plays a role. Uganda benefits from non-reciprocal preferential treatment available to developing countries under, inter alia, the U.S. African Growth and Opportunity Act (AGOA), the EU-ACP Cotonou Agreement and the EU Everything But Arms (EBA) scheme. AGOA preferences benefit manufactured goods, while the EU EBA scheme offers, in addition, duty free and quota free access to Ugandan agricultural exports to the EU. At the same time, Uganda is a significant importer of certain food products and must take account of the prices it must pay for these imports.[1] Given that agricultural trade policy reforms are being negotiated in the WTO Doha Round, and that changes are also underway in the EU's Common Agricultural Policy, it is of interest to ask what impact agricultural policy changes in OECD countries might have for economic performance and poverty reduction in Uganda.

Previous research (Giblin and Matthews, 2005) suggests that liberalisation of OECD countries' agricultural policy would have a slightly negative, if relatively minor, overall effect on the Ugandan economy. While some Ugandan exports (for example, cotton, tobacco) may benefit from the higher world market prices that would result from a reduction in the levels of support to these commodities provided by OECD countries, Uganda could expect to pay more for some of its importables such as rice and sugar as well as lose some of the margin of preference it currently enjoys on non-traditional exports (flowers, horticulture) particularly to the EU market. This pessimistic assessment of the overall impact of OECD countries' agricultural trade reform does not represent the full outcome of a Doha Round agricultural agreement. Least developed countries (including Uganda) will not be asked to take on any additional market access commitments in this Round. However, other developing countries both in Sub-Saharan Africa and elsewhere will be expected to lower their existing tariffs on agro-food commodities under the principle of proportionality covered by the principle of special and differential treatment of developing countries. The Giblin and Matthews study suggests that easier access to regional and non-OECD markets could provide a more positive stimulus to the Ugandan economy, such that the overall impact of a Doha Round agreement might be slightly positive. However, the effects are very small and the overall conclusion is that Uganda will be very little affected one way or the other by a Doha Round agreement on agriculture.

But while aggregate impacts might be small, changes in world market prices could have important income distribution effects within Uganda, affecting prices in both factor and goods markets. Other work (Opolot et al, 2006) raises a question mark over the extent to which world market price changes actually get reflected in price changes in Ugandan domestic markets, but for the purposes of this paper, we assume reasonably complete price transmission. Producers (farmers) might expect to benefit from higher world market prices, while consumers particularly

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[1] In 2005 food imports (including non alcoholic beverages) had an import bill of US$ 300 million, about 17 percent of the total import bill.

in the urban areas might expect to be slightly worse off. The impact on poverty will depend not only on whether the poor are net agricultural commodity producers or consumers, but also on the main sources of livelihood of poor and non-poor households. The price changes for the main sources of factor income (unskilled and skilled labour, land and capital) as well as for food expenditures will differ. They will thus have differential effects on poor and non-poor households, depending on the composition of their sources of income as well as the make-up of their basket of food expenditures.

Previous work on Uganda supports the view that trade policy changes can have significant poverty effects. Morrissey, Rudaheranwa and Moller (2003), who focus on trade performance rather than trade policy, conclude that trade, imports and exports affect households in different ways, as producers or consumers, and thus distribution affects should be allowed for in any poverty reduction strategy. They demonstrate that trade made an important contribution to poverty reduction in Uganda through exports, but that the gains were unevenly distributed. They identify household types, which gained from trade over the 1990s, but also household types, which did not gain. Their conclusion is that future trade policy should aim to consolidate gains by supporting sectors that experienced export growth and diversification and recognise the pressure of trade liberalisation on import competing sectors.

The recent World Bank Uganda Diagnostic Trade Integration Study (Tang, 2006) also recognised that trade policy can have important implications for poverty. It presented estimates of the impact on household income and poverty levels arising from changes in Uganda's domestic tariff structure through the adoption of the Common External Tariff (CET) of the East African Co-operation and the projected lowering of this tariff. It concluded that the adoption of the CET was anti-poor because of the large increase in tariffs on food and beverages, and the fact that expenditures on food generally make up a larger share of the expenditures of the poor than of the rich. This study also noted that the anti-poor effect is more severe in the urban than in the rural areas.

The contribution of this study is that it focuses ex ante on the poverty implications of OECD country agricultural trade policy reform. It presents a microsimulation of the impact on the poor of price changes in both factor and agricultural markets due to OECD country agricultural trade reform scenarios using income and expenditure data in the 1999/2000 Uganda National Household Survey and estimated global price changes. These impacts are compared to two other trade liberalization scenarios, including liberalization of OECD trade in manufactured goods and global partial liberalisation of all merchandise trade in which all countries including Uganda reduce but do not eliminate tariffs. Our purpose is to contribute to the debate on the coherence of OECD country agricultural policies with OECD countries' commitments to help developing countries to meet their Millennium Development Goal targets of reducing the numbers in poverty by half by 2015.

The structure of the paper is as follows. Section 2 documents the consumption and income characteristics of Ugandan households. Section 3 briefly describes how the impact of trade liberalisation on households can be measured. Section 4 describes the outcome of the microsimulation exercise designed to evaluate the possible impact of OECD agricultural policy reform on Ugandan poverty and to compare it to two other trade liberalization scenarios. The final section summarises the conclusions that are derived from the simulation experiments.

II HOUSEHOLD CHARACTERISTICS

2.1 Household income and expenditure characteristics

The impact of a vector of price changes upon a household will depend on the relative importance of its different sources of income and of the different goods in its consumption basket. For example, if the price of a staple food rises sharply then net producers will benefit, whereas net consumers will lose, but the extent of the gain or loss depends upon the production of this good and how important this good is in the household's consumption basket. Consequently, the best place to start in determining the impact of a price shock is to obtain, for different groups in society, information about the relative importance of different sources of income and the relative importance of different goods in household consumption. Tables 1, 2 and 3 show the sources of income and expenditure shares by deciles, residence, region, and the poverty status of households. The poverty status of households is measured based on comparisons of household consumption per adult equivalent with the absolute poverty line of approximately one dollar a day that is employed internationally. Total expenditure per adult equivalent derived from the 1999/2000 data set is used to rank households for the purpose of classifying households into deciles. The 1999/2000 household survey data is used in preference to the later 2002/03 survey because it provides more detailed information on the income sources of households as described below.

2.2 Sources of income for households

Table 1 shows the details of the sources of income of households by poverty status, region, and geographic area. Most households derive their livelihood from agriculture, either directly or indirectly. On average, the contribution of crop farming enterprises to the overall income of all households is 31.6 percent while other agricultural enterprises such as livestock and poultry contribute 3.6 percent. The poor earn 45.4 percent of their income from crop farming enterprises compared to 19.7 percent for the non-poor. Crop farming enterprises dominate as sources of income in most of the country with shares for the western, central and eastern regions at 39.7, 28.7 and 28.6 percent respectively. In the urban areas, non-agricultural activities are the most important source of the households' income at 37.9 percent. At the aggregate level, households earn 24.1 percent of their income from non-agricultural activities, 7.7 percent from property income and 20.5 from employment income. There is a substantial proportion of transfers of 12.5 percent in overall income, which shows that there are many dependent households especially the elderly and children. The sources of income are consistent with the Cambodia where the rich earn a far higher share of their income from non-farming activities than the rest of the population (McCulloch, 2003). Whereas people in urban areas derive 32.9 percent of their income from salaried employment, the people in rural areas earn 47.0 percent of their income from crop farming enterprises. There is a wide income gap between the poor and non- poor, with the typical poor person earning an average annual income of Shs. 0.447 million compared to the typical non-poor person who earns an average income of Shs. 5. 668 million.

Table 1: Disaggregated sources of income of households (by poverty status, region, and geographic area).

Decile	Crop farming enterprises	Other Agric enterprises (Livestock, poultry)	Non-agric	Property income	Transfers	Employ-ment income	Total	Average annual income (Shs)
1	35.7	1.3	11.2	7.0	29.7	15.1	100	446,598
2	41.1	1.4	14.0	5.4	22.3	15.8	100	681,595
3	39.5	1.7	14.3	6.5	19.4	18.5	100	804,494
4	42.0	2.4	16.2	5.4	17.4	16.7	100	930,135
5	38.2	2.9	20.1	5.4	14.6	18.8	100	1,262,908
6	36.6	2.9	21.7	5.8	14.2	18.8	100	1,367,342
7	37.0	2.5	23.0	5.9	12.8	18.9	100	1,636,110
8	34.1	4.0	22.1	8.4	13.1	18.3	100	2,064,423
9	32.2	3.6	23.5	7.0	10.3	23.5	100	2,600,493
10	21.8	5.0	32.0	10.2	8.0	23.0	100	5,667,798
Non-poor	19.7	3.2	31.5	9.4	10.3	25.8	100	3,060,821
Poor	45.4	4.1	15.5	5.7	15.1	14.3	100	1,160,641
Rural	47.0	4.9	15.3	5.9	14.5	12.5	100	1,363,516
Urban	7.6	1.6	37.9	10.5	9.5	32.9	100	3,107,829
Kampala	0.8	0.2	38.2	14.6	10.3	35.9	100	4,809,351
Central	28.7	3.8	25.2	9.3	11.6	21.4	100	2,224,463
Eastern	28.6	2.5	26.2	5.7	15.4	21.6	100	1,592,586
Northern	26.1	2.4	26.7	7.7	14.5	22.6	100	1,063,553
Western	39.7	4.8	20.1	7.3	10.5	17.5	100	1,815,555
All	31.6	3.6	24.1	7.7	12.5	20.5	100	1,156,327

Source: Computed from 1999/2000 Uganda National Household Survey Data

2.3 Sources of household crop income

Because of the importance of crop income in total income, it is useful to disaggregate further the dependence of households on different types of crop income. Among the crops specified in Table 2, maize, matooke and beans are the dominant crops. Maize is the dominant crop grown by the poor from which they earn 28.8 percent of crop income, although cassava is also important among the very poorest households. Matooke is the dominant crop among the non-poor, from which they earn 19.8 percent of crop income. This shows that the poor tend to grow food crops mainly for subsistence purposes while the non-poor grow cash crops. Matooke is still the dominant crop in urban areas from which the households earn 16.5 percent of crop income while maize is dominant in rural areas, from which the households earn 25.7 percent of crop income. Furthermore, maize dominates the contribution to the crop income in the eastern region with 48.2 percent while matooke dominates the contribution to the crop income in the central and western regions with 18.9 and 25.6 percent respectively. Table 2 shows disaggregated data of crop income from the crop module. The table also shows that the richer deciles have more diverse sources of crop income evidenced by a substantial proportion of income from other crops.

