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Abstract

This paper analyzes the poverty impacts of an economic partnership agreement (EPA) between Uganda and the EU. As Ugandan exports are also eligible for duty-free access to the EU under the Everything But Arms scheme the main impact of the EPA will be to require liberalization of EU exporters' access to the Ugandan market. There are fears this could threaten the incomes of poor people through lower prices for agricultural commodities, the crowding out of vulnerable industries, and loss of government revenue. We examine these fears by means of a qualitative analysis using data from a 1999 social accounting matrix of the Ugandan economy and the 2002/2003 household budget survey. We then quantify the effects on the economy and poverty employing a combined CGE-microsimulation model. The qualitative analysis shows that the scope for trade liberalization with the EU is very limited and that particularly the poor have only weak links to formal markets. The quantitative analysis suggests that the macroeconomic impacts of an EPA are minor but positive, implying that the economic adjustment costs might turn out to be low. Whether the very small poverty effects are positive or not depends on the selection of sensitive products in the EPA, although under all scenarios the very poorest appear to lose.

1 Introduction

The EU provided non-reciprocal trade preferences to the African, Caribbean and Pacific (ACP) signatories to the Lomé Convention (since 2000, the Cotonou Agreement) since 1975. Under these preferences, ACP countries were given duty-free access to the EU market for the great majority of their manufactured exports and exports of agricultural

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products not covered by the EU's Common Agricultural Policy (CAP), and enjoyed preferential treatment for exports of agricultural products covered by a CAP market regime (Bjørnskov and Krivonos; 2001).

In the Cotonou Agreement, the EU and the ACP countries agreed that these non-reciprocal trade preferences would be replaced by WTO-compatible free trade agreements, so-called Economic Partnership Agreements (EPAs), by the end of 2007 (Art. 36(1)). Until that date, the trade regime in Annex 5 of the Cotonou Agreement, which essentially continued the previous Lomé Convention preferences for ACP imports into the EU, was kept in place. The agreement also recognized that the new trading arrangements should be introduced gradually and with a necessary preparatory period (Art. 36(2)).

It was agreed that formal negotiations of the new trading arrangements should start in September 2002 and that the new trading arrangements should enter into force by 1 January 2008. For the negotiating process, the ACP states split into six self-determined regional groups, with the intention that EPAs would consist of separate free trade areas (FTAs) between the EU and each of these groups.[1] By the 1 January 2008 deadline, the Caribbean was the only region that had initialed a full EPA with the EU. However, in order to establish a new WTO-compatible trade regime from 1 January 2008, most African non-least developed countries (LDCs) (except Nigeria, Republic of Congo, Gabon and South Africa) as well as two Pacific non-LDCs have negotiated interim agreements with the EU. In total, 35 ACP countries had initialed either a full or an interim agreement by the end of 2007 (ECDPM; 2008; Commission; 2007). In East and Southern Africa (ESA), the East African Community members (Burundi, Kenya, Rwanda, Tanzania and Uganda) decided to form a separate EPA region and have initialed an interim agreement. The remaining ESA countries opted for a framework agreement with a common text but separate market access schedules.

The negotiations proved difficult, with the ACP countries raising a range of fears about the possible adverse effects of EPAs on their economies (Oxfam; 2006). These fears included the welfare-reducing effects of possible trade diversion from more efficient third country suppliers to EU exporters, the possibility that more competitive EU imports would undermine local industry and lead to a process of de-industrialization, the potential impact of the loss of tariff revenue on EU imports for the provision of government services and, in general, the risk that these agreements would exacerbate rather than reduce overall poverty levels. Recent literature has used a variety of modeling approaches to examine these concerns, without any overall consensus emerging (see ODI (2006) and the references cited therein). It is striking that virtually all of this literature focuses on national-level effects, and we are not aware of any previous study which has attempted to evaluate

[1]The six negotiating groups were the Caribbean, Central Africa, Eastern and Southern Africa, the Pacific Island States, the South African Development Community and West Africa.

directly the poverty and household level effects of EPAs.

This paper addresses this issue taking Uganda as a case study. It analyzes the poverty impact of the trade provisions of a potential EPA between the EU and the East African Community (EAC) of which Uganda is a member. In order to reach a WTO-compliant agreement, the EU and the EAC have agreed to establish a free trade area. According to GATT Art. XXIV, this requires that "substantially all the trade" between the constituent territories is liberalized. The European Commission interprets this phrase to mean that 90% of the bilateral trade value has to be liberalized where the liberalization can occur asymmetrically.[2] As under the interim EPA signed in December 2007 the EU will abolish 100% of its tariffs on EAC imports (with transitional periods for rice and sugar), the EAC has to liberalize 82.1% of its imports.[3] The EAC's tariffs on EU imports are scheduled to phase out gradually in three tranches starting in 2010 and completing in 2033 where the first non-zero tariffs will be eliminated in 2015. The ultimate list of sensitive tariff lines, which will be exempt from liberalization at the conclusion of the transition period, is not yet known. Stevens et al. (2008), in analyzing the interim EPA, find that 593 tariff lines (Harmonized System) where Uganda had actual imports – corresponding to 42.9% of Ugandan import value from the EU – are not listed in the interim EPA, either for liberalization or exemption. Hence, the agreement is rather preliminary at this stage.

In the absence of an elaborated EAC tariff liberalization schedule, we have constructed three alternative scenarios for such possible schedules, reflecting different priorities for the Ugandan negotiators. In each scenario sufficient tariff lines are exempt from liberalization to account for 17.9% of initial EU imports. We use 2006 revenue from a tariff line as a reflection of the sensitivity the government has attached to the product in the past. The *EPA-EAC* scenario optimizes the list of sensitive products with respect to overall EAC interests, the *EPA-UGA* scenario gives higher weight to Uganda's interests, and finally the *EPA-AG* scenario prioritizes the protection of Uganda's agricultural sectors.

Uganda as an LDC has enjoyed duty-free access to the EU under the EU's Everything But Arms (EBA) scheme since 2001.[4] We thus simplify the analysis of measuring the poverty impacts of the trade provisions by examining solely the requirement that Uganda as an EAC member reduces over time its tariffs on EU imports.[5] We implement a com-

[2]Other interpretations appearing in the literature are that liberalization of 90% of the tariff lines and that no major trade sectors should be excluded from liberalization, is necessary to comply with the GATT rules. Yet others argue a liberalization of less than 90% of the bilateral trade value is sufficient in the case of developing countries (Fontagne et al.; 2008, p. 30).

[3]Calculated using the 2006 trade and tariff data described later.

[4]Transition periods to full duty-free access are in place for rice (1 September 2009) and sugar (1 October 2009).

[5]We recognize that rules of origin can be an important determinant of the effectiveness of trade preferences and that more generous rules of origin in an EPA as compared to the EBA could provide an additional stimulus to Ugandan exports to the EU. This potential gain to Uganda from an EPA is not measured in the analysis in this paper.

bined computable general equilibrium (CGE) - microsimulation model which enables the quantification of the adjustment impacts on the economy following EPA liberalization and the impacts on overall poverty. The Uganda CGE model is a static, non-monetary model based on a 1999 Uganda social accounting matrix (SAM). The SAM has been updated to better match the factor income shares as observed in the household survey. A pre-experiment adjusts the SAM to the 2006 import tariffs taking account of Uganda's implementation of the EAC custom union's common external tariff (CET) and internal tariff elimination. The CGE model provides the post-simulation factor returns and commodity prices for the microsimulation that follows in a second step. The microsimulation projects these figures on to a detailed household income distribution derived from the 2002/2003 Uganda National Household Survey generating a counterfactual income distribution for poverty analysis.

While recognizing the limitations of the model used in this paper, we conclude that the introduction of the trade provisions of an EPA between Uganda and the EU would have a very small poverty effect which may be positive or negative depending on the list of sensitive products exempt from liberalization. The small magnitude of the impacts is driven, in part, by the relatively low share of the EU in current Ugandan imports and the relatively low average tariff which these imports currently face. Much of the effect would be due to a relative shift of resources out of import-competing sectors and into coffee production. But despite the possibility of reducing the poverty headcount, the very poorest would lose income in all of our EPA scenarios.

Section 2 of the paper describes the combined CGE-microsimulation model used for the analysis. Section 3 uses the two data sets assembled for the paper, the social accounting matrix behind the CGE model and the household data set behind the microsimulation model, to provide a qualitative analysis of the potential poverty impact of trade liberalization with the EU. The quantitative results from the formal modeling are set out in Section 4, while Section 5 draws conclusions and makes suggestions for further improvements in the modeling framework.

2 The Combined CGE-Microsimulation Model

The approach chosen for the present analysis is the sequential linking of a CGE model with a microsimulation model. Since the link is top-down from the CGE model to the microsimulation, the CGE model dictates the macroeconomic framework figures for the microsimulation. This section describes the CGE and microsimulation parts of the model and the data used.

2.1 The CGE Model

Data. The CGE model utilizes a 1999 Uganda SAM which is based on and slightly updates the 1999 Uganda SAM constructed by Dorosh and El-Said (2004). The SAM comprises 26 commodity, 25 activity, 4 factor of production including both skilled and unskilled labor, 1 household as well as government and rest of the world accounts. In contrast to the SAM by Dorosh and El-Said (2004), we have aggregated all domestic zones into a single zone and the four household types into a single household. In the original SAM, skilled labor is used exclusively by the manufacturing, petroleum and chemicals, utilities, and private and public services sectors. Because this differs strongly from the labor skill payments by industry observed in the Uganda National Household Survey (UNHS) that we use for the microsimulation, we have adjusted the respective skill shares in total payments to labor within each activity in the SAM to match the corresponding payments to skill shares in the survey.

The mapping between SAM and UNHS industries is detailed in the appendix, Table 21. All crop growing sectors including other agriculture have been pooled and assigned the same skilled to unskilled labor payment shares because the UNHS contains no information about the particular crop grown.[6] As in the original SAM, land is agriculture-specific and capital is specific to non-agricultural sectors. The SAM comprises household autoconsumption which is reflected as payments from the household directly to the activities instead of to the commodity accounts. Finally, the 1999 SAM has been inflated using a GDP deflator[7] to be compatible with the numbers of the household survey base year 2002/2003.[8,9]

In 2005, Uganda as a member of the EAC implemented the EAC's CET for imports from third countries.[10] Thus, starting from the 1999 Uganda SAM, we run a pre-experiment to simulate the changes in the Ugandan economy arising from the implementation of the EAC customs union and the common tariff structure using the 2006 EAC import tariffs and abolishing all tariffs on imports from EAC members.[11,12] The tariffs used are most favored nation (MFN) applied tariffs or preferential tariffs, whichever are

[6] Workers with ISIC code 13 (Growing of crops combined with farming of animals (mixed farming)) have been omitted from this process to get a clearer picture of the skill shares in crop growing in contrast to livestock farming.

[7] Source: World Bank. Series Name "GDP deflator (base year varies by country)", World Development Indicators (WDI) Online, retrieved on 20 February 2008.

[8] All cells of the SAM have been multiplied by $\frac{\Gamma_{2002}+\Gamma_{2003}}{\Gamma_{1999}+\Gamma_{2000}}$ to inflate the SAM from 1999/2000 to 2002/2003, with Γ: GDP deflator.

[9] The economic structure reflected in the 1999 SAM is shown in Tables 2 and 4.

[10] Roughly, the CET applies a three band import tariff structure with 0% on raw materials, 10% on intermediate products, and 25% on finished products complemented with a list of sensitive products for which the tariffs are higher than 25%.

[11] Kenyan imports to Tanzania and Uganda will be liberalized 2010.

[12] For details on the pre-experiment see Appendix D.

lower, as of 2006 and aggregated to SAM industries using trade weighting.[13] The import tariffs for the pre-experiment are shown in Table 16. Additionally, we substitute an *ad valorem* sales tax on the Petrol and Chemicals sector to avoid the drop of import tariffs in this formerly heavily protected sector becoming the dominating effect in the pre-experiment. Uganda introduced a high excise duty on gasoline, diesel, and illuminating kerosene in 2005.[14] For details of the tariff aggregation and petrol tax derivation see Appendix C.

Model. The CGE model adopts the IFPRI Standard Computational General Equilibrium Model in GAMS (Löfgren et al.; 2002). The model is a static, non-monetary, single-country model. All representative agents optimize – rationally and fully informed – their individual benefits resulting in a market-cleared, no-profit equilibrium.[15]

Producers (activities) maximize profits subject to the available production technology and input prices. The final commodity outputs are produced by combining quantities of value-added and aggregate intermediate outputs according to a constant elasticity of substitution (CES) function. Value-added in turn combines primary factors according to a CES function. On the other side of the technology tree, intermediate inputs are commodities combined according to a Leontief function. In the Uganda model used here, each activity produces exactly one commodity and each commodity is produced by exactly one activity with the exception of the fertilizer sector, which exhibits no domestic production. Profit maximization behavior of producers is ensured by the first-order optimality condition requiring that each factor's marginal productivity is equal to its remuneration, i.e. wage or rent. As long as a factor is fully mobile, its wage is the same across all sectors.

The representative institutions of the model are a household, the government, and the rest of the world. Because the Uganda SAM does not include enterprise accounts, there is no enterprise institution in the model. The household receives its income from the factors of production and from transfers from the government and the rest of the world. It consumes commodities according to linear expenditure system (LES) demand functions. Consumption of own produce happens at producer prices. The government receives income from collecting income, commodity, and import taxes as well as from transfers from the rest of the world. The government consumes a fixed quantity of private and public services, and investments. Additionally, it transfers CPI-indexed amounts to households. Finally, the rest of the world institution receives payments from imports to Uganda and spends for exports from Uganda, transfers to Ugandan households, and investments. Foreign savings is defined as the difference between rest of the world incomes

[13] UNCTAD Trains database, United Nations Conference on Trade and Development, Geneva, Switzerland. Accessed online via WITS, World Bank on 30 June 2008. The tariff rate selected is the "effectively applied rate".

[14] Excise Tariff (Amendment) Act, 2005, Uganda.

[15] The model description follows Löfgren et al. (2002), Section 3.

and spending.