Table 2: Disaggregation of crop income from crop module

Decile	Maize	Finger millet	Sorghum	Beans	G/nuts	Matooke	S/potatoes	Cassava	Other	Crop farming
1	12.9	10.1	4.9	14.1	7.2	9.1	1.2	15.2	25.3	100.0
2	13.3	5.4	12.9	13.3	5.5	8.4	2.9	9.7	28.5	100.0
3	13.9	7.5	3.7	15.8	7.9	11.5	3.0	10.1	26.5	100.0
4	15.9	5.1	8.0	16.3	6.6	13.7	2.7	7.6	24.1	100.0
5	14.3	7.5	2.9	14.6	9.0	13.7	1.6	5.2	31.3	100.0
6	14.0	5.4	2.5	14.3	7.0	13.8	3.7	4.4	34.9	100.0
7	14.6	5.2	4.1	13.3	6.6	18.4	1.8	3.4	32.5	100.0
8	13.2	6.4	2.6	14.6	8.4	16.9	1.0	3.8	33.1	100.0
9	12.8	4.6	2.0	12.5	8.2	17.2	1.3	3.3	38.1	100.0
10	11.6	3.4	1.5	11.3	5.1	19.6	1.5	2.2	43.6	100.0
Non-poor	15.8	3.3	2.9	11.6	5.6	19.8	1.7	2.5	36.7	100.0
Poor	28.8	5.4	3.6	12.1	6.0	11.3	1.9	5.0	25.9	100.0
Rural	25.7	5.0	3.6	12.0	5.6	13.8	1.8	4.4	28.1	100.0
Urban	12.8	2.4	1.3	11.5	7.7	16.5	2.2	2.0	43.5	100.0
Kampala	51.6	0.0	0.0	21.9	0.0	0.0	24.2	0.0	2.3	100.0
Central	13.9	0.6	0.6	15.0	3.8	18.9	2.2	1.5	43.4	100.0
Eastern	48.2	6.2	2.3	5.3	6.4	4.3	1.2	2.7	23.3	100.0
Northern	10.4	8.1	6.1	11.1	8.6	0.8	2.0	25.5	27.4	100.0
Western	8.4	5.9	6.6	18.0	6.2	25.6	2.3	2.7	24.3	100.0
All	24.6	4.8	3.4	12.0	5.8	14.0	1.8	4.2	29.4	100.0

Source: Computed from 1999/2000 Uganda National Household Survey Data

2.4 Composition of household consumption expenditure

The details of the composition of consumption expenditure are shown in Table 3. Food, beverages and tobacco form a substantial proportion of consumption expenditure, followed by services. The smallest proportion of consumption expenditure goes to other goods. On average, 52 percent of expenditure is attributed to food, beverages and tobacco; for poor households, the proportion is 60 per cent compared to 45.6 percent of the expenditure of the non-poor. This is followed by expenditure on services of 27.8 and 37.1 percent for the poor and non-poor respectively. The households in the Northern region incur a larger proportion of consumption expenditure on food, beverages and tobacco compared to people in other regions. About 40 percent of the consumption expenditure of the people who live in urban areas goes to services compared to 29 percent for those who live in rural areas. This demonstrates that people who live in urban areas spend more on services relative to those who live in rural areas, who spend more on food, beverages and tobacco.

Table 3: Composition of consumption expenditure

Decile	Food, beverages and tobacco	Other goods	Services	Non-consumption Expenditure	Total	Average Annual expenditure Shs
1	62.5	8.0	27.5	2.1	100	367,739
2	61.9	9.5	26.2	2.4	100	878,484
3	62.3	9.7	25.1	2.9	100	1,433,870
4	61.0	9.8	26.2	3.0	100	2,014,156
5	60.5	10.5	25.6	3.5	100	2,620,121
6	60.5	9.9	26.4	3.3	100	3,158,561
7	58.6	10.6	26.9	3.9	100	3,722,689
8	56.9	10.4	28.6	4.1	100	4,294,872
9	52.4	11.0	31.7	5.0	100	4,917,647
10	37.5	12.1	44.3	6.1	100	9,521,064
Non-poor	45.6	5.5	37.1	11.9	100	2,878,078
Poor	59.6	3.2	27.8	9.5	100	1,169,482
Rural	57.6	3.5	29.0	9.9	100	1,378,813
Urban	42.6	6.0	39.3	12.1	100	2,939,568
Kampala	36.2	4.9	46.5	12.4	100	4,139,799
Central	48.1	5.0	36.0	10.9	100	2,052,976
Eastern	52.9	4.9	32.3	9.9	100	1,679,008
Northern	56.6	4.0	27.2	12.2	100	1,051,939
Western	54.9	3.3	31.0	10.8	100	1,773,645
All	52.0	4.4	32.8	10.8	100	1,672,145

Source: Computed from 1999/2000 Uganda National Household Survey Data

III THE IMPACT OF TRADE RELATED PRICE CHANGES

Recent studies have shifted emphasis increasingly to quantifying the impact of trade liberalisation on the poor following Mellor and Gavian (1999), Dollar and Kraay (2000) and Winters (2000, 2002). Trade expands market opportunities and increases the demand and returns to factors of production. However, trade also increases competition, suggesting that success only comes with increased efficiency and production of high quality goods. The study by Morrisey et al (2003) represents a specific attempt at investigating the impact of trade on poverty in Uganda, arguing that the liberalisation of trade and agricultural marketing in the country was associated with poverty reducing growth. The premise was that as exports contribute to growth, trade directly contributes to reducing poverty. However, imports and exports affect households in different ways depending on whether they are producers or consumers. Import barriers create an anti-export bias by raising the price of importable goods relative to exportable goods. Removal of the anti-export bias through trade liberalisation helps to shift resources from the production of import substitutes to the production of exports. The shift in resources should imply that land and rural labour in Uganda that is used intensively in the production of exports should benefit most. While factors employed in the production of import competing goods such as urban capital and labour should expect to loose. However, trade policy barriers constitute only a component of the transactions costs that are associated with trade.[2]

Trade liberalisation will benefit the poor if it increases the returns to the factors owned by them. Even if they do not benefit directly from increased demand generated by a trade liberalisation, they may do so indirectly as those who do benefit directly increase their demands for inputs and consumption goods and services. It is argued that one of the main advantages of stimulating agriculture is that it strongly increases the demand for goods and services produced by the poor (Mellor and Gavian, 1999). Trade has a potential to change prices of goods and services in an

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2 Poor infrastructure by raising transport costs and institutional inefficiencies can significantly increase trade costs. Problems related to access and reliability of electricity, limited access to finance, inefficient service delivery in the communications sector all affect trade.

economy. If trade is to impact on poverty, then it is important to comprehend how price changes that result from trade affect the poor. McCulloch, Winters and Cirera (2001) provide a simple mechanism that is grounded on the analysis of household survey data to compute the first order impacts of changes in trade policy.

Interest in examining the impact of trade policy reforms upon poverty and the distribution of welfare in developing countries is growing (Winters, 2000 and Reimer, 2002). In particular, there has been concern regarding the potential distributional impacts of OECD agricultural trade policies for developing countries. It has been argued that if developed countries liberalised their agricultural trade policies, it would lead to an improvement in both production efficiency and resource allocation in developing countries. Understanding the impact of price changes on poverty is therefore an important element of trade policy reform, because the imposition or removal of tariffs on certain types of agricultural products can have important effects on the poor.

The underlying theoretical basis tying trade policy changes to poverty is available in Winters (2000) as well as McCulloch, Winters and Cirera (2001). Indeed, it is recognised that linking price changes that arise from trade reform to poverty is complex. The complexity has led to the design of different methods to tackle the problem. It has been suggested that the most ideal mechanism of tracing the impact of trade induced price changes on poverty is via an appropriately designed general equilibrium model that suitably disaggregates the household sector. Such a model can help generate predictions for the impact of price shocks upon different types of households and poverty. In addition CGE models can provide superior results especially regarding how sensitive results are to particular assumptions. CGE models can examine the impact of trade led impacts of price changes, but the drawback is that these models require a lot of data. In most countries Social Accounting Matrices (SAMs) may not be useable or available (McCulloch, 2003).

Given the huge data and resource requirements to conduct CGE type models, it is possible to employ simple partial equilibrium models to provide a rapid appraisal of poverty effects using available household data. Household survey datasets are rich in information regarding patterns of consumption and how this consumption changes across different household types (Nicita, Olarreaga and Soloaga, 2002). Surveys may also contain information on income that can provide answers regarding the relative significance of various sources of income for different sectors of the population. Analysis of such data can provide an interesting picture regarding poverty profiles as well as an initial map of the possible impact of trading partner policy reforms.

Nicita, Olarreaga and Soloaga (2002) provide an underlying methodology that relies on the analysis of a household whose income is a sum of three components; own production, wage employment and net transfers. Own production is composed of value added from farming activities and any other enterprises owned by the household. Wage employment aggregates all payments that the household receives from outside the household for labour services of its members. Net transfers includes the net payments from government, other transfers less taxes as well as net remittances from other households. McCulloch (2003) indicates that this methodology derives from the assumption that in the short run households cannot change their activities in response to a change in prices. This assumption allows income from own production and wage employment to be generated as a product of a set of prices and a set of quantities. Income from own production will be equivalent to the prices of the outputs produced multiplied by the quantities of inputs used. Income from wages will be wages multiplied by the net quantity of labour sold. Assuming that households are incapable of changing their underling activities in the short run when price changes result, then the appropriate estimate of the change in their income

that results from price shocks will be the sum of the price changes times the original quantities produced.

The derivation by Minot and Goletti (2000) allows a representative household to consume as well as produce and price changes will affect consumption as well. However, in the static short run quantities of goods consumed by a representative household are not variable. Hence a first approximation of the increase in the cost associated with a price increase will be derived by the change in the price times the quantity of the good originally consumed. Aggregating the production and consumption effects, it is possible to calculate changes in welfare. Welfare changes can be derived as the change in income less the change in consumption. The underlying intuitive sense in summing these effects is that an increase in the price of a good that is both produced and consumed will increase the income and also raise the cost of obtaining the original level of household consumption with the difference indicating changes in welfare.

The attraction of the Nicita, Olarreaga and Soloaga (2002) methodology is that first order percentage changes in welfare can be easily derived. The derivation employs readily available information on income shares of different income sources, the budget shares of different income sources, the budget shares of different expenditure items, and the percentage changes in prices experienced. This information can be derived from the Uganda National Household Budget Survey 1999/2000.

IV SIMULATION OF THE IMPACT OF PRICE CHANGES

4. 1 Methodology to derive the impact of price changes on households

The analysis employs primary data from the Uganda National Household Survey (UNHS) of 1999/2000 carried out by Uganda Bureau of Statistics. The UNHS collected information on the socio-economic characteristics of both the household and community levels. The main objective of the survey was to generate improved data on population and socio-economic characteristics of households for monitoring development performance. The total sample size used for analysis was 9,711 households. Given the differences observed between poor and non-poor households in terms of their sources of income and their patterns of expenditure, it will not be surprising to find that agricultural trade policy reforms in OECD countries are likely to have an impact on the amount and distribution of poverty. The size and direction of this impact is investigated in this section. We simulate the impact of price changes on household welfare using the methodology employed in Nicita, Olarreaga and Soloaga (2002) to study the impact of trade reform in Cambodia.

The empirical analysis is based on the Uganda household survey (1999) since this dataset contains relevant data for the analysis which was not included in the 2002/2003 survey. The 1999 dataset includes a consumption expenditure module as well as information on household income. This latter income data contains information regarding household enterprises; employment and other activities for the last 12 months preceding the date of the survey; property income that is generated from imputed rents (gross less maintenance, upkeep and mortgage interest paid) of owner occupied dwellings; actual payments from others for use of buildings, land, financial assets; and intangible assets such as copyrights and patents information. Furthermore, an agricultural module was piggy-backed on to the 1999 survey, which captured information on crop farming enterprises. This module provides information on persons engaged in agriculture and total payments, non – labour inputs (manure, inorganic fertilizers, pesticides and seeds), outputs, stocks, sales and transfers for major crops. These characteristics make the 1999 dataset more suitable for use in conducting simulations to derive first order changes in household welfare in the

sense that income shares from different income sources as well as budget shares of different items of expenditure can be computed.

The basic methodology defines income to be the sum of own production, wage employment and net transfers. Own production includes value added from farming and any other household enterprise, e.g., trading or service provision. Wage employment refers to payments made by non-household members to household members in return for their labour. Net transfers refer to net payments from the government (pensions, grants and other transfers less any fees or taxes) in addition to net transfers from other households, e.g., net remittances (McCulloch, 2003). The underlying assumption behind the methodology is that in the short-run households are unable to change the quantities of the goods which they produce and consume: that is, quantities remain constant. In effect, this results in simulating a worst case scenario since over time households would adjust their consumption and production levels in response to price changes: for production substituting higher value products for those which have become relatively cheaper and for consumption substituting cheaper goods for those that become relatively more expensive. These substitution effects increase the positive impact and lessen the negative effect on welfare.

The analysis calculates the percentage change in welfare relative to a base case, which in this case is the household budget survey of 1999 following McCulloch (2003).

$$\frac{\Delta W}{W} = \left[\sum_j IS_j^0 \left(\frac{\Delta p_j^0}{p_j^0} \right) - \sum_k BS_k^1 \left(\frac{\Delta p_k^1}{p_k^1} \right) \right] + \sum_f IS_f^w \left(\frac{\Delta w_f}{w_f} \right) - \sum_i BS_j^c \left(\frac{\Delta p_j^c}{p_j^c} \right) \qquad (1)$$

Where W is the measure of welfare, IS_j^0 indicates the value of family-produced output j as a share of household income, BS_k^1 is the budget share of input costs, IS_f^w is the income share of net factor income from factor f (in most cases this is equal to the income shares of wages), and

BS_j^c is the budget share of good j in consumption. $\left(\frac{\Delta p_j^o}{p_j^o} \right)$ is the percentage change in the price of output j, with other price changes defined similarly.

The first order percentage change in welfare is calculated using only information on the income shares of different income sources, the budget shares of different items of expenditure, and the percentage changes in prices.

To apply this methodology, information is needed both on the relevant shares and on the product and factor market price changes arising from the policy reform to be investigated. For the budget shares, the study used primary data from the Uganda National Household Survey (UNHS) of 1999/2000 carried out by Uganda Bureau of Statistics.[3] In the absence of data on input shares in own production, this element in the welfare change equation has been ignored in the simulations which follow.

A number of methods exist to estimate price changes resulting from policy reforms. In this analysis, these are taken from a trade reform simulation using the Global Trade Analysis Project

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[3] The UNHS 1999/2000 provides a description of the Uganda National Household Survey.

(GTAP) multi-region computable general equilibrium (CGE) model.[4] These are provided at the level of GTAP categories; hence for the simulation consumption and production values are aggregated from the household survey to this level. The impact of these price changes upon the poor will depend on the relative shares of the different goods in their consumption and production basket.

4.2 Price changes due to OECD agricultural policy reform

The percentage changes in relative prices arising from OECD trade liberalization inserted in the welfare equation above were obtained from simulations with the standard version of the GTAP model. In our version of the GTAP model (Rutherford 2006) perfect competition prevails on all markets. Assuming constant returns to scale technologies, marginal cost pricing implies that the producer price index is given by a nested CES-Leontief cost index. Following the Armington assumption of product differentiation according to region of origin, the Armington composite is given as a CES composite of domestic and imported varieties. Bilateral trade flows associated with international transport services gross of import tariffs are determined by cost-minimisation across the regions. On the demand side, both the representative consumer and government in each region are modelled as utility maximisers subject to their income constraints. Income of the representative household is obtained from factor returns, government and international transfers. Tax revenues and international transfers, adjusted for redistribution transfers, give the government income. The initial allocation of factor endowments is exogenous. In the closure adopted here investments are exogenous.

The GTAP database was aggregated into 15 world regions and 32 commodities shown in Table 4. The sectoral composition of agricultural activities was kept at the same level as in the initial GTAP breakdown, while the industrial sectors have been aggregated up to the major SITC categories.

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[4] The characteristics of the GTAP model and the closure used to generate the price changes used are described further in Annex 2.