The mechanics of the commodity markets are modeled as follows. Commodity output is allocated to domestic sales and exports assuming imperfect transformability using a constant elasticity of transformation (CET) function designating output shares exclusively to domestic or export sales. The production designated for domestic sales and the corresponding imported variety of a commodity are perceived by consumers as imperfect substitutes. The model employs a CES aggregation function to combine domestic products and their imported substitutes according to consumer preferences into one final composite commodity. This so-called Armington function prevents unrealistic total shifts towards either imports or domestic production following a relative price change. Following from the small country assumption, international supplies and demands are infinitely elastic at given world prices. The price domestic suppliers of exports receive is equal to the world price in domestic currency minus transaction costs to the border. The domestic supply prices are given by producer prices plus domestic transaction costs. Domestic demand is composed of household and government consumption, investment, intermediate inputs, and transaction inputs. Only demand for fertilizers is fully passed on to imports since those are not produced domestically. Demands and supplies on the various markets are required to equilibrate through adjustment of prices.

For a comprehensive description and mathematical formulation of the model see Löfgren et al. (2002).

Parameters and model closures. The CET and Armington elasticities are taken from the documentation of the Uganda SAM, see Dorosh and El-Said (2004). Additionally, we have set the Armington elasticities for the commodity accounts CCOFF, CCROP, and CCOFP from previously zero to 3, 3, and 1.5 respectively.[16] The elasticities of factor substitution have been adopted from the GTAP project (see Dimaranan et al. (2006), Table 20.2). For the LES function, the Frisch parameter of -5.85 for Sub-Saharan Africa was taken from the documentation of the GTAP database version 3 documentation (Dimaranan et al.; 1998) and all expenditure elasticities were assumed to equal unity.

Government expenditure and savings are fixed and the government account balance is established through replacement of tariff revenue loss by multiplying all sales tax rates by the same factor. Foreign savings are assumed to be fixed so that the exchange rate adjusts to balance the current account. The marginal propensity to save of the household is assumed to adjust according to the changes of the domestic value of the rest of the world savings and price changes of investments to accommodate the fixed investment real cost. On all factor markets we assume factors to be fully mobile. To close the labor market equations, we assume fixed employment levels and market-clearing wages. The CPI is

[16]For full details refer to Table 19.

fixed and serves as the numeraire for the model.

2.2 The Microsimulation Model

Data. The microsimulation is based on the Uganda National Household Survey 2002/2003[17] (UNHS). The UNHS consists of socio-economic, labor force, informal enterprise, and community questionnaire modules. The representative sample includes 9,711 households corresponding to 52,088 individuals. The sample coverage of the population is stated as 97%. The labor force section covers 23,098 individuals. Overall, the sample inflated using sample weights represents a population of 25,276,868 individuals. The sample data has been cleaned and adjusted and values have been imputed where necessary to get a usable and complete dataset.[18] All values are scaled to annual level.

Classification of household and individual characteristics. We define the *labor force* as consisting of all individuals aged at least 15 and at most 65. Educational attainment is classified into "low", "primary", "secondary", and "tertiary" education according to the answers to the question for "highest level attained" in the UNHS "household members' education" section: Individuals with less than completed primary level (P7) are labeled "low"; those with completed primary but less than completed middle or secondary level (J3, S4, S5, S6, or "completed post primary specialized training or certificate") are labeled "primary"; all with at least middle but less than "specialized training or diploma" or "completed degree or above" are labeled "secondary"; and all in the latter categories are labeled "tertiary". Invalid or missing values are all assigned to the "low" category. Workers are labeled "skilled" or "unskilled" according to their occupation stated in the labor force survey section. The occupation coding in the UNHS follows the International Standard Classification of Occupations (ISCO) of 1988. Following Liu et al. (1998), all individuals with occupations under the major ISCO headings one to three, namely "Legislators, senior officials, managers and administrators", "Professionals", and "Associate professionals" are considered "skilled" and all others "unskilled". Households are classified as "agricultural" either if they answered "agriculture" on the question for the "most important source of earnings" in the "welfare indicators" section of the UNHS or if the occupation of the household head (or if unavailable, the occupation of the spouse or the person with next lowest person identification number in the household) is under the ISCO heading "agricultural and fishery workers", and the household is classified "non-agricultural" otherwise. Individuals are classified as "agricultural" according to the affiliation to the industry sectors "agriculture, hunting, and forestry" or "fishing" as stated in the labor force section of the UNHS and as "non-agricultural" otherwise. The classifications for urban or rural and

[17] Uganda Bureau of Statistics, Entebbe, Uganda, 2003.

[18] For description of handling of missing values, in particular for occupation and industry, see Appendix A.

regions are adopted unaltered from the UNHS dataset.

Income sources. Unfortunately, the 2002/2003 UNHS contains no income survey section. It only collects data on some parts of household incomes, namely individual wages, household's free[19] and autoconsumption figures, as part of the expenditure survey, and a single figure for total income from crop farming enterprises in the welfare indicator section. Additional income information is collected within the informal sector survey covering household-based enterprises in both rural and urban areas. But only rural non-household-based enterprises are surveyed omitting those in urban areas.[20] Furthermore, the information collected does not allow to clearly infer the income from regular business activity, mainly due to the short recall period of 30 days. The numbers are likely dominated by seasonality, bulk purchases, etc. For this reason and because these datasets seem to be particularly affected by inconsistencies, we do not make use of the informal sector section.

Since impacts on poverty are expected to originate predominantly from changes on the income side, we have estimated the missing income sources using the information available. Our starting point for each household is the total annual expenditure figure and the observed income elements consisting of wages, free and auto-consumption, and income from crop farming enterprises. This observed income serves as a lower bound for the actual income. If it exceeds total expenditure then the difference is designated as household saving.[21] On the other side, we do not allow for dissaving. This assumption potentially exaggerates household incomes but we believe that dissaving does not play an important role for the poorer households.

Subsequently, total expenditure plus household saving is assumed to equal household's total income. This amount needs to be allocated to income sources. The income parts unambiguously attributable to their respective sources are only wage incomes, as part of labor income, and free consumption, as part of transfer incomes. Now, the residual of expenditure plus savings minus currently allocated income has to be allocated to labor, capital, land, and transfer incomes. This is done sequentially loosely inspired by an approach described in Ivanic (2004).

Labor incomes are determined by wage regressions. We impute a wage for each non-wage earning, working person, i.e. not unemployed and not inactive for at least 1 month, estimated according to personal characteristics, in particular age, marital status, gender,

[19]These are consumption items provided to the household as free transfers from other households or possibly from government or aid organizations.

[20]See UBoS (2002, p. 35).

[21]If total household saving reported in the SAM is higher than the amount already allocated to households then this difference is distributed according to household's share in total household assets so that each household gets the maximum of its share or the observed saving. This is determined in such a way that the SAM saving figure is accurately distributed. But the observed saving in the UNHS was already higher than the saving in the SAM.

urban or rural domicile, educational attainment, skill level, and industry category.[22,23] If the residual income is already zero, all imputed wages are set to zero. If the sum of household's imputed wages is larger than the residual, then the imputed wages are shrunk proportionally to fit the residual keeping observed wages untouched. No further adjustment is necessary when the sum of imputed wages is less than the residual.

Next, we impute *returns to land* for households which still exhibit an income residual. The total amount of returns to land is taken from the SAM and distributed to households proportionally to their share in "agricultural land owned" taken from the UNHS Household and Enterprise Assets section.[24] Again, imputed land income cannot exceed the household's remaining residual. Hence, total returns to land are allocated to households in an iterative procedure subject to this constraint.

If the value of autoconsumption income is not covered by the incomes imputed by this point then the uncovered part is assigned to other unskilled labor, which is labor by unspecified household members.

Finally, the remaining residual is assigned completely to *income from transfers* if the household states that its "most important source of earnings" in the UNHS welfare indicators section is transfers or to *income from capital* otherwise.

Table 1 compares the structures of the imputed income sources in the estimated household micro-database (HHS) and the SAM. The column HHS (SAM) shows the share of each income source in the total household income from the HHS (SAM). The structures are quite similar. Putting each source's total nominal income from the HHS and the SAM in relation to each other, column HHS/SAM shows that capital and land are overestimated in the HHS, labor is underestimated, and land incomes equal those of the SAM (by construction). In the case of transfer incomes the SAM only includes remittances from the rest of the world to households and government transfers to urban non-poor households but leaves out household to household transfers completely. In contrast, the HHS takes only in-kind household to household transfers into account and imputes some residuals of unknown origin. The actual figure of transfer incomes should equal the sum of both amounts plus cash transfers from households to households, which might play an important role for households where the household head has left the household because of work reasons. But since no transfers apart from government transfers are modeled this will have no important impact on the results. Overall, *nominal* income, expenditure and saving totals in the HHS are somewhat higher than in the SAM (see column HHS/SAM) but

[22]The dependent variable is the log of the wage. Note that the dependent variable reflects both the hourly wage rate as well as how much time the individual devotes to work either due to own choice or to involuntary underemployment. It is also adjusted to annual values taking the number of months employed into account.

[23]For full details on the wage regression see Appendix B.

[24]Sample weights are used for all imputations.

the income source *shares* in total income in the HHS (column HHS) deviate from those in the SAM (column SAM) by a maximum of less than 5 percentage points.

Table 1: Shares of income sources and dispositions in total income

	HHS	SAM	HHS/SAM
Labor	45.53	49.82	96.56
Capital	24.40	21.93	117.59
Land	19.81	20.93	100.00
Transfers	9.58	7.32	138.22
Total	100.00	100.00	105.66
Expenditure	91.97	91.71	105.96
Saving	8.03	8.29	102.32

The columns HHS and SAM show the shares of each income source in total income for the adjusted household data and the SAM, respectively. Column HHS/SAM relates the nominal income of each source in the HHS to that one of the SAM. Source: Own computation.

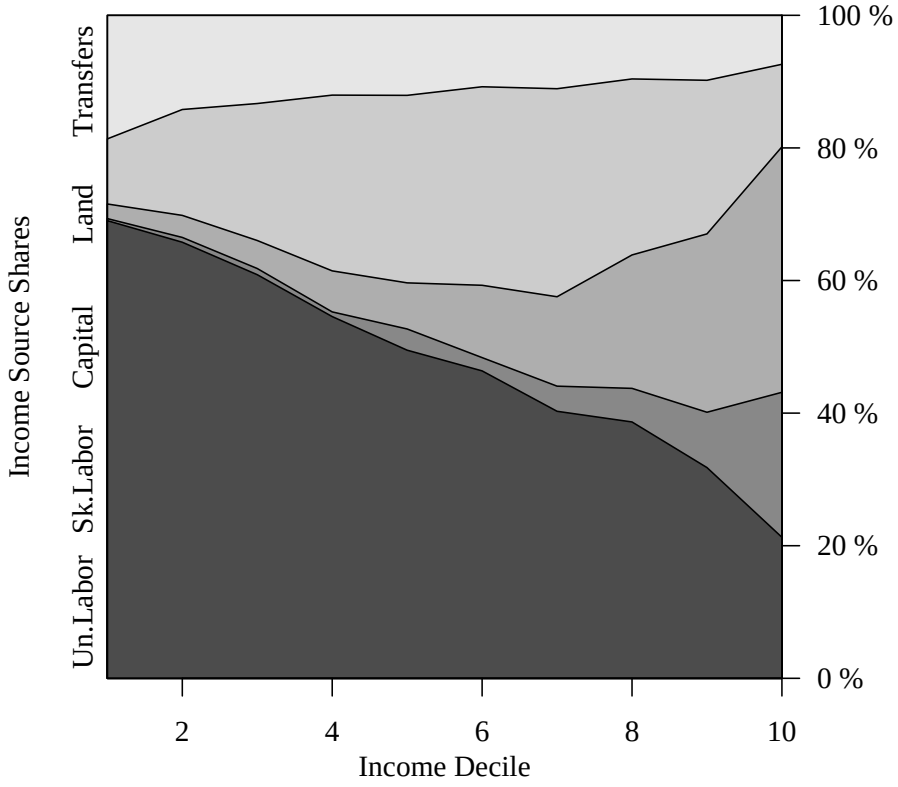
The resulting distribution of income across sources by decile is shown in Figure 1. This imputation approach does not allow for dissaving. Extraordinarily large expenditure items might indicate dissaving but instead lead to large capital, or sometimes transfer, income imputations since those items absorb the final residual from income minus expenditure minus saving. Qualitatively, we expect that some household incomes are overestimated because expenditures partly represented dissaving. Other household incomes are underestimated due to incompleteness of income categories surveyed in the questionnaire leading to unreported extra saving. Nevertheless, the consequences for poverty analysis are likely small because poor households in particular have insufficient assets for substantial dissaving and cannot spend much in excess of their income and usually cannot save systematically either.

Model. The microsimulation model is a non-behavioral micro accounting model which simulates the first order effects of changes in commodity prices and factor returns given by the CGE model on household incomes based on the representative household sample collected in the UNHS. No reactions to price changes are assumed on the household side thus the simulation reflects explicitly the short-term implications on the income distribution.

After simulation household income for household h is defined as follows:

$$Y'_h = \left(dw_{L_{un}} \sum_{i \in I_{h,L_{obs,un}}} w_i + dw_{L_{sk}} \sum_{i \in I_{h,L_{obs,sk}}} w_i + Y_{otf,h} + \sum_{c \in C} dp_c Q_{h,c} + Y'_{imp,h} \right) \cdot \frac{1 - \tau_h}{CPI_h}$$

Figure 1: Income allocated to imputed income sources by per capita household income decile in per cent



Source: Own computation from the imputed household incomes.

with

$$Y'_{imp,h} = (1-\gamma_h)Y^{scaled}_{imp,h} + \gamma_h Y_{imp,h}$$

$$Y_{imp,h} = K_h + T_h + \sum_{i \in I_{h,L_{imp,un}}} w_i + Y_{olab,h} + \sum_{i \in I_{h,L_{imp,sk}}} w_i$$

$$Y^{scaled}_{imp,h} = drK_h + dqT_h + dw_{L_{un}} \left(\sum_{i \in I_{h,L_{imp,un}}} w_i + Y_{olab,h} \right) + dw_{L_{sk}} \sum_{i \in I_{h,L_{imp,sk}}} w_i$$

where Y: income, K: capital, T: land, L: laborers (unskilled or skilled; imputed or observed), r, q: capital or land returns, w_i: wage of individual i, I: household's workers, Y_{otf}: other transfer income, C: consumption items, p_c: price of item c, Q_c: household's free consumption of item c, CPI: household-specific consumption price index, τ: income tax rate, γ: share of autoconsumption in imputed incomes, Y_{olab}: other imputed labor income. d denotes the ratio of the respective variable's values before and after the simulation. The latter is taken from the CGE simulation results. CPI_h is the sum of the

household's expenditure items weighted by their respective after simulation prices divided by the sum of the household expenditure before the simulation hence corresponding to a Laspeyres price index. Also for the CPI_h computation only the marketed items are scaled by the simulated growth rates leaving auto- and free consumption items unweighted.

The simulation considers the heterogeneity of households' income source compositions by accounting for their respective factor endowments and specific individual wages by skill levels. In order to account for changes on the expenditure side, nominal household income is divided by the household-specific CPI to yield real income. This implies that all wages of the same skill level change proportionally and that households do not react to the changes in their economic situation thus leaving their income source composition unchanged and not substituting consumption items. The neglect of any adaptive behavior represents a worst case scenario for the household but is not far-fetched as a short-run scenario for the poorest people since they usually also lack resources and options to react quickly and comprehensively to economic changes, particularly on the income side.[25] Note, there is an inherent conceptual problem with the factor income-based imputed household income since there is no guarantee that the simulated "shadow" income changes for subsistence farmers correspond to the changes of the prices of their produce. This income represents an opportunity cost than rather a realized income and those incomes can diverge from each other. To circumvent this problem we separate out the autoconsumption income from the imputed incomes and do not scale this part thus leaving subsistence income unaffected by price and factor return changes.

Poverty measure. For measuring poverty, we employ an absolute poverty line and the measures P_α introduced by Foster, Greer and Thorbecke (1984). Setting the parameter α in the following formula to 0, 1, or 2 computes the poverty headcount, gap, or severity index, respectively.

$$P_\alpha = \frac{1}{N} \cdot \sum_{i=1}^{N} \left(\frac{z - y_i}{z} \right)^\alpha \cdot I_i$$

with N: population size, z: poverty line, y_i: income of individual i, and $I_i = \begin{cases} 1 & \text{if } y_i < z \text{ and} \\ 0 & \text{otherwise.} \end{cases}$

The poverty headcount index P_0 measures the percentage of people falling below the poverty line. The poverty gap P_1 measures the extent by which poor people undercut the poverty line as a percentage of the poverty line on average. The poverty severity index P_2 squares that shortfall percentage of each person before averaging and thus gives more weight to more severely affected people.

[25] Taking advantage of new opportunities might require for instance training, new seeds or machinery but necessary credit is often unavailable for the poorest.

We use a national as well as rural and urban poverty lines which have been recovered from the adjusted household survey data in order to reproduce the poverty headcounts reported in the UNHS Report on the Socio-Economic Survey (UBoS; 2003, table 6.3.2 (a)). In particular, we find a poverty line of 199,135 UGS for the 38.8% of national poverty headcount and 192,707 UGS and 218,516 UGS for the 41.7% of rural and 12.2% of urban poverty headcounts, respectively. The UBoS poverty lines are based on the *cost of basic needs approach*, which accounts for the cost of meeting physical calorie needs and allowing for vital non-food expenditure, as for instance clothing and cooking fuels, valued using the average consumption basket of the poorest 50% of the population.[26] The rural and urban poverty lines account for the differences in prices and consumption baskets for the respective subpopulations. As the income measure we use per capita income.

3 Qualitative Analysis of the Poverty Impact Potential

In order to approach the question about the impact of signing an EPA with the EU, we first establish intuitively how trade liberalization is linked to poor Ugandans following the chain of cause and effects. We then look at the data on trade relations between Uganda and the EU as well as at the UNHS to obtain an impression of the magnitude of the trade shock and its impact potential for the Ugandan economy and the poor population.

McCulloch et al. (2001) identify three main channels via which trade liberalization reform might translate into poverty impacts: the consumption, the enterprise, and the government channel. Import tariff liberalization reforms initially affect the prices of the imported commodities and their substitutes on the domestic market. As consumers, individuals are affected by changes in their consumption goods' prices which change the purchasing power of their incomes (*the consumption channel*). As producers, their profits directly depend on prices for inputs and outputs, or, as workers, price changes affect enterprise profits and thus factor demand which materializes in employment and wage changes (*the enterprise channel*). As citizens, people are affected by way of tariff revenue loss-induced changes in government policies regarding direct transfers, taxes, and provision of public goods and social services (*the government channel*). Of course, these are only the immediate, static, monetary impacts on peoples' livelihood. More indirectly and dynamically, trade liberalization, for instance, increases incentives for investment and innovation and thus economic growth as well as altering the vulnerability of an economy and households to negative external shocks, e.g. by encouraging specialization in a small number of goods.[27] In the following, we look only at the impact potential of the three

[26] See UBoS (2003, Appendix II(A), 2).

[27] These two channels are discussed in Bannister and Thugge (2001) and Winters (2002).

static channels.

While the reduction of import tariffs by foreign countries tends to raise domestic prices for the particular exported goods through resulting higher demand from abroad, the reduction of Uganda's own import tariffs tends to reduce associated domestic prices through the availability of cheaper imported substitutes. The magnitude of the direct price effect of the import liberalization depends on the volume of trade, the size of existing import trade barriers and the size of the tariff cuts. In an extended view, it also depends on how much the specific tariff lines are decreased relative to each other and on the general equilibrium effects working through the entire economy. How these effects translate into real income effects for each individual depends initially on their personal composition of expenditure items and income sources.

Table 2: Composition of Uganda's GDP in 1999

	Total	% of GDP
+ Priv. Cons.	8779.2	88.3
+ Investments	1709.0	17.2
+ Gov. Cons.	1122.3	11.3
+ Exports	1164.3	11.7
− Imports	2837.9	28.6
= GDP	9937.0	100.0

The table reflects the structure of 1999. GDP is measured at market prices. Totals are in billion Ugandan Shillings of 2003. Source: Own computations from the Uganda SAM.

Trade and aggregate impacts. What is the magnitude of Uganda's current trade relations? Table 2 shows the composition of gross domestic product (GDP) at market prices computed from the adjusted SAM for Uganda.[28] Imports amount to 29% of Uganda's GDP while exports only to about 12% of GDP showing strong import dependence.

Through which import sectors will the EPA affect the economy? As illustrated in Table 3 (column EU Imp.%) based on 2006 import value and tariff data, the EU's share in world imports to Uganda amounts to 18.86%. 96% of EU imports are concentrated in manufacturing, petroleum and chemicals, and other agriculture. Imports of manufacturing are by far the predominant imports from the EU accounting for 13% of total global imports to Uganda. While the EU import share is high for some agricultural products, import volumes are insignificant. The overall trade-weighted import tariff for the EU is currently as low as 5.5%. Within these three main import sectors, there is a moderately high tariff of 6% on manufacturing but only a 2% tariff on petroleum and chemicals,

[28]Here and in the remainder of this paper, all values are given in Ugandan Shillings (UGS) of the year 2003.

and the tariff on other agriculture is negligible. Thus, assuming imperfect substitutability between imported and domestic goods, only in the manufacturing sector do we expect substantial initial impacts of the EPA in the form of a drop in prices.

Table 3: Importance of the EU as a source of imports for Uganda, 2006

	Value	% of global Imp.	EU Imp.%	Tar.EU
Coffee	2.25	0.00	0.00	–
Other Cash Crops	65.53	0.00	0.00	24.88
Maize	8,061.04	0.17	0.04	50.00
Sorghum/Millet	26,207.10	0.56	0.09	25.00
Horticulture	15,716.51	0.34	0.08	25.00
Other agriculture	214,533.01	4.59	1.19	0.07
Livestock	815.78	0.02	0.01	12.54
Forestry	1,342.15	0.03	0.00	0.22
Fishing	92.83	0.00	0.00	12.25
Meat and dairy processing	8,296.36	0.18	0.02	46.92
Coffee processing	1,725.91	0.04	0.00	14.05
Grain milling	37,828.07	0.81	0.05	12.62
Other beverages	43,023.90	0.92	0.24	15.00
Textiles and leather	212,933.26	4.55	0.11	20.13
Manufacturing	2,500,611.61	53.49	13.24	6.22
Fertilizers	22,582.42	0.48	0.05	0.00
Petroleum and chemicals	1,572,418.83	33.63	3.72	1.95
Utilities	8,187.31	0.18	0.00	–
Private services	535.24	0.01	0.00	11.78
Total or wtd. mean	4,674,979.09	100.00	18.86	5.48

Column Value: value of Uganda's imports from the world for each sector in million UGS of 2006. Column % of global Imp.: distribution of Uganda's imports from the world across sectors. Column EU Imp.%: EU's sectoral imports divided by total global imports to Uganda. Column Tar.EU: trade-weighted average tariff the EU imports face in each sector. Source: Own computation from UNCTAD Trains data for 2006.

What are the expected effects on domestic industry? Table 4 shows the structure of domestic industry and trade based on the 1999 Uganda SAM. Uganda's production activity is strongly concentrated in the agricultural sector, generating 46% of Uganda's value added, followed by the services (35%) and industrial (19%) sectors. The manufacturing and petroleum and chemicals sectors account for only 5% and 1% of output, respectively. 75% of domestic demand for manufactures is satisfied through imports while at the same time manufacturing accounts for 23% of Uganda's exports. This hints at complementarities rather than competition between imports and domestic production of manufacturing goods. The petroleum and chemicals sector is small and domestic demand is largely satisfied by imports.

Table 4: The structure of Uganda's domestic industry and trade, 1999

	%OUT	%VA	%EX	EX/OUT	%IM	%IMTARREV	IMTAR	IM/D
Coffee	2.56	3.06	–	–	0.00	0.00	6.60	0.00
Other Cash Crops	1.28	1.30	–	–	0.00	0.00	6.60	0.02
Maize	1.94	2.86	0.87	3.02	–	–	–	–
Sorghum/Millet	2.36	3.48	–	–	–	–	–	–
Cassava	1.81	2.67	–	–	–	–	–	–
Sweet Potatoes	1.73	2.55	–	–	–	–	–	–
Matooke	4.35	6.41	–	–	–	–	–	–
Horticulture	4.68	6.89	1.21	1.72	–	–	–	–
Other agriculture	3.75	5.52	2.09	4.12	0.84	0.31	6.58	6.52
Livestock	5.03	7.34	–	–	0.13	0.05	6.60	0.54
Forestry	1.35	1.51	–	–	0.02	0.01	6.60	0.36
Fishing	1.73	2.20	4.11	15.87	0.01	0.01	6.60	0.22
Meat and dairy processing	0.93	0.42	–	–	2.24	0.82	6.58	33.99
Coffee processing	3.13	0.33	41.92	98.43	0.00	0.00	6.60	1.89
Grain milling	0.59	0.26	–	–	0.67	0.25	6.60	18.76
Other beverages	8.38	4.73	8.36	6.86	1.85	0.68	6.58	4.24
Textiles and leather	0.94	0.59	0.46	3.33	9.22	3.39	6.58	67.92
Manufacturing	4.75	3.22	15.75	23.36	48.39	38.48	14.24	74.90
Fertilizers	–	–	–	–	1.37	0.52	6.84	100.00
Petroleum and chemicals	1.00	0.44	–	–	20.07	49.94	44.54	84.20
Utilities	1.05	1.31	1.81	14.46	0.18	0.07	6.60	4.04
Construction	10.52	8.00	–	–	0.17	0.06	6.61	0.34
Commerce	10.60	12.24	–	–	0.69	0.25	6.58	1.36
Transport	7.56	4.95	8.31	9.16	6.73	2.46	6.54	17.18
Private services	12.32	13.94	15.12	10.23	7.41	2.71	6.55	12.60
Public services	5.66	3.79	–	–	–	–	–	–
Total or wtd.avg.	100.00	100.00	100.00	8.34	100.00	100.00	17.90	15.70

The table reflects the structure as implicit in the SAM. Exports, imports and import tariff revenue are given in percent of their respective totals, import tariff rates in percent, domestic output and value added in percent of their respective totals. Value added is composed of activity payments to factors plus payments of households to activities, i.e. home consumption. Exports/Output redefines exports as exports minus export transaction costs. Imports/Domestic Demand is defined at market cost. Source: Own computation from the 1999 Uganda SAM.

On the export side, by far the most important commodity is processed coffee with 42% of total exports, followed by manufacturing and private services. The agricultural and food processing sectors in total comprise 59% of total exports. 98% of processed coffee output is exported. This indicates a strong dependency on coffee exports and the agriculture and food processing sector in general.

Looking at the entirety of Uganda's imports, these are dominated by manufacturing commodities accounting for 48% of total imports, followed by petroleum and chemicals 20%, and textiles and leather 9%.[29] Agricultural commodities play a minor role within imports while manufacturing accounts for the vast majority followed by services. The very low import significance and an average import tariff rate[30] of 6.6% indicate that liberalization of agricultural trade has only a small impact potential for the economy.[31] In contrast, imports in the industrial sectors are relatively important and tariff rates average 20%.[32] In these sectors, liberalization is expected to impact domestic prices relatively strongly. Here, own tariff liberalization impacts on domestic prices are expected to be significant. The same applies to a lesser degree to the services sector which has an average tariff of 6.5%.

Revenue from import tariffs accounts for a large share, 31.5%, of total government revenue and thus is a very important income source for the government.[33] Manufacturing and petroleum and chemicals imports provide the bulk of import tariff revenue. The loss of tariff revenue requires the government to introduce compensatory measures like, for instance, reduction of governmental transfers or public services or raising tax rates. Such measures might have direct effects on individual welfare. Unfortunately, the UNHS includes no data about income from government transfers or other welfare enhancing provisions by the government and thus we cannot evaluate the impacts of shocks working through the government channel.