Table 4:Regional aggregation

Region	Aggregated GTAP	Initial GTAP
Australia and New Zealand	AUS	AUS, NZL
Oceania	XOC	XOC
Asia	XAS	CHN, HKG, KOR, TWN, IDN, MYS, PHL, SGP, THA, VNM, BGD, XEA, XSE, IND, LKA, XSA, TUR, XME
Japan	JPN	JPN
Canada	CAN	CAN
United States	USA	USA
Americas	XAM	MEX, XNA, XCA, XCB, COL, PER, VEN, XAP, CHL, URY, XSM, XFA
Argentina	ARG	ARG
Brazil	BRA	BRA
EU	XEU	AUT, BEL, DNK, FIN, FRA, DEU, GBR, GRC, IRL, ITA, LUX, NLD, PRT, ESP, SWE, CHE, XEF, CZE, HUN, MLT, POL, SVK, SVN, EST, LVA, LTU, CYP
Rest of Europe	REU	XER, ALB, BGR, HRV, ROM
Russian Federation	RUS	RUS, XSU
Africa	XAF	MAR, TUN, XNF, BWA, XSC, MWI, MOZ, ZMB, ZWE, ZAF, XSS, MDG, XSD
Tanzania	TZA	TZA
Uganda	UGA	UGA

Source: Authors' aggregation

Three scenarios have been performed. The initial two scenarios illustrate limiting cases of potential OECD country trade liberalization. The first simulation requires the OECD countries to completely liberalize their agricultural trade. The scenario has been implemented by setting all existing agricultural tariffs and export subsidies of the OECD countries in the GTAP database equal to zero. It is a general feature of the Arrow-Debreu modelling framework that relative prices only uniquely determine the counterfactual equilibrium. The consumer price index in each region was taken as numeraire and all prices are thus expressed in terms of the regional consumer price index. The resulting percentage changes of the consumer, producer and production factor prices in terms of the respective regional consumer price index. Table 5 summarizes the benchmark levels of border protection in the OECD region facing individual exporters calculated as trade weighted averages of the tariffs applied by the OECD member countries. Agricultural commodities such as wheat, cereals, sugar, and processed rice are among the most protected commodities. However, the magnitude of the barriers to access in OECD markets differs among developed and developing countries. In particular, LDCs such as Uganda face relatively low export bariers to the OECD markets, e.g., 2.04 percent for fruits and vegetables or 1.66 percent for oil seeds. OECD protection of manufactured goods trade is relatively low, but there are tariff peaks facing some exporters particularly in textiles and clothing. Thus, the main impact of liberalising OECD country access for a country like Uganda will be the indirect effects arising from improved access for its competitors on OECD country markets (preference erosion) and any indirect changes in world market prices for Uganda's imports and exports (terms of trade effects).

Table 6 depicts the benchmark trade protection of the developing countries similarly calculated by means of the trade weighted average of tariffs of the developing countries. The benchmark database makes clear that LDCs such as Uganda face much higher trade barriers in accessing the markets of other developing countries. Therefore the third scenario assumes a partial global agricultural trade liberalisation in which the OECD countries cut all agricultural tariffs by 70 percent while developing countries are required to cut their tariffs by 40 percent. In this third scenario, Uganda's own trade policies are left unchanged. The purpose of the scenario is to measure the impact of external liberalization, and we do not want to contaminate the interpretation of these effects by including domestic liberalization by Uganda in these scenarios. All three simulations illustrate the impacts of a change in world prices implied by the liberalization efforts undertaken either by the OECD countries alone or in combination with developing countries (DC).

Table 5: Protection facing individual exporters of agricultural and non-agricultural products in OECD markets, 2001, percent

	AUS	XOC	XAS	JPN	CAN	USA	XAM	ARG	BRA	XEU	REU	RUS	XAF	TZA	UGA
PDR			11.53									3.83	7.11		
WHT	141.47		5.19		106.95		59.03	12.61			14.49	7.43	82.91		
GRO	83.18		22.46		9.76	28.39	4.74	25.81	26.56		11.54	17.47	25.25		
V_F	7.63	3.66	10.19	5.24	3.25	3.62	12.69	14.14	6.12	2.36	11.47	3.09	11.33	0.60	2.04
OSD			1.24		0.10		2.57	0.10	3.07		1.07	2.84	1.47		1.66
PFB			0.00								0.08	0.04	0.00		
OCR	2.15	0.02	2.73	1.60	0.88	6.53	0.81	7.61	5.18	2.59	6.69	2.15	1.33	1.45	0.78
CTL	7.99		0.23		0.10	3.07	0.02			3.22	22.23		1.20		
OAP	0.77		2.72	0.40	0.58	7.41	1.20	10.91	1.45	1.19	2.73	0.79	0.07	0.11	
WOL	0.06														
FRS	0.19	0.00	0.29		0.03		0.02	0.06	0.13	0.07	0.09	0.05	0.01		
FSH	2.34	2.77	3.05	1.37	0.06		0.85			0.99	1.93	1.72	2.03	0.06	
ENE	0.04	1.53	0.11		0.00	0.01	0.03	0.00	0.03	0.01	0.41	0.12	0.01		
CMT	16.86	24.76	26.49		5.52	37.56	31.85	22.52	97.88	4.75	16.83	41.89	94.71		
OMT	18.20	5.73	18.55	8.53	21.93	64.18	45.51	19.17	24.49	8.30	14.86	14.87	4.20		
VOL	8.63	0.04	6.45		0.50		0.77	2.47	0.52	1.47	30.19	28.93	38.38		
MIL	41.20	21.90	50.17		21.28	60.60	18.27	29.30	47.21	5.76	24.21	38.82	13.95		
PCR			274.54	72.69			61.75		15.54		26.79	3.74	48.90	5.95	
SGR	137.59	183.68	138.26			23.47	77.74		29.88	9.07	41.05	8.59	95.65		
OFD	10.60	4.33	6.52	4.80	3.73	11.15	2.27	8.90	13.34	3.25	10.37	5.97	2.21	0.16	0.02
B_T	6.94	2.92	13.11	3.21	1.15	10.20	3.28	10.68	14.47	3.24	20.89	4.80	7.31		
TEX	5.97	12.71	7.54	7.16	0.24	2.97	5.95	4.07	8.36	1.60	1.48	8.08	2.55	0.49	0.01
WAP	10.06	16.91	10.46	11.05	0.60	7.53	5.96	3.99	9.55	2.06	1.23	10.96	2.43	0.60	
LEA	2.89		11.48				1.66	3.05	6.50	2.63	0.41	2.65	0.39	0.05	
LUM	1.34	0.77	1.14	1.26	0.12	0.54	0.17	0.15	1.19	0.43	0.87	1.57	0.02	0.01	
PPP	1.15	0.46	0.55	0.91	0.04	0.39	0.03	0.06	0.14	0.29	2.44	0.60	0.21	0.09	
P_C	0.45	0.55	1.23	0.28	0.16	0.54	0.65	1.83	1.87	0.59	1.72	2.88	0.93		
CRP	2.04	0.75	2.11	3.00	0.14	1.60	0.40	1.68	2.07	0.55	2.30	2.23	0.38	0.52	
NMM	2.93	1.12	2.90	2.75	0.10	1.54	0.57	4.27	1.90	0.98	7.00	3.07	1.98		
FMP	0.57	0.01	2.05	2.98	0.12	1.07	0.21	1.22	2.11	0.50	0.98	0.98	0.16		0.01
MVH	1.45	1.27	3.27	4.21	0.08	1.16	0.14	0.76	1.12	0.60	1.49	3.31	2.83	0.00	
EME	1.35	2.11	0.95	1.58	0.14	1.53	0.02	0.62	0.88	0.38	1.21	2.06	0.07	0.00	0.10
EGW			0.00							0.03	0.54	3.26			

Note: For description of GTAP sectors, see Table 7.

Table 6: Average levels of protection facing individual exporters into developing country markets, 2001, percent

	AUS	XOC	XAS	JPN	CAN	USA	XAM	ARG	BRA	XEU	REU	RUS	XAF	TZA	UGA
PDR			98.77	0.00								11.48	1.61		
WHT	1.77		2.94		4.49		1.23	1.62			5.30	10.65	0.87		
GRO	67.32		170.24		58.27	60.35	1.64	65.76	136.47		1.65	6.50	69.96		0.85
V_F	15.97	9.84	16.08	9.76	19.99	14.30	12.97	1.90	2.87	17.77	18.86	25.50	12.20	31.35	1.58
OSD			93.98		6.20		1.51	91.94	92.49		10.53	25.56	130.29	30.88	10.60
PFB	1.99		2.43								0.00	0.97	3.15	3.33	0.43
OCR	19.58	3.88	17.82	4.67	17.08	27.04	5.73	9.07	23.20	11.32	9.75	10.68	16.93	8.77	7.53
CTL	2.30		1.39		6.76	0.29	0.97			2.42	0.91		0.40		
OAP	7.64		3.93	6.24	4.71	4.09	3.42	2.76	4.07	6.09	1.26	5.27	1.47	3.90	1.30
WOL	2.83												4.03		
FRS	1.76	0.37	3.02		3.35		3.63	13.68	6.55	1.61	2.29	0.25	1.72	3.03	0.67
FSH	5.68		7.53	10.56	16.43		9.35			6.03	0.17	14.16	6.79	7.77	
ENE	4.09	1.74	3.33		1.87	1.49	8.39	5.24	1.87	5.23	5.32	1.48	3.45		0.01
CMT	14.45	15.13	5.19		6.88	13.95	5.92	3.72	3.54	6.21	3.25	16.94	1.28	7.31	
OMT	9.96	30.88	16.72	12.33	12.77	14.51	6.70	8.50	9.36	13.87	13.15	16.53	6.69	8.72	
VOL	7.31	0.85	37.29		4.14		3.19	25.10	18.38	15.64	15.48	16.85	11.76		
MIL	12.87	27.17	5.52		35.43	14.58	13.32	18.24	8.20	14.41	16.79	21.98	6.24		
PCR			9.27	26.15			7.55		17.39			3.01	0.96	14.20	20.10
SGR	15.68	103.32	18.65			22.16	11.16		14.92	22.59	45.90	5.50	12.69		8.42
OFD	13.82	51.56	13.89	16.33	14.22	10.24	7.03	15.82	14.82	13.40	17.18	15.35	15.24	8.53	0.73
B_T	62.66	287.39	29.24	19.77	66.83	60.32	17.17	6.99	5.15	28.89	29.22	34.78	40.91		3.43
TEX	10.06	21.85	12.61	18.28	8.11	6.52	8.27	2.84	6.10	9.71	4.31	8.16	10.44	13.39	
WAP	10.91	23.68	10.81	16.56	12.96	11.33	10.11	8.71	5.61	11.70		16.57	8.24	9.81	
LEA	8.42		4.42				6.50	4.63	5.28	6.15		10.38	7.99	11.07	
LUM	8.56	7.39	7.21	13.03	7.45	7.02	5.81	4.01	5.27	9.74	5.62	4.60	6.86	6.01	
PPP	6.03	12.24	7.55	7.75	3.38	3.98	3.78	3.03	3.44	7.29	4.03	4.53	4.67	5.53	5.33
P_C	4.17	1.18	6.39	5.93	4.73	3.61	4.65	2.25	4.74	5.74	0.61	5.79	2.91		
CRP	7.74	16.42	9.50	8.14	6.50	5.36	5.55	3.75	5.18	7.32	4.43	7.93	15.35	15.16	
NMM	4.85	1.68	7.91	7.79	7.29	5.91	6.12	7.93	5.89	8.94	5.62	5.36	8.19	13.97	17.38
FMP	5.68	2.41	6.92	7.33	4.19	4.20	4.37	5.34	6.01	7.43	2.91	5.81	14.52	4.19	10.10
MVH	10.24	6.00	15.71	17.02	8.78	3.27	11.45	19.48	16.69	12.51	12.91	7.59	11.09	31.78	4.75
EME	5.96	8.44	4.66	5.56	6.51	3.92	6.49	6.62	7.08	7.87	6.53	7.10	6.17	28.49	8.30
EGW			0.01			0.12					0.07		0.00		