The preceding discussion touches qualitatively on the potential impacts of trade liberalization reforms on Uganda's economy but leaves open the question how this will impact on poverty. In order to explore this question, we need to assess the impact on individuals' real incomes and therefore turn to the UNHS 2002/2003.

[29]Differences in sectoral shares in imports between the SAM and Table 3 may be due to both real structural change in the import pattern between 1999 to 2006 as well as to differences in the mapping used to aggregate trade items to SAM sectors during aggregation.

[30]These are trade-weighted tariff averages.

[31]Note that missing tariff values are due to zero imports but this in turn can also be the consequence of prohibitively high tariff rates.

[32]These are the tariff rates prior to Uganda's adoption of the EAC CET in 2005. Before running our scenarios we conduct a pre-experiment to implement the 2006 tariff structure in the SAM.

[33]Government income, as implicit in the SAM, is composed of 15.4% income taxes, 31.5% import tariffs, 18.9% commodity taxes, and 34.2% transfers from abroad.

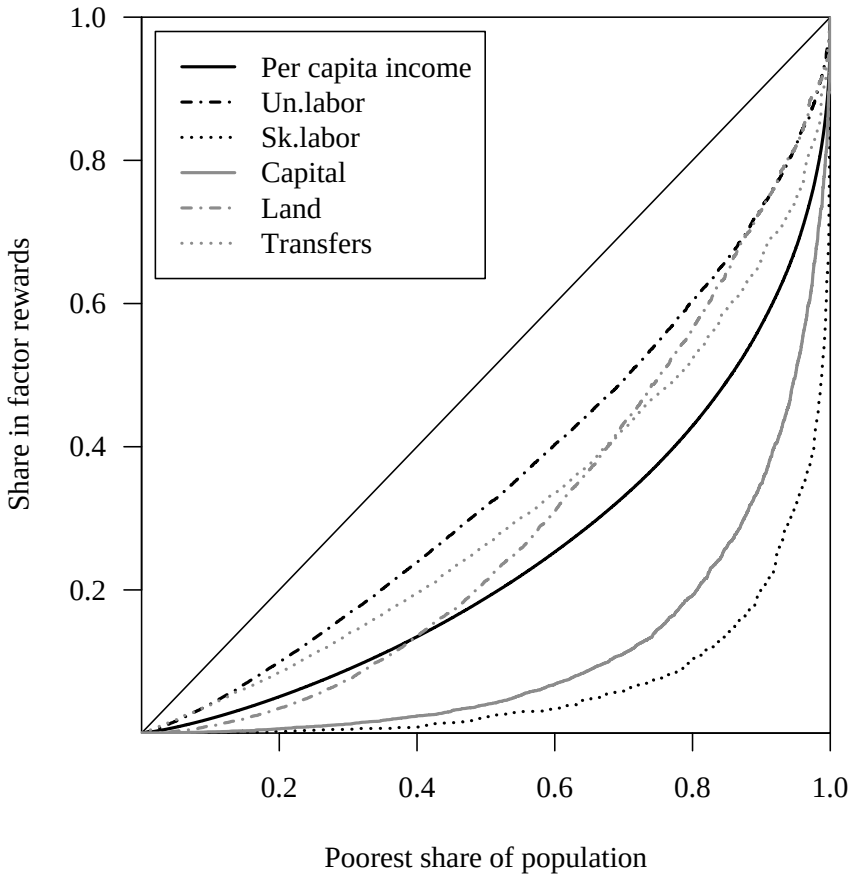
Enterprise channel. Looking at the imputed income sources (Figure 1), most income for the poorest deciles comes from unskilled labor (65% for the poorest decile) and some from transfers and land returns. With increasing per capita income, unskilled labor and transfer incomes decrease constantly in weight while skilled labor and capital returns increase constantly in weight in total income so that the latter two become the main income sources for the richest deciles. Reliance on land returns is largest amongst the middle per capita income deciles. But although the poorer deciles draw most of their incomes from the returns to unskilled labor it does not mean that mainly the poor benefit from higher returns to unskilled labor. Figure 2 describes the distribution of factor rewards across the population in the fashion of Lorenz curves. The lower half of the income distribution gets only about 30% of the returns to unskilled labor. Land returns benefit poor people to an even smaller extent. But returns to capital and skilled labor are the most unequally distributed since the richest 10 to 20% reap 85 to 90% of the total returns. Figure 3 shows the average share of each observed income source in the total household income for each per capita income decile. While wages, accounting for 6%, are negligible as a source of income for the poorest population decile its share increases disproportionately over the deciles accounting for 76% of the income of the richest decile.[34] The share of free consumption – consisting, e.g., of transfers from other households, the government, or abroad – is rather constant around 21% with a peak in the lowest and low point in the highest decile. Crop farming provides a roughly constant share of about 17% in income for the poorest eight deciles and then drops for the richest two. Autoconsumption, i.e. subsistence farming and the consumption of own produce or of withdrawal of household enterprise stock, amounts to a fairly constant share of about 50% for the first 6 deciles and then drops with an increasing rate accounting for only 8% of incomes of the richest decile. There is a strong shift in the importance of income sources from autoconsumption (or subsistence farming) to wage incomes in moving from the poorest to the richest deciles. The poorest decile draws 79% of their income from auto- and free consumption. The richest decile earns 76% of its income from wage employment alone.

Consequently, in the lower income deciles we expect little direct effect on income from wage level changes as most of their income derives from free and autoconsumption. On the other side, there might well occur a strong indirect effect from the restructuring of the economy as rising wages draw more people into wage employment. Since subsistence farming is independent of market prices, it will not experience any direct price effects. But there will be direct price effects on incomes from crop farming and transfers of free goods.

Figure 4 shows the distribution of the population across income deciles by their affinity to rural areas and agriculture. 86% of the population live in rural and only 14% in

[34]This and following discussions refrain from judging the direction of causality of the observed relationships.

Figure 2: Lorenz curve and factor ownership distribution



The Lorenz curves show for each factor or income source the share of the poorest population that gets the share of the total rewards. Source: Own computation from the imputed household incomes.

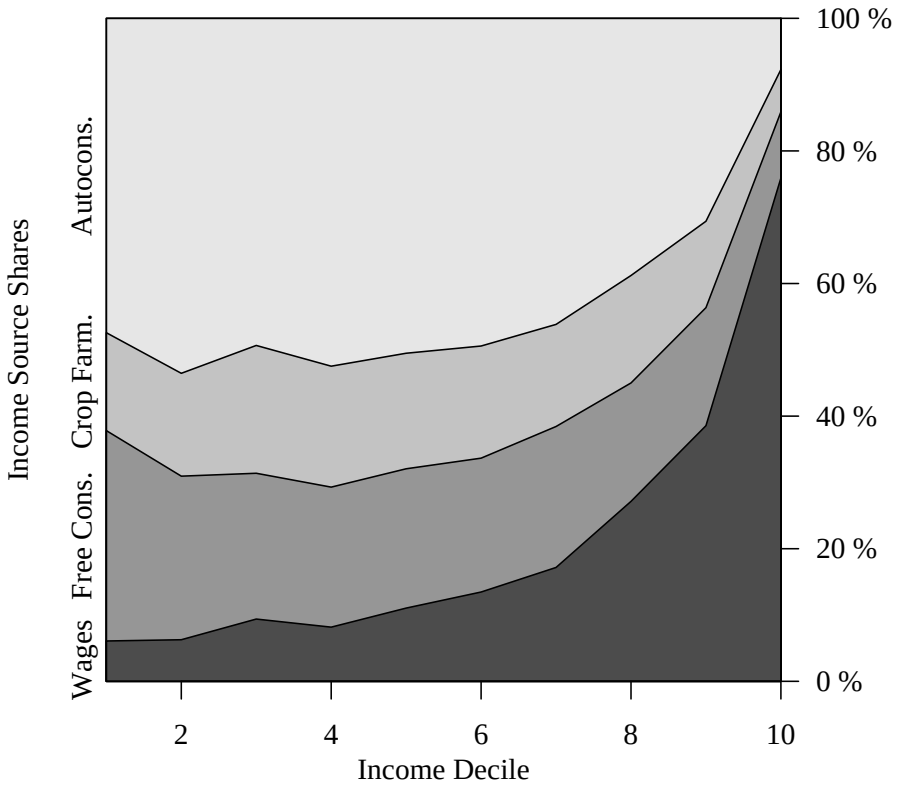
urban areas. 64% are directly connected to agriculture and another 26%, the rural non-agricultural population, are likely to have a strong indirect dependency on the agricultural sector. But the distribution changes drastically with increasing per capita income. While virtually all people of the lowest decile live in rural areas (98%) and 88% are directly associated with agriculture, the latter decreases over the deciles to only 28% in the richest decile. Similarly, the share of people living in urban areas increases from 2% in the poorest to 50% in the richest decile. Furthermore, the importance of agrarian occupations declines rather strongly with rising income to only 28% for the richest decile.

This highlights the dependency of the poorer households in particular but also of the Ugandan economy in general on the agricultural sector. Therefore, trade liberalization impacts on the agricultural sector are likely to affect largely and especially the poorer population.

Figure 5 explores the usual employment status of the workforce by per capita income

Figure 3: Sources of observed income as shares of total income by per capita income decile in per cent

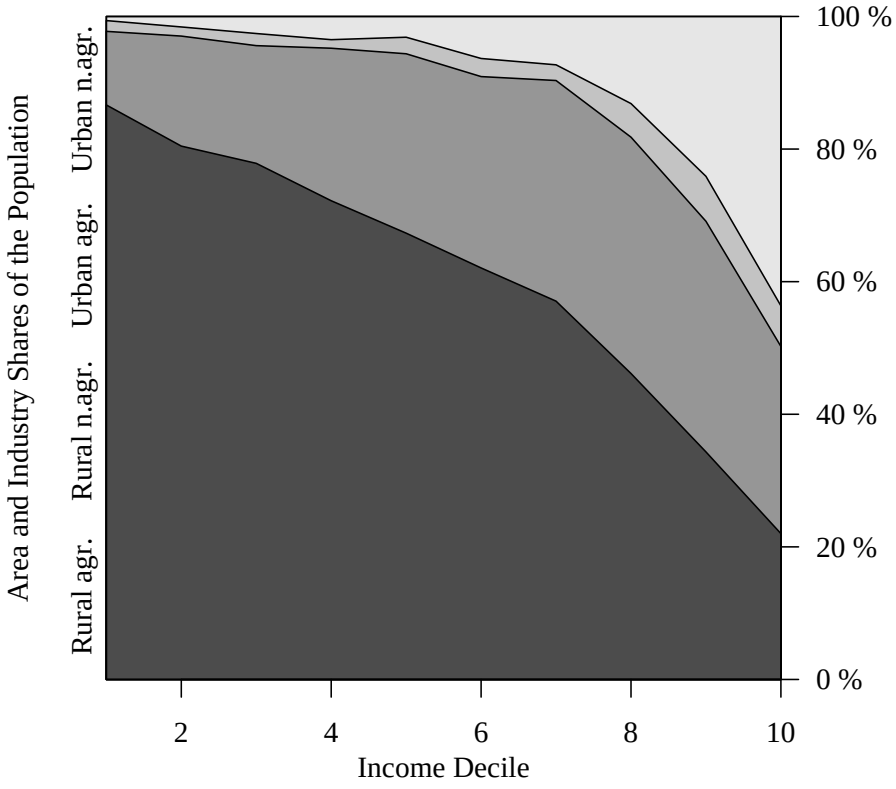
Decile	$\leq$ UGS	Wages	Free Cons.	Crop Farm.	Autocons.
1	108,590	6.08	31.73	14.76	47.42
2	142,162	6.27	24.67	15.52	53.54
3	172,339	9.39	21.99	19.28	49.34
4	204,359	8.17	21.12	18.24	52.47
5	241,461	11.05	21.01	17.43	50.52
6	289,959	13.47	20.19	16.91	49.43
7	352,148	17.17	21.26	15.40	46.17
8	469,673	27.14	17.86	16.21	38.79
9	735,029	38.56	17.80	13.03	30.61
10	105,531,556	75.91	9.98	6.38	7.72



Source: Own computation from the UNHS.

Figure 4: Households by their affinity to rural areas and agriculture across per capita income deciles in per cent

Decile	Rural agr.	Rural n.agr.	Urban agr.	Urban n.agr.
1	86.65	11.10	1.62	0.62
2	80.45	16.59	1.38	1.58
3	77.84	17.75	1.83	2.57
4	72.21	23.00	1.29	3.50
5	67.32	27.06	2.50	3.13
6	62.07	28.86	2.73	6.34
7	57.06	33.28	2.37	7.29
8	46.15	35.65	5.07	13.14
9	34.32	34.78	6.78	24.11
10	22.00	28.23	6.12	43.65
All	60.61	25.64	3.17	10.59



Affinity to agriculture is classified by the usual industry of occupation of the household head. Source: Own computation from the UNHS.

decile. 60% of the entire workforce are engaged in subsistence farming. The share of subsistence farmers in each decile is rapidly decreasing from 83% in the poorest to 18% in the richest decile. The share of people in subsistence farming shifts strongly towards self (from 9% to 38%) and paid employment (from 4% to 33%) with increasing income. Unemployment is on a relatively low level of 3% on average with an increasing trend towards the richer deciles.[35] Likewise, the share of the inactive population, i.e. individuals unemployed and not actively searching for work, is 2% on average and exhibits a slightly increasing trend towards richer deciles.[36]

The high shares of subsistence farmers and self-employed workers and the low share of paid workers in the poorer deciles point out once more that wage level changes will have little direct impact on poverty. However, trade liberalization might increase the demand for wage work and thereby increase wages and draw additional workers into wage work. The theory of dual economies explains that this does not necessarily lead to any output loss in the subsistence or self-employment sectors as there might exist a considerable level of underemployment in the informal sector.[37] If so, increased work effort of the remaining workers can at least partly make up for the withdrawn manpower. Thus, if the additional wage income for the household comes without loss of income from subsistence farming such a shift might mean a dramatic income improvement for the household. However, we do not explicitly model this possibility in this paper.