Note: For description of GTAP sectors, see Table 7.

The first scenario is where OECD countries fully liberalize only their agricultural trade. The results are sumarized in Table 7. The removal of the protection in the most protected commodity markets such as processed rice, sugar and non-bovine meat leads to a substantial increase of import prices in Uganda.[5] However, these increases are transmitted to Uganda's domestic prices to only a very minior extent; indeed, the domestic price (the price relevant to domestic producers) of processed rice is estimated to fall by 0.36 percent while the produccer price of sugar cane essentially remains unchanged. The actual magnitude of the transmission of the policy impacts into the domestic price level depends on the interplay of the underlaying substitution, supply and demand elasticities and the benchmark value shares. The Armington approach of modelling international trade weakens the complete transmission into consumer prices by allowing for some degree of market power. In terms of domestic prices, the biggest effects are observed in the other crops sector (-3.87 percent), other food products (+2.13 percent), and refined oil products (1.32 percent). These price changes, in turn, feed into changes in consumer prices. Consumer prices for other crops follow closely the fall in the producer price. For processed rice and meat, the main driver is the increase in import prices while for other food products it is the increase in domestic prices which plays the more important role. From a poverty perspective, the fall in both producer and consumer prices for other crops will play an important role, given their importance to both production and consumption in Uganda.

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[5] In particular, the high increase of the price of processed rice follows the lack of substitution among the trading partners as almost all of Uganda imports originate from the Asian producers.

Table 7: Ugandan price changes following OECD country agricultural trade liberalisation

code	full name	import price	domestic price	consumer price	export price
GRO	Cereal grains		-0.10	-0.10	-0.51
V_F	Vegetables, fruits	0.27	-0.12	-0.12	-0.12
OSD	Oil seeds	-1.65	0.01	-0.01	-1.62
OCR	Other crops	0.80	-3.87	-3.40	0.28
CTL	Bovine, cattle, sheep		-0.01	-0.01	
OAP	Animal products		-0.06	-0.06	0.27
RMK	Raw milk		-0.04	-0.04	
FRS	Forestry		-0.09	-0.09	0.00
FSH	Fishing		-0.14	-0.14	-0.31
ENE	Energy resources	0.00	-0.36	-0.23	0.03
CMT	Bovine meat products		-0.03	-0.03	
OMT	Meat products	6.52		6.52	
VOL	Vegetable oils, fats	1.67		1.67	
MIL	Dairy products		-0.08	-0.08	
PCR	Processed rice	78.11	-0.36	15.47	28.54
SGR	Sugar cane, beet	13.34	-0.09	1.81	2.66
OFD	Food products	0.48	2.13	1.46	-0.40
B_T	Beverages tobacco		-0.21	-0.21	0.02
TEX	Light industry	0.04	-0.43	-0.17	-0.30
WAP	Wearing apparel	-0.09	-0.09	-0.09	
LEA	Leather products	0.14		0.14	
LUM	Wood products	-0.16	-0.08	-0.10	
PPP	Paper products, publishing	-0.06	-0.07	-0.06	-0.10
P_C	Refined petroleum products	0.03	1.32	0.30	0.77
CRP	Chemical, rubber, plastic products	-0.15		-0.15	
FMP	Metal products	-0.08	-0.06	-0.07	-0.10
MVH	Motor vehicles and parts	-0.37	-0.06	-0.31	-0.25
EME	Manufacturing	-0.25	-0.05	-0.22	-0.16
EGW	Electricity, gas and water distribution	-0.18	-0.01	-0.02	0.05
TRN	Transport	-0.15	-0.04	-0.05	-0.09
PSR	Private services	-0.29	-0.07	-0.15	-0.19
OSG	Public services	-0.20	-0.08	-0.08	-0.20

Note: Missing values mean that there is no imports or domestic production of the commodity in question reported in the database.

The results of the second scenario involving OECD total merchanise trade liberalization scenario do not differ essentially from the agricultural trade liberalization scenario (Table 8). Ugandan import prices follow the changes in the export prices of its principal trading partners. Again, significant increases in import prices of commodities such as meat, processed rice, sugar and clothing are observed. These price changes are transmitted into consumer prices, although domestic prices remain unchanged or even decrease (e.g., by 1 percent for textiles). Once again, the most dramatic change is the fall in the price of other crops of -5.14 percent (in Uganda, these

represent major commodity products such as coffee and matooke, although the GTAP aggregation driving this result will contain a different composition of the basket of goods).

Table 8: Ugandan price changes following OECD total merchandise trade liberalization

code	full name	import price	domestic price	consumer price	export price
GRO	Cereal grains		-0.20	-0.20	-0.35
V_F	Vegetables, fruits	0.34	-0.20	-0.20	0.00
OSD	Oil seeds	-0.80	-0.17	-0.17	-0.71
OCR	Other crops	1.04	-5.14	-4.53	0.33
CTL	Bovine, cattle, sheep		-0.10	-0.10	
OAP	Animal products		-0.41	-0.41	0.93
RMK	Raw milk		-0.13	-0.13	
FRS	Forestry		-0.19	-0.19	0.21
FSH	Fishing		-0.26	-0.26	-0.53
ENE	Energy resources	-0.12	-0.33	-0.26	-0.20
CMT	Bovine meet products		-0.08	-0.08	
OMT	Meat products	6.77		6.77	
VOL	Vegetable oils, fats	2.73		2.73	
MIL	Dairy products		-0.10	-0.10	
PCR	Processed rice	79.90	-0.26	15.76	29.12
SGR	Sugar cane, beet	13.66	-0.14	1.80	2.74
OFD	Food products	0.44	1.92	1.32	-0.57
B_T	Beverages tobacco		-0.34	-0.34	-0.09
TEX	Light industry	2.09	-1.00	0.68	-3.24
WAP	Wearing apparel	4.08	0.07	2.56	
LEA	Leather products	1.58		1.58	
LUM	Wood products	0.08	-0.14	-0.10	
PPP	Paper products, publishing	-0.35	-0.23	-0.31	0.03
P_C	Refined petroleum products	0.41	1.37	0.62	1.03
CRP	Chemical, rubber, plastic products	0.32		0.32	
FMP	Metal products	0.37	0.23	0.29	-0.30
MVH	Motor vehicles and parts	0.57	0.02	0.46	-0.39
EME	Manufacturing	-0.06	0.04	-0.05	-0.39
EGW	Electricity, gas and water distribution	-0.26	-0.02	-0.04	0.04
TRN	Transport	-0.02	0.01	0.00	0.11
PSR	Private services	-0.27	-0.18	-0.21	-0.20
OSG	Public services	-0.23	-0.25	-0.25	-0.28

Note: Missing values mean that there is no imports or domestic production of the commodity in question reported in the database.

Table 9 reports the results from the third scenario involving partial agricultural trade liberalization but including developing countries. The changes of the import prices follow somewhat similar patterns as in the previous scenarios. However, the magnitude of the import price changes is

attentuated and the increases of 5.61 percent for processed rice, 4.98 percent for sugar and 3.43 percent for meat products are much smaller than in the full OECD liberalisation scenarios.