Table 5 decomposes the active workforce by their classifications into top level International Standard Industrial Classification (ISIC) codes, ordered by share in total active workforce.[38] With 66%, the largest part of the workforce is absorbed by the agricultural sector (A). Another 11% work in the wholesale trade and repair services sector (G), but only 6% in manufacturing. The remaining 17% are spread in shares of less than 3% and most can be attributed to the services sector.

This again emphasizes the predominance of the agricultural sector for the Ugandan economy and establishes the private services sector as the second largest sector in terms of workforce shares employed. Manufacturing is of lesser importance. Moreover, the manufacturing sector in Uganda also largely consists of processing of agricultural goods.

Consumption channel. Having looked at the income sources we now turn to the expenditure side which determines the real purchasing power of the income for each household. Table 6 lists household expenditure shares of each income decile in terms of the commod-

[35] Subsistence farming and self-employment include unpaid family workers. In rural household enterprises family members are likely to be "underemployed" rather than unemployed.

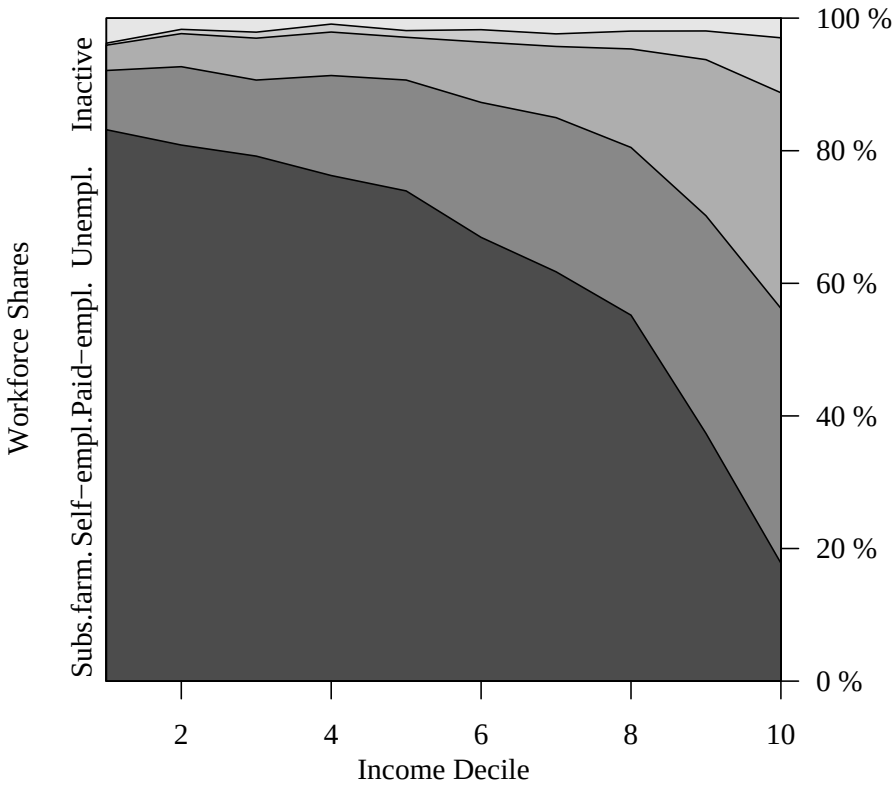
[36] The inactive workforce includes in particular students and individuals, especially women, engaged in domestic duties.

[37] See for instance Ranis (2004).

[38] ISIC revision 3.1, accessed online from the United Nations Statistics Devision at `http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17` on 10 September 2007.

Figure 5: Workforce shares by employment status and per capita household income decile in per cent

Decile	Subs.farm.	Self-empl.	Paid-empl.	Unempl.	Inactive
1	83.17	8.93	3.82	0.31	3.78
2	80.86	11.82	4.99	0.65	1.69
3	79.19	11.47	6.31	0.91	2.12
4	76.26	15.08	6.56	1.20	0.90
5	73.94	16.72	6.45	1.01	1.88
6	66.93	20.35	9.11	1.86	1.74
7	61.74	23.25	10.73	1.90	2.38
8	55.20	25.29	14.86	2.69	1.96
9	37.37	32.83	23.54	4.33	1.94
10	17.80	38.42	32.52	8.29	2.97
All	60.18	21.75	13.24	2.67	2.16



Source: Own computation from the UNHS.

Table 5: Division of the active workforce by ISIC categories for industry of occupation

ISIC	%	Description
A	65.52	Agriculture, hunting and forestry
G	11.33	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods
D	5.82	Manufacturing
M	2.82	Education
Z	2.78	Unknown
H	2.37	Hotels and restaurants
I	1.96	Transport, storage and communications
O	1.81	Other community, social and personal service activities
F	1.29	Construction
L	0.92	Public administration and defence; compulsory social security
N	0.85	Health and social work
B	0.85	Fishing
P	0.84	Activities of private households as employers and undifferentiated production activities of private households
K	0.41	Real estate, renting and business activities
C	0.26	Mining and quarrying
E	0.07	Electricity, gas and water supply
Q	0.05	Extraterritorial organizations and bodies
J	0.05	Financial intermediation

Source: Own computation from the UNHS data.

ity groups of the SAM. Household expenditure shares spent on most of the staple food items like cassava, sorghum, maize, and sweet potatoes show a monotonous decreasing trend with increasing per capita income. This trend applies also to horticulture and milling. For other food items like meat, fish, and matooke the trend is upwards towards the richer deciles first but then drops off for the richest deciles. A continuous and increasing upward trend is observable for expenditures for services. The expenditure share for services is increasing substantially with per capita income. Richer households also spend more on the "Others" category, which in particular comprises transfers and gifts.

Figure 6 shows a more aggregated picture of these regularities. In line with Engel's Law, the share of food in household expenditure shrinks with increasing per capita income.[39] Thus, when looking at the development of prices and purchasing power after trade liberalization, especially agricultural and processed food commodity prices have a larger impact on the poorer deciles while the richer ones are relatively more affected by the prices of manufacturing goods and services.

The above discussion of data explored how trade liberalization might affect the Ugandan economy and the likely impacts on different sectors of the economy. The descriptive

[39] See for example Deaton (1997, p. 25).

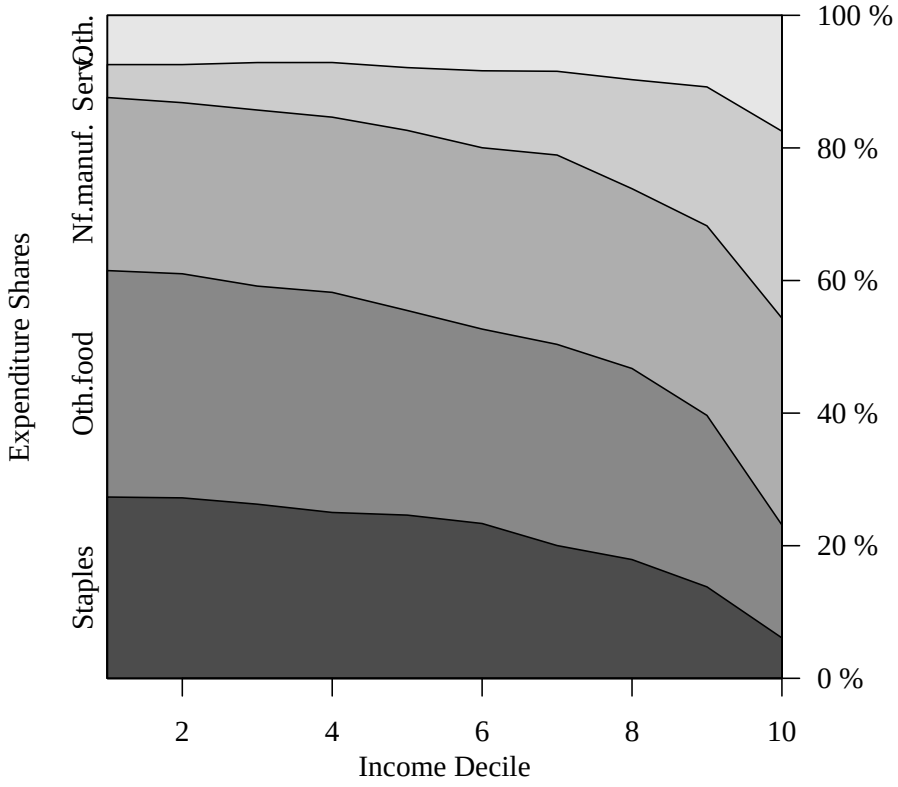
Table 6: Expenditure shares by commodity group and per capita household income decile in per cent

	1	2	3	4	5	6	7	8	9	10
Maize	1.0	0.6	0.6	0.7	0.5	0.6	0.5	0.5	0.4	0.1
Sorghum/Millet	4.2	2.7	2.4	1.8	1.6	1.6	1.3	1.0	0.7	0.3
Cassava	9.9	9.2	9.3	6.9	6.7	5.4	4.0	3.2	2.4	0.7
Sweet Potatoes	6.2	6.4	5.8	6.5	6.3	5.0	4.0	3.4	2.3	1.0
Matooke	2.4	5.3	5.2	5.9	6.4	7.6	7.4	7.3	5.8	3.2
Horticulture	17.8	16.0	15.0	14.0	12.2	11.1	10.0	9.2	7.6	4.3
Other agriculture	0.2	0.3	0.6	0.7	0.8	0.7	1.1	1.2	1.2	0.8
Livestock	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4
Forestry	6.8	6.6	6.1	5.4	4.7	4.9	4.7	4.4	3.4	1.7
Fishing	2.6	2.4	2.9	2.8	2.7	2.9	2.4	2.6	1.8	1.3
Meat and dairy processing	3.8	5.7	5.6	7.5	7.5	7.0	9.4	8.5	8.4	5.8
Coffee processing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grain milling	3.6	3.1	3.0	3.2	3.1	3.2	2.8	2.5	2.2	0.8
Other beverages	2.9	2.7	2.6	2.5	2.7	2.6	2.6	2.7	3.1	2.8
Textiles and leather	4.8	4.7	5.0	5.4	5.7	5.3	6.2	5.6	5.9	5.5
Manufacturing	11.4	11.5	12.1	12.4	12.7	13.1	13.6	13.6	13.7	12.9
Petroleum and chemicals	2.0	2.3	2.0	2.1	2.3	2.6	2.6	2.5	3.4	5.8
Utilities	7.8	7.1	7.2	6.4	6.3	6.0	5.6	4.8	4.6	3.7
Construction	0.2	0.3	0.2	0.2	0.2	0.3	0.6	0.6	1.1	3.3
Transport	0.7	1.5	1.4	2.1	2.0	2.8	2.9	3.4	4.3	3.4
Private services	4.3	4.2	5.8	6.2	7.4	8.8	9.7	13.0	16.6	24.8
Income Tax	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	1.5
Other Expenditures	7.4	7.4	7.1	7.1	7.8	8.3	8.4	9.5	10.7	16.0

Source: Own computation from the UNHS data.

analysis illustrated that the EU's exports to Uganda currently face only low tariffs and that Uganda's tariff elimination will have a significant impact only in the non-food manufacturing and petroleum and chemicals sectors because in the other sectors either imports are insignificant, the EU's share in imports is low or the Ugandan tariff is very low. Furthermore, it looked at how differently the per capita income deciles might be affected by price and structural changes brought about by trade liberalization. The impact on the poorer deciles will be strongly related to the development in food prices in both their capacities as consumers and as producers and the development of the agricultural sector in general, although any impact will be dampened by the large share of subsistence farmers among the poor. It is clear that there is a multitude of offsetting effects making it impossible to make even a prediction on the direction of impact on the poor population. This requires the use of quantitative methods, which can evaluate the sizes of the various – sometimes counteracting – effects as discussed in the following section.

Figure 6: Expenditure shares by commodity group and per capita household income decile in per cent



Nf.manuf. denotes non-food manufacturing commodities. Source: Own computation from the UNHS.

4 Quantitative Analysis

4.1 Pre-Experiment

Since the Uganda SAM used is from 1999, we conduct a pre-experiment to simulate the impacts of Uganda's implementation of the EAC customs union in 2005 including the adoption of the CET and the removal of the EAC market's internal tariffs. The tariff patterns before and after the EAC CET implementation are rather different. Many sectors experience strong import tariff hikes where Uganda had low tariffs before and many others are cut drastically. But overall, the trade-weighted average tariff for Uganda drops by almost 11 percentage points. To a large extent, this is due to tariff cuts in the main import sectors, manufacturing and petrol and chemicals. But Uganda has replaced the petroleum tariff by a per unit excise duty which we take into account in the pre-experiment and the counterfactual scenarios by introducing an *ad valorem* equivalent sales tax on petroleum and chemicals. Further details on the tax and tariff rates of this *EAC* scenario and on its consequences for GDP, industry structure, trade and poverty can be found in Appendices C and D. The results of this pre-experiment form the starting point for the EPA scenarios

and are shown in the EAC column in the tables in this section.

4.2 Scenarios

As detailed in the introduction, our scenarios assume that the EAC has to liberalize 82.1% of imports from the EU so that 17.9% can be exempted in the list of sensitive products. Taking the 2006 tariff revenue of each line as an indicator of the line's sensitivity, we optimize the list of sensitive products according to different interest priorities. The *EPA-EAC* scenario assumes that the EAC as a whole tries to retain as much tariff revenue as possible and selects exempted tariff lines up to a maximum of 17.9% of 2006 EU imports accordingly. The next two scenarios give more weight to Ugandan interests. In the *EPA-UGA* scenario, Uganda optimizes the tariff schedule with respect to sensitive products to minimize its own tariff revenue loss. In the *EPA-AG* scenario, Uganda's first priority is to protect its agricultural sector and then to minimize tariff revenue loss from the remaining sectors. This means that we first exempt all agricultural tariff lines and then the non-agricultural tariff lines. In contrast to the long phase-out period set down in the interim EPA, for our comparative-static model we assume a simultaneous implementation of the schedule, as it will be realized in 2033.