Table 9: Ugandan price changes following partial liberalization of agriculltural trade in both OECD and developing countries (except Uganda)

code	full name	import price	domestic price	consumer price	export price
GRO	Cereal grains		-0.06	-0.06	2.09
V_F	Vegetables, fruits	0.63	0.04	0.04	0.01
OSD	Oil seeds	3.88	-0.13	-0.09	2.03
OCR	Crops	0.79	-2.13	-1.83	0.26
CTL	Bovine, cattle, sheep		0.05	0.05	
OAP	Animal products		0.12	0.12	-0.13
RMK	Raw milk		0.05	0.05	
FRS	Forestry		-0.03	-0.03	0.00
FSH	Fishing		-0.07	-0.07	-0.19
ENE	Energy resources	-0.02	-0.17	-0.12	0.00
CMT	Bovine meet products		0.00	0.00	
OMT	Meat products	3.43		3.43	
VOL	Vegetable oils, fats	3.40		3.40	
MIL	Dairy products		-0.01	-0.01	
PCR	Processed rice	5.61	0.11	1.94	2.01
SGR	Sugar cane, beet	4.98	0.00	0.77	0.58
OFD	Food products	0.54	0.68	0.62	-0.55
B_T	Beverages tobacco		-0.09	-0.09	0.05
TEX	Light industry	-0.11	-0.01	-0.07	-0.10
WAP	Wearing apparel	-0.16	-0.04	-0.11	
LEA	Leather products	-0.19		-0.19	
LUM	Wood products	-0.12	-0.02	-0.04	
PPP	Paper products, publishing	-0.07	-0.03	-0.05	-0.06
P_C	Refined petroleum products	-0.01	0.78	0.16	0.44
CRP	Chemical, rubber, plastic products	-0.12		-0.12	
FMP	Metal products	-0.08	-0.01	-0.04	-0.05
MVH	Motor vehicles and parts	-0.18	-0.04	-0.15	-0.12
EME	Manufacturing	-0.15	-0.01	-0.13	-0.08
EGW	Electricity, gas and water distribution	-0.11	0.02	0.01	0.02
TRN	Transport	-0.09	-0.02	-0.03	-0.04
PSR	Private services	-0.17	-0.02	-0.07	-0.11
OSG	Public services	-0.16	-0.02	-0.02	-0.14

Note: Missing values mean that there is no imports or domestic production of the commodity in question reported in the database.

4.3 Individual expenditure items by GTAP sectors

The Ugandan household budget surveys and GTAP database differ in their sectoral and commodity coverage. The household survey data therefore had to be processed before any simulation took place. The Ugandan HBS is compiled on the basis of the International Standard

Industrial Classification (ISIC), Rev.3. The correspondence between ISIC and GTAP has been assembled on the basis of the available concordances between the two modes of categorisation.

Table 22 in the Appendix Tables shows the details of the individual expenditure items in the 1999/2000 HBS by GTAP sector. The composition of individual expenditure items by GTAP categories is shown in Table 10 below. The data show that staple food products (the combination of GRO cereals and OCR other crop products) form a large proportion of expenditure. On average, 22.4 percent of the expenditure of the poor goes to staples compared to 20.4 percent of the expenditure of the non-poor on these items respectively. This is followed by expenditure on public administration, defence, education and health of 11.0 and 12.5 percent for the poor and non-poor respectively. The expenditure on staples is higher in rural areas at 23.9 percent compared to urban areas where it is at 12.6 percent. At the national level, staples represent 20.9 percent, public administration 12.1 percent and dwellings 9.1 percent of total household expenditure.

Table 10: Individual expenditure items by GTAP sector

Decile	STAPLE	OSG	DWE	V_F	OFD	FRS	ROS	B_T	WAP	CTL	SGR	CRP	MVH	RMK	P_C	Others
1	21.0	11.0	6.5	7.0	4.7	5.8	4.5	5.3	3.2	3.4	3.2	2.5	1.2	1.8	2.2	16.8
2	22.9	11.5	6.8	6.6	4.6	6.1	4.4	4.3	3.5	3.3	3.3	2.6	2.2	2.1	1.9	13.8
3	22.7	11.3	7.3	6.7	5.2	5.7	4.7	4.4	3.6	3.7	3.1	2.6	1.3	2.0	1.3	14.4
4	23.1	12.6	8.7	6.8	4.5	5.9	3.5	3.6	3.4	3.1	3.3	2.5	1.3	2.0	1.7	13.9
5	20.3	11.3	8.2	5.7	5.4	5.0	5.3	3.7	3.8	3.1	3.0	2.3	3.9	2.0	2.9	14.0
6	22.1	11.7	9.0	6.5	5.9	5.3	4.3	4.5	3.5	2.9	3.1	2.3	1.2	2.3	1.7	13.9
7	21.9	12.8	8.0	6.1	5.2	5.2	5.3	3.8	3.4	2.8	2.8	2.2	1.8	2.1	1.9	14.7
8	20.4	11.9	12.3	5.8	5.0	4.3	3.7	4.0	3.3	2.9	3.0	2.2	2.1	2.3	2.6	14.2
9	18.3	12.4	12.5	5.2	6.0	4.0	3.9	4.1	3.4	2.9	2.5	2.0	4.5	2.1	2.5	13.6
10	18.2	14.2	10.0	5.4	6.1	3.5	4.7	4.6	3.5	2.9	3.0	2.1	1.6	2.3	1.6	16.2
Non-poor	20.4	12.5	9.8	5.8	5.4	4.6	4.5	4.1	3.4	3.0	2.9	2.2	2.4	2.2	2.1	14.5
Poor	22.4	11.0	7.0	7.1	4.9	6.1	4.1	4.6	3.5	3.4	3.1	2.6	1.4	1.9	2.0	14.7
Rural	23.9	11.6	6.9	6.8	4.7	6.2	4.3	4.3	3.4	3.2	3.1	2.4	2.0	2.2	1.9	13.2
Urban	12.6	13.8	15.5	4.3	7.1	1.5	4.8	4.2	3.6	2.6	2.6	2.1	2.6	1.9	2.6	18.4
Kanpala	9.6	14.6	18.4	3.6	7.6	0.2	4.9	3.9	3.4	2.3	2.4	1.8	3.7	1.7	3.0	19.0
Central	17.4	13.2	11.8	4.9	6.2	3.7	4.7	3.4	3.4	2.6	3.2	2.1	3.2	2.1	2.4	15.8
Eastern	21.1	11.3	7.6	6.2	4.9	5.1	5.0	5.0	3.4	3.6	3.5	2.4	1.6	2.2	1.6	15.7
Northern	20.0	10.1	6.6	8.3	7.3	6.5	3.0	5.7	3.9	3.4	3.1	3.1	1.0	0.7	1.4	16.0
Western	27.4	12.0	7.1	7.3	3.3	6.4	4.0	4.3	3.5	3.3	2.2	2.2	1.6	2.6	2.2	10.7
ALL	20.9	12.1	9.1	6.1	5.3	5.0	4.4	4.2	3.5	3.1	3.0	2.3	2.2	2.1	2.1	14.6

Notes: STAPLE- staple foods; OSG-Public Administration, Defence, Education, Health; DWE-Dwellings; V_F-vegetables, fruit, nuts; OFD-Food products nec; FRS-Forestry; ROS-Recreational and other activities; B_T-Beverages and tobacco products; WAP-Wearing apparel; CTL -Bovine cattle, sheep and goats, horses,; SGR-sugar; CRP-Chemical , rubber, plastic products; MVH-Motor vehicles and parts; RMK-Raw milk; P_C-Petroleum, coal products
Source: Computed from 1999/2000 Uganda National Household Survey Data

4.4 Microsimulation results

The three scenarios give some indications of the potential welfare implications of OECD trade liberalisation for poverty in Uganda. The differential welfare impacts arise from price adjustments that affect consumers, producers and factors of production.

4.4.1 Results for OECD agricultural trade liberalization

Table 11 provides results of the first scenario which simulates agricultural trade liberalization in the OECD countries by setting all import and export tariffs on agri-food commodities to zero. The overall impact of OECD agricultural trade liberalisation on welfare in Uganda from this simulation is positive unlike the Giblin and Matthews (2005) conclusion. Nevertheless, the poor appear to be made worse off. There is an overall modest improvement in welfare of 0.1 percent,

but much of the improvements goes to the highest income deciles, whose welfare improves by about 0.3 percent on average and the urban sector that witnesses a welfare improvement of 0.7 percent. The Central and Northern regions of the country also experience modest welfare improvements under this scenario. However, welfare reductions are noted in the lower income deciles and in rural areas. It appears that price adjustments for agricultural output under this scenario are too minor to have a noticeable impact on poverty. Furthermore, given the relatively narrow product base in which price increases are envisaged in this scenario, the gains to producers in Uganda will be limited to a few sectors were export capacity exists. While Blake, McKay and Morrissey (2002) indicate that even modest price increases for Ugandan agricultural products have pro poor effects, it is likely that high transaction costs would lower the size of the world price adjustments that would be passed on to both consumers and producers.

Table 11: Impact of OECD agricultural trade liberalization
(Standard GTAP simulation millions Shs.)