Table 7 details the number of tariff lines affected and the tariff revenue loss corresponding to each scenario. For example, in the EPA-UGA scenario, Uganda imports under 2542 tariff lines of the 5224 of the Harmonized System. It selects 1068 lines for exemption to maximize its tariff revenue and the trade value of imports to the EAC on these lines accounts for the targeted 17.9% and in sum the Ugandan government will lose 28% of the tariff revenue from imports from the EU.[40] Only 781 of the lines selected for the EPA-UGA scenario overlap with lines selected for the EPA-EAC scenario. This divergence might indicate quite a large potential for disagreement between the EAC members in choosing sensitive products. It is only a rough indicator since some non-overlapping lines might be rather good alternatives. The direct tariff loss for Uganda compared to the initial EU import tariff revenue is 10.6%. The much higher loss in the EPA-EAC scenario confirms the conflict potential. The EPA-UGA and EPA-AG scenarios appear rather similar where the latter increases the tariff revenue loss by 1.3%. Finally, the EPA-FULL scenario liberalizes all imports on the EAC side as a counterfactual experiment. The aggregated scenarios are shown in Table 8. The tariffs listed are the average trade-weighted tariffs for imports from the world, taking into account the eliminated tariff lines on EU imports in each scenario. From an initial EAC tariff of 7.07% the tariff drop for the three "realistic" EPA scenarios is around 1%, which is less than half of the 2.24% of a fully

[40]For this analysis, we assume that tariff revenues on Ugandan imports under the EAC CET are recycled to the Ugandan government.

liberalized FTA with the EU. Apparently, Uganda is able to retain its protection to a large extent. The tariff differences in the Uganda-optimized and EAC-optimized scenarios are only noteworthy in sectors where EU imports or imports in general play no important role. Therefore, we do not expect large shocks in any particular sectors.

Table 7: Tariff line liberalization and revenue loss with respect to imports from the EU only

	EPA-EAC	EPA-UGA	EPA-AG
No. tariff lines	3965	2542	2542
No. exempted	1133	1068	1070
Overlapping with EAC	1133	781	802
Uganda tariff revenue loss	-28.1%	-10.6%	-11.9%

Source: Own computation from UNCTAD Trains for 2006.

4.3 CGE Simulations

An inspection of the macro results in Table 9 indicates a similar tendency for all EPA scenarios. The effect on the GDP is negligible while both imports and exports increase with exports increasing more than twofold compared to imports. Government consumption and investment are fixed in the model but the impact on private consumption is minimal as well. The sales tax rates, which adjust to compensate for lost tariff revenue, increase between 4 to 9%.[41] Returns to labor decrease where skilled labor loses more compared to unskilled labor. Also returns to capital decrease. But returns to land increase relatively more than returns to each of the other factors are reduced.

Likewise, the sectoral changes of imports, exports, and domestic production exhibit similar tendencies in all EPA scenarios. Table 10 shows large impacts only for rather minor import sectors. While imports increase slightly for all agricultural and manufacturing sectors apart from petroleum and chemicals they shrink somewhat for construction, commerce, and trade. On the export side in Table 11, the most noteworthy increases are in coffee processing and manufacturing, two of the major export sectors. As presented in Table 12, domestic production reacts to the import liberalization by decreasing almost all production activities in the agricultural and manufacturing sectors. The single greatest beneficiaries are the coffee growing and processing sectors whose production increases between 1.3 and 3.0% depending on the EPA scenario. Moreover, utilities, construction, commerce, and transport benefit slightly from this development.

Overall, the coffee sector appears to be the driver of the export growth. It experiences only a negligible negative import price shock and profits strongly from reduced import

[41] This is a *percentage* increase and not *percentage point* increase applied to each previously existing sales tax.

Table 8: Import tariff shocks for simulation scenarios

	EAC	EPA-EAC	EPA-UGA	EPA-AG	EPA-FULL
	%	percentage point change from EAC			
Coffee	0.00	0.00	0.00	0.00	0.00
Other Cash Crops	9.50	-5.58	-4.73	-4.73	-6.58
Maize	48.42	-0.18	-0.18	-0.18	-20.60
Sorghum/Millet	24.98	-0.02	-0.02	-0.02	-7.18
Cassava	0.00	0.00	0.00	0.00	0.00
Sweet Potatoes	0.00	0.00	0.00	0.00	0.00
Matooke	0.00	0.00	0.00	0.00	0.00
Horticulture	23.82	-0.17	-0.17	-0.17	-9.75
Other agriculture	0.12	-0.02	-0.02	-0.02	-0.04
Livestock	10.99	-7.57	-0.76	-0.74	-7.77
Forestry	0.89	-0.04	-0.00	-0.00	-0.07
Fishing	12.21	-7.22	-0.15	-0.15	-10.65
Meat and dairy processing	11.02	-4.90	-4.94	-4.89	-8.15
Coffee processing	0.38	-0.33	-0.33	-0.33	-0.34
Grain milling	5.58	-0.36	-0.36	-0.33	-1.47
Other beverages	6.91	-2.74	-1.36	-1.29	-5.44
Textiles and leather	18.65	-1.60	-1.55	-1.55	-2.24
Manufacturing	9.11	-1.23	-1.03	-1.06	-3.06
Fertilizers	0.00	0.00	0.00	0.00	0.00
Petroleum and chemicals	2.69	-0.78	-0.66	-0.66	-0.93
Utilities	0.00	-0.00	-0.00	-0.00	-0.00
Construction	6.61	0.00	0.00	0.00	0.00
Commerce	6.58	0.00	0.00	0.00	0.00
Transport	6.54	0.00	0.00	0.00	0.00
Private services	14.35	-3.29	-1.75	-1.75	-4.58
Public services	0.00	0.00	0.00	0.00	0.00
Weighted average	7.07	-1.04	-0.87	-0.88	-2.24

EAC constitutes the base scenario to which all other scenarios are compared. Here, the CET has been implemented and all internal tariffs have been removed. EPA-EAC optimizes tariff revenues for the EAC as a whole, EPA-UGA the revenues for Uganda, EPA-AG prioritizes protection of the agricultural sector before maximizing Uganda's revenues, and EPA-FULL depicts a full import liberalization between the EAC and the EU. All tariffs are computed from 2006 UNCTAD Trains data using trade weighting. All values are trade-weighted percentage *ad valorem* tariffs. Source: Own computation.

Table 9: CGE simulation results: GDP composition, real exchange rate and factor returns

	EAC	EPA-EAC	EPA-UGA	EPA-AG	EPA-FULL
GDP components	Level		% change from EAC		
Priv. Cons.	8,782.52	0.02	0.01	0.01	0.02
Investments	1,709.04	0.00	0.00	0.00	0.00
Gov. Cons.	1,122.32	0.00	0.00	0.00	0.00
Exports	1,171.25	1.24	0.82	0.82	2.06
Imports	-2,844.79	0.51	0.34	0.34	0.85
GDP	9,940.34	0.01	0.01	0.01	0.02
Government income	1,617.54	-0.29	-0.19	-0.19	-0.50
Real exchange rate	1.00	0.08	0.02	0.02	0.06
Sales tax rate		4.30	3.58	3.62	8.46
Factor real returns	% of total		% change from EAC level		
Labor unsk.	44.49	-0.25	-0.20	-0.20	-0.53
Labor sk.	9.28	-0.53	-0.34	-0.34	-0.89
Capital	23.60	-0.39	-0.29	-0.29	-0.76
Land	22.63	0.62	0.42	0.42	0.97

GDP component levels are in billion UGS of 2003. GDP is valued at market prices. Source: Own computation.

prices of its intermediary inputs as well as from cheaper unskilled labor which is released from the other agricultural and light manufacturing sectors. Since unskilled labor is released abundantly compared to land, the relatively land-intensive production of coffee drives up land returns. This effect is amplified by the depreciation of the exchange rate, which balances the current account after the import tariff shock. The expansion in coffee exports simultaneously lifts up the commerce and transport sectors. But all observed allocational efficiency adjustments occur on a very low level.

4.4 Microsimulations

What are the consequences of the CGE results for poverty in Uganda? This question cannot be answered from the above results since price (Table 13) and factor income (Table 9) changes are partially counteracting and require quantification of their respective impacts on household income. In the CGE simulation results, returns to unskilled labor, but also to skilled labor and capital, fall but the prices for staples and grain milling products increase slightly while the prices for manufacturing tend to fall, making the impact on the poor population ambiguous. The only beneficiary factor is land, which is mainly owned by households in the richer deciles. The EPA scenarios appear to have a generally minor impact on the poverty headcount P_0 of -0.04 to +0.03 percentage points. The Uganda-optimized scenarios have a slightly decreasing effect in contrast to the EAC-optimized

Table 10: CGE simulation results: import quantities

	EAC	EPA-EAC	EPA-UGA	EPA-AG	EPA-FULL
	% of total	% change from EAC level			
Coffee	0.00	2.17	1.46	1.45	3.52
Other Cash Crops	0.00	13.59	11.34	11.34	15.60
Other agriculture	0.85	0.05	0.08	0.08	0.01
Livestock	0.10	19.99	2.08	2.06	20.92
Forestry	0.02	0.21	0.08	0.07	0.09
Fishing	0.01	18.13	0.20	0.20	28.24
Meat and dairy processing	1.84	3.80	3.89	3.85	6.51
Coffee processing	0.00	0.72	0.65	0.64	0.90
Grain milling	0.62	0.10	0.19	0.17	1.01
Other beverages	1.68	2.89	1.34	1.26	5.89
Textiles and leather	8.02	0.63	0.59	0.59	0.88
Manufacturing	47.40	0.19	0.17	0.18	0.52
Fertilizers	1.55	0.56	0.39	0.39	0.92
Petroleum and chemicals	24.60	-0.03	-0.04	-0.04	-0.19
Utilities	0.18	-0.73	-0.50	-0.50	-1.34
Construction	0.15	-0.76	-0.56	-0.57	-1.60
Commerce	0.63	-0.47	-0.32	-0.32	-0.86
Transport	6.16	-0.20	-0.13	-0.13	-0.34
Private services	6.18	3.33	1.68	1.68	4.50

Changes in import quantities. Rows with only zeros have been omitted. Source: Own computation.

Table 11: CGE simulation results: export quantities

	EAC	EPA-EAC	EPA-UGA	EPA-AG	EPA-FULL
	% of total	% change from EAC level			
Maize	0.79	0.09	0.02	0.02	0.26
Horticulture	1.09	0.17	0.06	0.06	0.38
Other agriculture	2.06	0.07	0.00	0.00	0.23
Fishing	3.65	0.28	0.24	0.24	0.52
Coffee processing	41.00	1.88	1.28	1.27	3.04
Other beverages	7.83	0.49	0.31	0.32	0.90
Textiles and leather	0.44	0.30	-0.04	-0.04	0.67
Manufacturing	14.82	1.25	0.75	0.75	1.99
Utilities	2.04	1.31	0.87	0.88	2.39
Transport	9.20	0.62	0.38	0.38	0.99
Private services	17.06	0.85	0.59	0.59	1.58

Changes in export quantities. Rows with only zeros have been omitted. Source: Own computation.

Table 12: CGE simulation results: domestic production activity

	EAC	EPA-EAC	EPA-UGA	EPA-AG	EPA-FULL
	% of total	% change from EAC level			
Coffee	2.57	1.86	1.27	1.26	3.02
Other Cash Crops	1.30	-0.23	-0.18	-0.18	-0.39
Maize	1.95	-0.06	-0.03	-0.03	-0.09
Sorghum/Millet	2.37	-0.00	0.00	0.00	0.00
Cassava	1.82	-0.00	0.00	0.00	0.00
Sweet Potatoes	1.74	-0.00	0.00	0.00	0.00
Matooke	4.37	-0.06	-0.04	-0.03	-0.12
Horticulture	4.69	0.01	0.01	0.01	0.02
Other agriculture	3.74	0.00	-0.00	-0.00	0.02
Livestock	5.03	-0.25	-0.16	-0.15	-0.35
Forestry	1.35	-0.08	-0.08	-0.08	-0.19
Fishing	1.73	-0.00	0.02	0.02	0.01
Meat and dairy processing	0.89	-1.81	-1.83	-1.82	-3.00
Coffee processing	3.14	1.86	1.27	1.26	3.02
Grain milling	0.59	-0.12	-0.10	-0.09	-0.40
Other beverages	8.45	-0.16	-0.10	-0.09	-0.32
Textiles and leather	1.02	-0.67	-0.76	-0.76	-0.86
Manufacturing	4.64	-0.05	-0.17	-0.19	-0.64
Petroleum and chemicals	0.69	-0.32	-0.24	-0.25	-0.28
Utilities	1.05	0.22	0.14	0.14	0.39
Construction	10.55	0.01	0.01	0.01	0.03
Commerce	10.59	0.08	0.04	0.04	0.11
Transport	7.56	0.15	0.09	0.09	0.23
Private services	12.51	-0.25	-0.10	-0.10	-0.28
Public services	5.68	0.00	0.00	0.00	0.00

Changes in domestically produced quantities. Rows with only zeros have been omitted. Source: Own computation.

scenario, which has a slightly increasing effect on the poverty headcount. The impacts differ for rural and urban areas. Rural areas generally experience an improvement but the urban population deterioration. All scenarios are associated with a constant or increasing poverty gap P_1.[42] Details not shown here reveal that in the three "realistic" EPA scenarios, between 0.07 and 0.11% of the population fall into, while between 0.09 and 0.11% are lifted out of, poverty. Between 55 and 67% of the poor population experience a widening of their individual poverty gaps. The agricultural protection-prioritizing scenario EPA-AG shows no difference to the outcomes of the EPA-UGA scenario. The Gini index indicates a worsening of income inequality. The changes in mean real incomes by decile are biased against the poor where loss of average income in the lower deciles turns to gains for the richer deciles. This reflects the higher income shares of the richer spent on manufactures and services for which prices have decreased more strongly than for basic foods and also higher prevalence of land ownership, the only factor which gained.