Decile	Change in consumption expenditure		Change in income		Change in welfare	
	Shs	%	Shs	%	Shs	%
1	2,025	1.11	-2,483	-1.36	-458	-0.25
2	3,263	1.25	-4,324	-1.66	-1,061	-0.41
3	4,113	1.34	-5,390	-1.76	-1,277	-0.42
4	5,069	1.34	-6,639	-1.75	-1,570	-0.41
5	6,320	1.45	-7,072	-1.63	-752	-0.17
6	7,587	1.51	-7,989	-1.59	-402	-0.08
7	9,302	1.61	-10,252	-1.77	-950	-0.16
8	10,502	1.42	-11,049	-1.49	-547	-0.07
9	15,003	1.64	-11,895	-1.30	3,109	0.34
10	26,567	1.03	-18,630	-0.72	7,937	0.31
Non-Poor	77,173	1.31	-67,728	-1.15	9,446	0.16
Poor	12,578	1.26	-17,995	-1.81	-5,417	-0.54
Rural	67,789	1.48	-80,440	-1.76	-12,653	-0.28
Urban	21,965	0.95	-5,283	-0.23	16,681	0.72
Kampala	11,278	0.87	-1,169	-0.09	10,109	0.78
Central	34,104	1.08	-28,509	-0.90	5,594	0.18
Eastern	19,747	1.38	-19,919	-1.39	-171	-0.01
Northern	9,116	1.41	-8,933	-1.38	183	0.03
Western	26,784	1.66	-28,362	-1.75	-1,578	-0.10
All	89,752	1.31	-85,723	-1.25	4,028	0.06

Source: Computed from 1999/2000 Uganda National Household Survey Data

4.4.2 Results for OECD total trade liberalisation

The second scenario widens the focus and allows for the liberalization of all OECD merchandise trade including non-agricultural commodities. Table 12 provides simulation results for this scenario, which show a reduction in welfare for all deciles irrespective of household poverty status, residence and region. Households engaged in other crop agriculture are worst affected. Furthermore, the Northern region of the country experiences the highest reduction in household welfare of about 1.8 percent while the Central region is least affected with a reduction of 0.8 percent. The results suggest that overall expenditure increases by 0.5 percent while income reduces by about 1.7 percent implying a welfare reduction of 1.2 percent for all households. The

impacts appear negative because the envisaged trade liberalisation under this scenario actually reduces rather than increases the prices of most agricultural goods. Moreover, since Ugandan producers are further constrained by supply side factors involving difficulties in sourcing inputs, poor infrastructure and high transactions costs, price reductions for commodities produced in rural areas will have a more sustained adverse impact on rural welfare because producers have difficulty in making appropriate responses. Giblin and Matthews (2005) argue that the lack of competition in the distribution and marketing channels generates asymmetry in price transmission where cuts in world prices are passed through to domestic producers more fully than increases in world prices. This would further aggravate the negative welfare effects.

Table 12: Impact of OECD total merchandise trade liberalization
(Standard GTAP simulation in millions of shs.)

Decile	Absolute Change in consumption expenditure (shs)	Percent Change in consumption expenditure (%)	Absolute Change in income (shs)	Percent Change in income (%)	Absolute Change in welfare (shs)	Percent Change in welfare (%)
1	884	0.49	-3,373	-1.85	-2,490	-1.37
2	1,507	0.58	-5,876	-2.26	-4,368	-1.68
3	2,103	0.69	-7,324	-2.39	-5,221	-1.70
4	2,777	0.73	-9,047	-2.39	-6,270	-1.65
5	2,972	0.68	-10,008	-2.30	-7,036	-1.62
6	3,605	0.72	-10,976	-2.19	-7,370	-1.47
7	4,670	0.81	-14,046	-2.43	-9,376	-1.62
8	5,5379	0.73	-15,317	-2.07	-9,939	-1.34
9	5,969	0.65	-16,671	-1.82	-10,703	-1.17
10	7,573	0.29	-27,442	-1.07	-19,869	-0.77
Non-Poor	30,334	0.52	-95,567	-1.63	-65,233	-1.11
Poor	7,105	0.71	-24,515	-2.46	-17,410	-1.75
Rural	35,254	0.77	-110,591	-2.42	-75,337	-1.65
Urban	2,184	0.01	-9,490	-0.41	-7,306	-0.32
Kampala	408	0.03	-2,962	-0.23	-2,962	-0.20
Central	14,404	0.45	-40,645	-1.28	-26,241	-0.83
Eastern	4,492	0.31	-27,675	-1.93	-23,183	-1.62
Northern	1,282	0.20	-12,404	-1.91	-11,123	-1.72
Western	17,260	1.07	-39,356	-2.43	-22,096	-1.37
All	37,435	0.54	-120,081	-1.75	-86,642	-1.20

Source: Computed from 1999/2000 Uganda National Household Survey Data

4.4.3 Results for global partial agricultural trade liberalization

Table 13 provides the simulation results for changes in welfare that result from building in the impact of global partial agricultural trade liberalization. The mixed liberalisation scenario provides for a combined partial liberalization effort in both OECD countries (agricultural tariffs reduced by 70 percent) and developing countries including least developed countries, but excluding Uganda (all tariffs reduced by 40 percent). The overall impact of this scenario is a welfare decline of 0.5 percent, explained by reductions that cut across all households irrespective of income levels, residence and region.

It appears that the magnitude of the total welfare impacts on Uganda of OECD liberalisation and attendant price adjustments is marginal largely because the country has only modest exports of agricultural products likely to be affected by trade liberalization. More specifically, even the modest welfare gains for producers from increased prices seem to be offset by welfare losses from increases that accrue to prices of consumer goods. The large subsistence agricultural sector household tends to experience little or no change in total welfare arising from agricultural price changes. Increases in the market value of their output tend to be offset by changes in the opportunity cost of their subsistence consumption of that output.

Table 13: Impact of global partial agricultural trade liberalization (standard GTAP simulation millions shs.)

Decile	Change in consumption expenditure		Change in income		Change in welfare	
	Shs	**%**	**Shs**	**%**	**Shs**	**%**
1	316	0.17	-1,373	-0.75	-1,057	-0.58
2	548	0.21	-2,384	-0.92	-1,836	-0.71
3	789	0.26	-2,978	-0.97	-2,188	-0.71
4	1,046	0.28	-3,675	-0.97	-2,629	-0.69
5	1,107	0.25	-4,237	-0.98	-3,130	-0.72
6	1,358	0.27	-4,413	-0.88	-3,055	-0.61
7	1,753	0.30	-5,665	-0.98	-3,911	-0.68
8	2,030	0.27	-6,079	-0.82	-4,049	-0.55
9	2,229	0.24	-6,493	-0.71	-4,264	-0.47
10	3,147	0.12	-9,981	-0.39	-6,834	-0.27
Non-Poor	11,641	0.20	-37,311	-0.63	-25,6708	-0.44
Poor	2,683	0.27	-9,967	-1.00	-7,284	-0.73
Rural	13,502	0.30	-44,889	-0.98	-31,387	-0.69
Urban	822	0.04	-2,389	-0.10	-1,567	-0.07
Kampala	172	0.01	-321	-0.02	-150	-0.01
Central	5,722	0.18	-15,364	-0.48	-15,367	-0.48
Eastern	1,337	0.09	-10,962	-0.76	-5,240	-0.37
Northern	276	0.04	-4,923	-0.76	-3,585	-0.55
Western	6,989	0.43	-16,029	-0.99	-15,753	-0.97
All	14,325	0.21	-47,279	-0.69	-32,954	-0.48

Source: Computed from 1999/2000 Uganda National Household Survey Data

V CONCLUSIONS

The simple model used in this paper to simulate the impact of different world price changes for Uganda is in line with several attempts to quantify the impacts of trade on poverty using a variety of approaches. This attempt employs household survey data and permits some modest level of disaggregated country coverage and the employment of an increased level of commodity disaggregation to analyse real trade policy scenarios and generate intuitive results regarding welfare effects. However, the analytical tool also has shortcomings. The underlying framework is static because it ignores market constraints and the attendant dynamic effects. By construction, it assumes complete transmission of EU price adjustments to the domestic market. The reality in Uganda is that trading infrastructure affects the transmission of trading prices to the domestic market affecting welfare impacts.

The overall impact of the OECD agricultural trade liberalisation on welfare in Uganda from this simulation is positive unlike the Giblin and Matthews (2005) conclusion. Nevertheless, the poor appear to be made worse off. There is an overall modest improvement in welfare of 0.1 percent, but much of the improvement goes to the highest income deciles, whose welfare improves by about 0.3 percent on average and the urban sector that witnesses a welfare improvement of 0.7 percent. The Central and Northern regions of the country also experience modest welfare improvements under this scenario. However, welfare reductions are still noted in the lower income deciles and in rural areas. It appears that price changes are still relatively minor to have a noticeable impact on poverty. Furthermore, given the relatively narrow product base in which

price increases are envisaged in this scenario, the gains to producers are limited to few sectors were export capacity exists. However, this scenario indicates that modest price increases for some semi processed agricultural products have welfare improving effects. It is therefore important to work at reducing the high transaction costs which tend to lower the size of the world price adjustments that would be passed on to both consumers and producers in the country.

The microsimulation results indicate a reduction in welfare arising from OECD total trade liberalization for all deciles irrespective of household poverty status, residence and region, wotj households engaged in other crop agriculture worst affected. Furthermore, the Northern region of the country experienced the highest reduction in household welfare of about 1.8 percent while the Central region was least affected with a reduction of 0.8 percent. The results suggest that overall expenditure increased by 0.5 percent while income reduced by about 1.7 percent implying a welfare reduction of 1.2 percent for all households. The impacts appear modest because the envisaged trade liberalisation under this scenario actually reduces rather than increase the prices of the agricultural goods. Moreover, since Ugandan producers are further constrained by supply side factors, price reductions for commodities produced in rural areas only serve to worsen rural welfare. Indeed, the lack of competition in the distribution and marketing channels may generate asymmetry in price transmission where cuts in world prices are passed through to domestic producers more fully than increases in world prices, exacerbating the negative welfare effects. The results for global partial merchandise trade liberalisation are similar to those for total trade liberalisation. Even in this scenario the overall welfare decline of 0.5 percent is explained by reductions that cut across all households irrespective of income levels, residence and region.