5 Conclusion

This paper examines the poverty impacts of an EPA agreement between Uganda and the EU and specifically its trade provisions. It focuses particularly on the implications of the required reduction in EAC tariffs as part of the implementation of a reciprocal free trade area. The qualitative analysis of the data derived from the Uganda National Household Survey (UNHS) 2002/2003 confirms that Uganda is an agriculture-centered economy with most people living in rural areas and being dependent on agriculture. In particular, there is a high incidence of subsistence farming and a strong dependency of the poorest people on income from unskilled labor and, to a lesser extent, from transfers and land. They spend the largest part of their incomes on food but also a significant share on non-food manufactures. The analysis of the impact potential of an EPA with the EU first of all highlights the relatively low share the EU has in Ugandan imports and the low average tariff of 5.5% the EU currently faces for those exports. 18.9% of Ugandan imports come from the EU which is similar to the 16.7% Uganda imports from the internal EAC market. Also, EU imports appear to be complementary to Uganda's domestic production rather than competing.

The EPA impact is then quantified using a single country CGE model for Uganda. Starting from the EAC's common external tariff and its free trade area, all EPA scenarios show negligible effects on GDP and a small increase in trade activity with exports increasing more strongly than imports. On the import side, all impacts on the economy

[42]The poverty effects modeled here take the changes in the factor returns of each individual household's endowments and the changes in prices of its specific consumption bundle into account. But the model disregards changes in unemployment and employment structure and the adaptive behavior of individuals.

Table 13: CGE simulation results: consumer price changes

	EPA-EAC	EPA-UGA	EPA-AG	EPA-FULL
	% change from EAC level			
Coffee	0.17	0.08	0.08	0.22
Other Cash Crops	-0.01	-0.04	-0.05	-0.21
Maize	0.03	0.01	0.00	-0.04
Sorghum/Millet	0.04	0.01	0.01	-0.03
Cassava	0.04	0.01	0.01	-0.03
Sweet Potatoes	0.05	0.01	0.01	-0.01
Matooke	0.04	0.01	0.01	-0.02
Horticulture	0.04	0.01	0.01	-0.02
Other agriculture	0.04	0.01	0.01	-0.02
Livestock	0.21	0.15	0.15	0.29
Forestry	0.09	0.05	0.04	0.02
Fishing	-0.02	-0.04	-0.05	-0.11
Meat and dairy processing	-1.36	-1.39	-1.37	-2.37
Coffee processing	-0.31	-0.25	-0.25	-0.55
Grain milling	0.05	0.03	0.03	-0.07
Other beverages	0.37	0.35	0.35	0.65
Textiles and leather	-0.82	-0.82	-0.82	-1.20
Manufacturing	-0.82	-0.70	-0.72	-2.08
Fertilizers	0.02	-0.01	-0.01	-0.03
Petroleum and chemicals	1.05	0.83	0.84	2.46
Utilities	-0.23	-0.16	-0.16	-0.47
Construction	-0.41	-0.33	-0.34	-0.96
Commerce	-0.19	-0.14	-0.14	-0.39
Transport	-0.01	-0.02	-0.02	-0.06
Private services	-0.69	-0.42	-0.42	-1.12
Public services	-0.30	-0.21	-0.21	-0.55

Changes in domestic consumer prices. Source: Own computation.

are rather small. On the export side, the coffee processing sector as the largest export sector stands out with gains between 1.3 and 1.9% in exports for the three "realistic" EPA scenarios but also manufacturing expands by 0.8 to 1.3%. The coffee sector benefits from the reduced prices of imported intermediate inputs as well as the negative price shocks on the other agricultural sectors, which cause wages for unskilled labor to fall. This effect is reinforced by a slight depreciation of the exchange rate. The abundant release of unskilled labor compared to land combined with the high land-intensity of coffee growing causes land rents to increase.

A subsequent microsimulation projecting the CGE results onto the UNHS 2002/03 quantifies the ensuing poverty effects. Both the development of factor returns and price

Table 14: Microsimulation results

	EAC	EPA-EAC	EPA-UGA	EPA-AG	EPA-FULL
Poverty, national					
P_0	38.81	38.84	38.77	38.77	38.79
P_1	12.34	12.37	12.34	12.34	12.38
P_2	5.44	5.47	5.45	5.45	5.48
Poverty, rural					
P_0	41.34	41.32	41.26	41.26	41.26
P_1	12.93	12.97	12.93	12.93	12.98
P_2	5.64	5.67	5.65	5.65	5.68
Poverty, urban					
P_0	11.81	11.91	11.86	11.86	11.90
P_1	3.36	3.38	3.37	3.37	3.39
P_2	1.39	1.41	1.40	1.40	1.41
Gini	55.70	55.77	55.74	55.74	55.81
Real income by decile					
Decile	Mean income	% change from EAC			
1	82,807.60	-0.35	-0.16	-0.16	-0.52
2	125,303.23	-0.22	-0.06	-0.06	-0.30
3	156,268.52	-0.10	0.02	0.02	-0.09
4	186,667.56	0.01	0.12	0.12	0.10
5	221,051.59	0.08	0.17	0.17	0.22
6	262,778.56	0.12	0.19	0.19	0.29
7	315,409.83	0.24	0.30	0.30	0.50
8	402,777.47	0.23	0.28	0.28	0.48
9	574,612.84	0.28	0.30	0.30	0.53
10	1,729,785.34	0.28	0.28	0.28	0.51

The poverty figures use national, rural, and urban poverty lines, respectively. Totals are in UGS of 2003. Source: Own computation.

patterns are adverse for the poor so that the poorest two deciles face a small decrease in their average real incomes whereas the richer deciles gain. On the national level we find very small poverty effects amounting to between -0.04 and +0.03 percentage points change in the poverty headcount depending on whether Uganda is able to secure its preferred tariff exemptions in the EAC negotiations or not. In all scenarios, the poverty headcount is falling for the rural but rising for the urban population. The poverty gap tends to increase everywhere and the Gini index worsens slightly in all scenarios. However, it should be born in mind that the microsimulation does not allow for adaptive behavior of the households and thus overestimates the negative effects.

We see these results as preliminary and a number of caveats should be noted. The

model is rather neoclassical in design and takes no specific developing country features into account. It would be desirable to integrate dual economy features into the CGE model in particular to make the working of the labor market more realistic and to account for imperfect spatial transmission of price signals in product markets. Moreover, it rests on the small country assumption. Although Uganda's small share in world trade for most goods might justify this, larger changes in exports like the one seen for coffee is unlikely to find infinitely elastic demand on the world market. Furthermore, the impacts of Uganda's membership in the EAC cannot be fully accounted for in a single region model. The trade-diverting effects of the EAC customs union and the EPA would additionally decrease the trade-weighted average import tariff. The effects of an EPA between the EAC and the EU will also lead to feedback effects from each member of the EAC to the others and thus change the isolated effect on Uganda. Such considerations could be examined using a global multi-regional CGE model. Results from such a model could be used to externally shock the national model and thereby to imitate Uganda's interaction with the world. The microsimulation model implemented is a very basic non-behavioral model ignoring behavioral reactions of individuals to the changes in their economic environment, such as product substitution on the consumption side and changes in the choice of employment on the income side. Those mechanisms could be implemented in a future version of the model.

In general, the CGE model results have to be interpreted in the light of the model's structure and assumptions. They show the economic pressures arising from adjustment towards an efficient allocation of resources as a result of the simulated shock. Our model ignores limiting factors like, for example, limited adjustment capacities of farmers and other supply-side constraints. Moreover, it does not model qualitative development. The model only allows to produce more of what has been produced already by increasing input but it does not allow for new products, technical change, quality improvements, and so forth. The same applies for trade. No trade will arise for products which the country did not trade before. Indeed, qualitative development is likely to play an important role in Uganda's response to the opportunities created by the EPA, for example, if foreign investment takes advantage of the more credible policy environment.

Summarizing, the quantitative analysis of the EPA scenarios confirms that the agreement with the EU will have only a minor impact on the Ugandan economy and Uganda's poor population. Importantly, it shows that such an agreement does not induce large deindustrialization effects and that the economic adjustment costs for Uganda and the poor population are quite low. Nevertheless, whether the small poverty effects are negative or positive depends on the choice of the tariff lines for exemption from liberalization, although under all scenarios the ultra-poor appear to lose.

Appendices

A Handling of Missing Values

During the preparation of the UNHS data, missing *industry code* values for *usual activity status* have been substituted by the first valid entries for industry code of the following entries: *current activity status*, *current status secondary activity*, *usual activity status* of household head, *current activity status* of household head, *current status secondary activity* of household head, *usual activity status* of the household head's spouse, the households most important source of earning in case its agriculture, other household members' *usual activity status* in order of increasing person identifier code. We have substituted missing usual activity status *occupation category* (ISCO header) with the one for current activity status if available.

The rest of the missing values for industry and occupation codes have been imputed using the `rrp.impute()` procedure from the `rrp` package, version 2.7 in the statistical computing package R (R Development Core Team; 2008). The package uses a matching-based hot deck imputation procedure, for details see Iacus and Porro (2007). The following personal attributes are used for the procedure: *district*, *sex*, *education*, *literacy*, *urban*, *household size*, *age*, *two sets of clothes*, *number of meat or fish meals per week*, *operation of a non-crop enterprise*, *industry code*, and *occupation category*.

B Wage regression

A single wage regression is used for the imputation of labor incomes as specified in Equation 1.

$$\ln(W_i) = \alpha + X_{i,c} \cdot \beta_c + w_i \tag{1}$$

The wage W_i is determined by the intercept α, the vector of individual characteristics $X_{i,c}$ and its coefficients β_c and the term w_i capturing the unobserved wage determinants. The wage is the annual value of wage payments received and implicitly determines the hours worked and months employed of the individual. The wage-determining individual characteristics together with their estimated coefficients are presented in Table 15. The following individuals were identified as obvious outliers and have been removed during the estimation, specified by pairs of (household identification, person identification) codes: (10210237402, 101), (10710002102, 103), (20230020110, 101), (10210237402, 101). Furthermore, the annual wage for 9 individuals could not be determined due to missing "months worked" values.

These results illustrate that education plays a major role and that there are large differentials between the wages paid in the respective industries. There is a gender gap discriminating against females and people get higher wages in urban areas on average. Skill level, a variable based on occupation, has a large impact as well.

Table 15: Wage income regression

	Estimate	Std. Error	t value	Pr(>|t|)
Intercept	11.724	0.170	69.042	0.000
Age	0.061	0.009	6.475	0.000
Age^2	−0.001	0.000	−5.207	0.000
Female	−0.309	0.040	−7.664	0.000
Married	0.218	0.039	5.533	0.000
Region 2	−0.133	0.045	−2.963	0.003
Region 3	−0.085	0.051	−1.681	0.093
Region 4	−0.102	0.041	−2.484	0.013
Urban	0.235	0.038	6.118	0.000
Industry B	1.015	0.121	8.401	0.000
Industry C	0.758	0.197	3.849	0.000
Industry D	0.518	0.073	7.121	0.000
Industry E	0.719	0.199	3.611	0.000
Industry F	0.650	0.081	8.025	0.000
Industry G	0.431	0.075	5.733	0.000
Industry H	0.138	0.096	1.442	0.149
Industry I	0.816	0.077	10.600	0.000
Industry J	1.031	0.213	4.845	0.000
Industry K	0.740	0.161	4.601	0.000
Industry L	0.707	0.079	8.990	0.000
Industry M	0.368	0.078	4.706	0.000
Industry N	0.659	0.096	6.875	0.000
Industry O	0.393	0.077	5.076	0.000
Industry P	−0.088	0.076	−1.157	0.247
Industry Q	1.253	0.247	5.079	0.000
Pri.Edu.	0.200	0.044	4.550	0.000
Sec.Edu	0.538	0.054	9.976	0.000
Ter.Edu.	1.111	0.066	16.730	0.000
Unskilled	−0.376	0.063	−5.952	0.000

Regression summary statistics: Residual standard error: 0.857 on 2862 degrees of freedom. Multiple R-Squared: 0.501. Adjusted R-squared: 0.496. F-statistic: 103 on 28 and 2862 DF. p-value: <2e-16. When testing for selection bias in a two equation system with one equation describing the selection of individuals into wage employment and the above wage regression using the inverse Mill's ratio it appeared to be non significant.

C Aggregation of Import Tariffs and Derivation of Petrol Taxes

Aggregation of import tariffs. The Base scenario involves simulating import tariff shocks on the original Uganda SAM applying 2006 EAC import tariffs. These tariffs are import trade-weighted using trade values for 2006. The data used comes from the TRAINS database.[43]

In order to map the import data coded with HS codes to SAM commodities, we use the mapping which results from a HS 2002 to ISIC revision 3 concordance table[44] and Table 21 as a starting point. Then, we refined in particular the agricultural sectors, which are not distinguished by products in the ISIC codes and added the fertilizers sector which has no associated activity in the SAM. We reassign many HS codes in order to increase the detail of the mapping in comparison with the ISIC to SAM mapping and assign some HS codes that were previously not assigned to ISIC codes. These refinements are guided by a HS 2002 to GTAP concordance table also taken from WITS.[45]

Finally, the trade-weighted tariffs are derived by $\tau_{sector} = \frac{\sum_{hs \in HS_{sector}} \tau_{hs} \cdot v_{hs}}{\sum_{hs \in HS_{sector}} v_{hs}}$ with τ: import tariff, v: import value for the respective HS line or sector.

For the EPA scenarios, import values from the EU 25 and the rest of the world (ROW) are distinguished and all relevant trade flows from the EU weighted with zero tariffs and the tariffs aggregated accordingly.

As from the description of the original Uganda SAM Dorosh and El-Said (2004) it is not clear where the import tariffs on CCONS, CTRADE, and CTRANS originated from, these tariffs are maintained in all scenarios.