The results appear to be underpinned by the fact that the country has only modest exports of agricultural products. The narrow export base implies that the magnitude of the total welfare impacts on Uganda of OECD liberalisation and attendant price adjustments will be marginal. More specifically, even the modest welfare gains for producers from increased prices seem to be offset by welfare losses from increases that accrue to prices of consumer goods. Overall, because of the large subsistence sector, households tend to experience little or no change in total welfare arising from agricultural price changes. Increases in the market value of their agricultural based output tend to be offset by changes in the opportunity cost of their subsistence consumption of the bulk of that output.

These results need to be interpreted in the light of the methodology used. The methodology emphasises the first round impacts of trade policy changes and does not allow for changed behaviour on the part of households that would tend to mitigate any advantageous or disadvantageous effects. Also, the poverty impacts depend on the specific trade liberalisation scenarios and the robustness of the underlying database. Further work to test these results would be highly desirable as Uganda continues with a challenging series of trade negotiations at both regional and multilateral levels.

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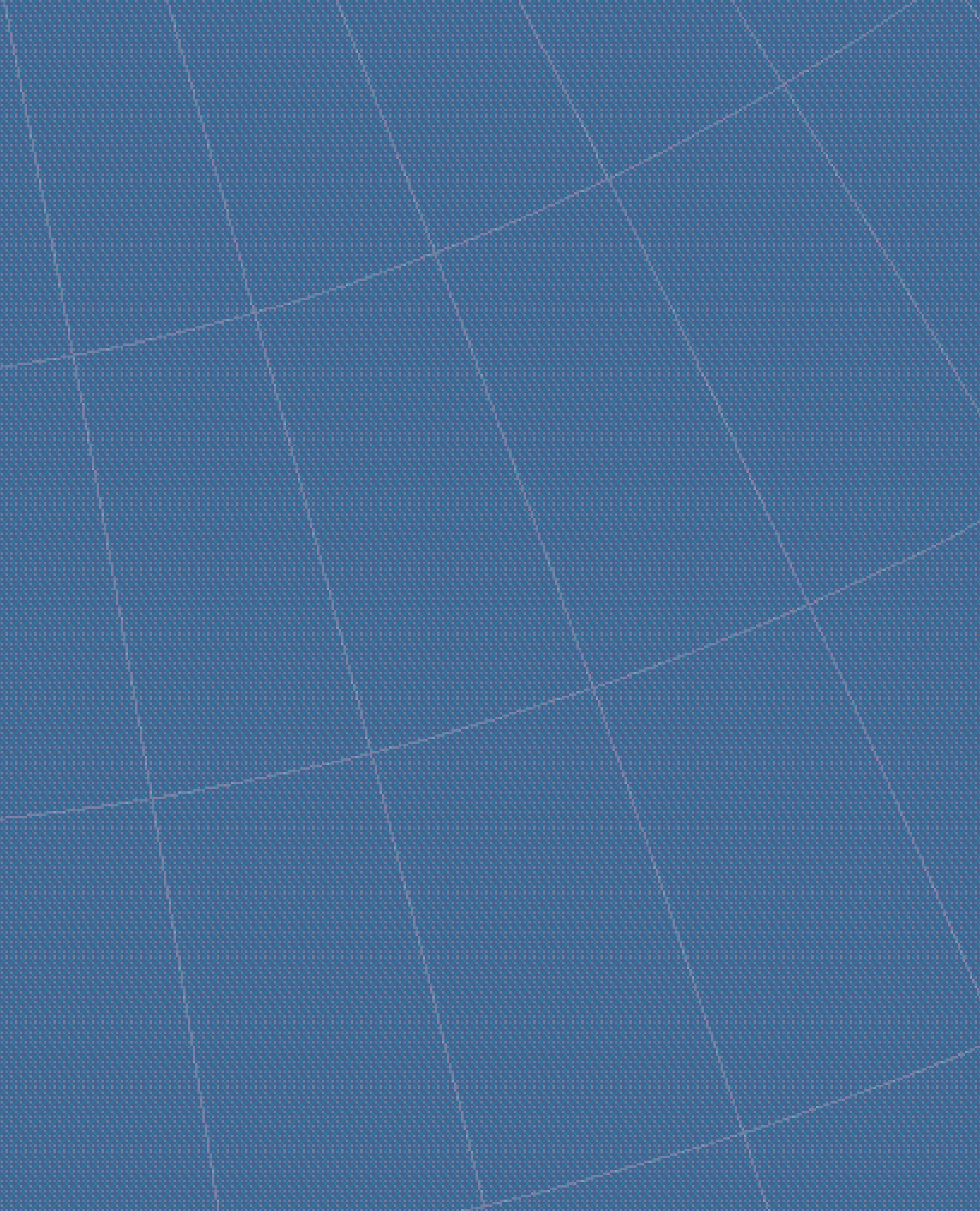
APPENDIX TABLE

Table 14: GTAP categorisation format

Item	ITMCD	GTAP sector
Maize (grains)	111	GRO
Maize (cobs)	112	GRO
Millet	115	GRO
Sorghum	116	GRO
Passion Fruits	129	V_F
Sweet bananas	130	V_F
Mangoes	131	V_F
Oranges	132	V_F
Onions	133	V_F
Tomatoes	134	V_F
Cabbages	135	V_F
Dodo	136	V_F
Other Vegetables	137	V_F
Groundnuts (In shell)	140	OSD
Groundnuts (Shelled)	141	OSD
Sim sim	144	OSD
Matooke	101	OCR
Matooke	102	OCR
Matooke	103	OCR
Matooke	104	OCR
Sweet Potatoes (Fresh)	105	OCR
Cassava (Fresh)	107	OCR
Irish Potatoes	109	OCR
Beans (fresh)	138	OCR
Beans (dry)	139	OCR
Peas	143	OCR
Beef	117	CTL
Goat Meat	119	CTL
Pork	118	OAP
Other Meat	120	OAP
Chicken	121	OAP
Eggs	124	OAP
Fresh milk	125	RMK
Firewood	308	FRS
Fresh fish	122	FSH
Others	309	COA
Cooking oil/ghee	127	VOL
Margarine, Butter, etc.	128	VOL
Rice	110	PCR
Sugar	145	SGR
Sweet Potatoes (Dry)	106	OFD
Cassava (Dry/Flour)	108	OFD
Maize (flour)	113	OFD

Bread	114	OFD
Dry/Smoked fish	123	OFD
Infant Formula Foods	126	OFD
Groundnuts (Pounded)	142	OFD
Salt	148	OFD
Coffee	146	B_T
Tea	147	B_T
Soda/juice	149	B_T
Beer	150	B_T
Other Alcoholic drinks	151	B_T
Cigarettes	152	B_T
Restaurants etc.	154	OFD
Other food, drinks etc.	159	OFD
Other Tobacco	153	B_T
Tailoring and Materials	210	TEX
Curtains, Bed sheets, etc.	403	TEX
Men's clothing	201	WAP
Women's clothing	202	WAP
Children's wear	203	WAP
Other clothing and Clothing Materials	209	WAP
Handbags, travel bags etc.	456	LEA
Men's' Footwear	221	LEA
Women's Footwear	222	LEA
Children's Footwear	223	LEA
Other Footwear and Repairs	229	LEA
Charcoal	307	LUM
Furniture Items	401	LUM
Paraffin (kerosene)	306	P_C
Petrol, diesel etc.	462	P_C
Washing soap	452	CRP
Bathing soap	453	CRP
Tooth paste	454	CRP
Cosmetics	455	CRP
Plastic Basins	441	CRP
Plastic plates/tumblers	442	CRP
Jerry cans and Plastic buckets	443	CRP
Charcoal and Kerosene stoves	422	FMP
Enamel and metallic utensils	444	FMP
Tyres, Tubes, Spares etc.	461	MVH
Motorcar, Pick-ups, etc.	425	MVH
Bicycles	424	OTN
Electric iron/Kettles etc.	421	ELE
Electronic Equipment (TV. etc.)	423	ELE
Switches, plugs, cables, etc.	445	ELE
Other equipment and repairs	429	OME
Matches	451	OMF
Batteries	457	OMF

Others	459	OMF
Carpets, Mats, etc.	402	OMF
Bedding Mattresses	404	OMF
Blankets	405	OMF
Others and Repairs	409	OMF
Jewelry, Watches etc.	430	OMF
Others and repairs	449	OMF
Electricity	305	ELY
Water	304	WTR
Taxi, Bus and other fares paid	463	OTP
Others	469	WTP
Stamps, Telephones, etc.	464	CMN
Pension and Social Security Contributions	902	ISR
Dry Cleaning and Laundry	702	OBS
Barber and Beauty Shops	704	OBS
Expenses in hotels, Lodging places etc.	705	OBS
Sports, theatres etc.	701	ROS
Houseboys/girls, Shamba boys etc.	703	ROS
Expenditure on household functions	801	ROS
Other services N.E.S	802	ROS
Remittances, Gifts and Other Transfers	903	ROS
Contributions to Funerals and Other Functions	904	ROS
Others (like subscriptions, interest to consumer debts, etc.)	909	ROS
Consultation Fees	501	OSG
Medicines etc.	502	OSG
Hospital /Clinic Charges	503	OSG
Traditional Doctors fees/medicines	504	OSG
Others	509	OSG
School fees including PTA	601	OSG
Boarding and Lodging	602	OSG
School uniform	603	OSG
Books and supplies	604	OSG
Other educational expenses	609	OSG
Taxes and duties paid	901	OSG
Rent of Rented House	301	DWE
Imputed rent of owned House	302	DWE
Maintenance and Repair Expenses	303	DWE