Derivation of petrol taxes. The sales taxes for the CPETR sector are derived using HS 2002, 6-digit coded 2006 import trade data for Uganda from the world from the UN comtrade database[46], namely the variables `Commodity Code`, `Commodity Description`, `Trade Value`, and `NetWeight (kg)`. Excise duties for fuel are taken from the Excise Tariff (Amendment) Act, 2005, section 3A, 7. According to this, specific excise duty for "i. Motor spirit (gasoline)" is 720 UGS per liter, for "ii. Gas oil (automotive, light, amber for high speed engine)" and "iii. Other gas oils" 450 UGS per liter and for "iv. Illuminating kerosene" 200 UGS per liter. Since quantity data is only available at the 6-digit

[43] UNCTAD TRAINS database, United Nations Conference on Trade and Development, Geneva, Switzerland. Accessed online via WITS, World Bank on 26 March 2008. We used Harmonized System (HS) 2002 codes on the 6 digit level and the variables `Product`, `Weighted Average`, `Imports Value ($ Ó00)` for reporter Uganda, partner country groups world and EU25 and `DutyType` MFN .

[44] Accessed online via WITS, World Bank on 26 March 2008.

[45] Accessed online via WITS, World Bank on 26 March 2008.

[46] UN comtrade, United Nations, New York, accessed online via WITS, World Bank on 26 March 2008.

disaggregation level, HS 271011 is mapped to i. and HS 271019 to ii. to iv. where the latter is associated to a simple average tax of 325 UGS per liter.

The Comtrade quantities are given in kg. We convert the units from kg to liter using the density factor 740 kg/m^3 for gasoline and 830 kg/m^3 for the other category. To convert from specific taxes to *ad valorem* ones we convert Comtrade import values from 2006 current USD to current UGS using the exchange rate of 1831.45 UGS per USD.[47] The final specific fuel tax is then computed as the liter weighted average of the two category taxes and yields a tax rate of 45.45%.

The commodity tax for the CPETR sector is then derived using the import share of these tariff lines of 60.28% in total imports of the CPETR sector: The fuel tax is applied to this part and the commodity tax for CPETR implicit in the original Uganda SAM is applied to the rest which includes amongst others coal, gas and chemicals.

D Pre-Experiment and Free Trade Scenarios

Pre-experiment. We conduct a pre-experiment to simulate the impacts of Uganda's implementation of the EAC CET and the removal of the EAC market's internal tariffs. Table 16 clarifies that the structures before and after the EAC implementation are rather different. Many sectors show strong import tariff hikes where Uganda had low tariffs before and many others are cut drastically. But the trade-weighted average tariff reveals that, in fact, the new tariff schedule cuts the average tariff by almost 11 percentage points. This cut is mainly due to the cuts in the manufacturing and petrol and chemicals tariffs since these are the only commodities with significant import shares as well as large drops of tariffs. Uganda has replaced the petroleum tariff by a per unit excise duty which we take into account in the pre-experiment and the counterfactual scenarios by introducing an *ad valorem* equivalent sales tax on petrol and chemicals. That aside, only tariffs on textiles and private services are increased significantly and at the same time have significant import shares and hence should have a noticeable impact on the economy.

On an aggregated level, the pre-experiment indicates a slightly positive impact on the Ugandan economy as a result of the adoption of the EAC tariffs and the trade liberalization of the EAC area, see Table 17. GDP, imports, and exports increased somewhat with the EAC implementation. It is important to note that this still ignores the general equilibrium effects arising between the EAC members. Thus, these figures should not be interpreted as a comprehensive analysis of the impact of Uganda's accession to the EAC. The most important changes in the import structure brought about by the adaptation of the EAC tariffs are, as expected, decreases in textiles and leather and private services imports and

[47] Series name "Official exchange rate (LCU per US$, period average)" for 2006 from WDI online, World Bank, Washington, DC, accessed online on 26/03/2006.

Table 16: Import tariffs for simulation scenarios

	BASE	EAC	FreeTrade
	%	%pt change from BASE	
Coffee	6.60	-6.60	-6.60
Other Cash Crops	6.60	2.89	-6.60
Maize	0.00	48.42	0.00
Sorghum/Millet	0.00	24.98	0.00
Cassava	0.00	0.00	0.00
Sweet Potatoes	0.00	0.00	0.00
Matooke	0.00	0.00	0.00
Horticulture	0.00	23.82	0.00
Other agriculture	6.58	-6.46	-6.58
Livestock	6.60	4.39	-6.60
Forestry	6.60	-5.71	-6.60
Fishing	6.60	5.61	-6.60
Meat and dairy processing	6.58	4.44	-6.58
Coffee processing	6.60	-6.22	-6.60
Grain milling	6.60	-1.02	-6.60
Other beverages	6.58	0.33	-6.58
Textiles and leather	6.58	12.07	-6.58
Manufacturing	14.24	-5.13	-14.24
Fertilizers	6.84	-6.84	-6.84
Petroleum and chemicals	44.54	-41.85	-44.54
Utilities	6.60	-6.60	-6.60
Construction	6.61	0.00	0.00
Commerce	6.58	0.00	0.00
Transport	6.54	0.00	0.00
Private services	6.55	7.80	-6.55
Public services	0.00	0.00	0.00
Weighted average	17.90	-10.84	-17.90

The tariffs for the BASE scenario are taken from the original 1999 SAM. The EAC scenario modifies Uganda's tariffs to take the EAC CET and the EAC FTA into account. The FreeTrade scenario abolishes all import tariffs. All tariffs are computed from 2006 UNCTAD Trains data using trade weighting. All values are trade-weighted percentage *ad valorem* tariffs. Source: Own computation.

Table 17: CGE simulation results: GDP composition, real exchange rate and factor returns

	BASE	EAC	FreeTrade
GDP components	Level	% change from BASE	
Priv. Cons.	8,779.18	0.04	0.07
Investments	1,709.04	0.00	0.00
Gov. Cons.	1,122.32	0.00	0.00
Exports	1,164.33	0.59	7.22
Imports	-2,837.87	0.24	2.96
GDP	9,937.00	0.03	0.06
Government income	1,615.28	0.14	-1.56
Real exchange rate	1.00	-0.03	-0.07
Sales tax rate		-8.02	19.20
Factor real returns	% of total	% change from BASE level	
Labor unsk.	44.54	-0.48	-2.38
Labor sk.	9.21	0.41	-2.78
Capital	23.66	-0.62	-3.34
Land	22.59	-0.19	3.71

GDP component levels are in billion UGS of 2003. GDP is valued at market prices. Source: Own computation.

an increase in petrol and chemicals imports (tables not shown). Many sectors expand slightly with the textiles sector growing the most. But the livestock, coffee growing and processing, meat and dairy processing, manufacturing, petroleum and chemicals sectors shrink. On the export side, coffee – by far the largest export sector with 39% of total exports – suffers slightly while most other exports experience a little increase.

Table 18 shows that the adoption of the EAC CET and FTA has no effects on poverty when measured against the national poverty line but against the regional poverty lines poverty actually falls in both rural and urban areas by around 0.4 percentage points. The changes in mean real incomes per decile reveal that this policy is actually pro-poor, increasing the incomes of the poorer deciles more relative to the richer ones. While the nominal incomes of all deciles fall with increasing drops towards the richer deciles, consumer prices for the poorer deciles fall even more strongly but increase for richer deciles. Although skilled labor gains as the only factor, the share of skilled labor returns in richer deciles income composition is too low to make these gains compensate for the losses in other factor returns.

Free trade. As a benchmark we have also listed a free trade scenario which assumes complete import tariff elimination also on non-EU trade. It results in a GDP increase of 0.06% and more strongly increased trade activity. The growth of the economy is carried

Table 18: Microsimulation results

	BASE	EAC	FreeTrade
Poverty, national			
P_0	38.81	38.81	38.48
P_1	12.38	12.34	12.51
P_2	5.46	5.44	5.60
Poverty, rural			
P_0	41.70	41.34	41.30
P_1	12.97	12.93	13.13
P_2	5.67	5.64	5.82
Poverty, urban			
P_0	12.25	11.81	11.87
P_1	3.39	3.36	3.51
P_2	1.41	1.39	1.47
Gini	55.81	55.70	56.09
Real income by decile			
Decile	Mean income	% change from BASE	
1	82,589.54	0.26	-1.42
2	125,076.92	0.18	-0.98
3	156,027.54	0.15	-0.24
4	186,515.45	0.08	0.30
5	221,028.86	0.01	0.65
6	262,780.01	-0.00	0.91
7	315,885.62	-0.15	1.43
8	403,437.48	-0.16	1.29
9	576,478.42	-0.32	1.32
10	1,740,908.99	-0.64	0.85

The poverty figures use national, rural, and urban poverty lines, respectively. Totals are in UGS of 2003. Source: Own computation.

by the coffee processing sector, which also expands its exports strongly. The complementary sectors like transport etc. and staple growing benefit but most other sectors lose out in particular also the non-coffee manufacturing sectors. Although the poverty headcount decreases the income development is not pro-poor and leads to a deterioration in the income distribution as indicated by the Gini index.

E Mappings and Parameters

Table 19: Armington and CET elasticities

SAM account	Sector	σ_Q	σ_T
CCOFF	Coffee	3.0	0.0
CCCROP	Other Cash Crops	3.0	0.0
CMZE	Maize	0.0	3.0
CSORG	Sorghum/Millet	0.0	0.0
CCASS	Cassava	0.0	0.0
CSWPOT	Sweet Potatoes	0.0	0.0
CMATOK	Matooke	0.0	0.0
CHORT	Horticulture	0.0	3.0
COTHAG	Other agriculture	3.0	3.0
CLVSTK	Livestock	3.0	0.0
CFORES	Forestry	3.0	0.0
CFISH	Fishing	3.0	3.0
CMEAT	Meat and dairy processing	1.5	0.0
CCOFP	Coffee processing	1.5	2.5
CMILL	Grain milling	1.5	0.0
CBEV	Other beverages	1.5	2.5
CTEXTS	Textiles and leather	1.5	2.5
CMANF	Manufacturing	1.5	2.5
CFERT	Fertilizers	1.5	0.0
CPETR	Petroleum and chemicals	1.5	0.0
CUTILS	Utilities	1.5	2.5
CCONS	Construction	1.5	0.0
CTRADE	Commerce	1.5	0.0
CTRANS	Transport	1.5	2.5
CPRISV	Private services	1.5	2.5
CPUBSV	Public services	0.0	0.0

The Armington elasticities σ_Q define the elasticity of substitution between imported and domestically produced goods within domestic demand. The CET elasticities σ_T define the elasticity of transformation between exported and domestically sold goods within domestic production.

Table 20: Mapping of SAM commodities and UNHS expenditure items

SAM account	UNHS section	Item code	Description
CMATOK	s6aq2	101	Matooke
CMATOK	s6aq2	102	Matooke
CMATOK	s6aq2	103	Matooke
CMATOK	s6aq2	104	Matooke
CSWPOT	s6aq2	105	Sweet potatoes (fresh)
CSWPOT	s6aq2	106	Sweet potatoes (dry)
CCASS	s6aq2	107	Cassava (fresh)

Table 20: Mapping of SAM commodities and UNHS expenditure items

SAM account	UNHS section	Item code	Description
CCASS	s6aq2	108	Cassava (dry/flour)
CSWPOT	s6aq2	109	Irish potatoes
COTHAG	s6aq2	110	Rice
CMZE	s6aq2	111	Maize (grains)
CMZE	s6aq2	112	Maize (cobs)
CMILL	s6aq2	113	Maize (flour)
CMANF	s6aq2	114	Bread
CSORG	s6aq2	115	Millet
CSORG	s6aq2	116	Sorghum
CMEAT	s6aq2	117	Beef
CMEAT	s6aq2	118	Pork
CMEAT	s6aq2	119	Goat meat
CMEAT	s6aq2	120	Other meat
CMEAT	s6aq2	121	Chicken
CFISH	s6aq2	122	Fresh fish
CFISH	s6aq2	123	Dry/smoked fish
CLVSTK	s6aq2	124	Eggs
CMEAT	s6aq2	125	Fresh milk
CMEAT	s6aq2	126	Infant formula foods
CMANF	s6aq2	127	Cooking oil
CMEAT	s6aq2	128	Ghee
CMEAT	s6aq2	129	Margarine, butter etc
CHORT	s6aq2	130	Passion fruits
CHORT	s6aq2	131	Sweet bananas
CHORT	s6aq2	132	Mangoes
CHORT	s6aq2	133	Oranges
CHORT	s6aq2	134	Other fruits
CHORT	s6aq2	135	Onions
CHORT	s6aq2	136	Tomatoes
CHORT	s6aq2	137	Cabbages
CHORT	s6aq2	138	Dodo
CHORT	s6aq2	139	Other vegetables
CHORT	s6aq2	140	Beans (fresh)
CHORT	s6aq2	141	Beans (dry)
CHORT	s6aq2	142	Groundnuts (in shell)
CHORT	s6aq2	143	Groundnuts (shelled)
CHORT	s6aq2	144	Groundnuts (pounded)
CHORT	s6aq2	145	Peas
CHORT	s6aq2	146	Sim sim
CMANF	s6aq2	147	Sugar
CCOFP	s6aq2	148	Coffee
CBEV	s6aq2	149	Tea
CMANF	s6aq2	150	Salt
CBEV	s6aq2	151	Soda
CBEV	s6aq2	152	Beer
CBEV	s6aq2	153	Other alcoholic drinks
CBEV	s6aq2	154	Other drinks

Table 20: Mapping of SAM commodities and UNHS expenditure items

SAM account	UNHS section	Item code	Description
CMANF	s6aq2	155	Cigarattes
CMANF	s6aq2	156	Other Tobacco
CPRISV	s6aq2	157	Expenditure in restaurants on Food
CPRISV	s6aq2	158	Expenditure in restaurants on Soda
CPRISV	s6aq2	159	Expenditure in restaurants on Beer
CBEV	s6aq2	160	Other juice
CMANF	s6aq2	161	Other foods
RENT	s6bq2	301	Rent of rented house
RENT	s6bq2	302	Imputed rent of owned house
CCONS	s6bq2	303	Maintenance & repair expenses
CUTILS	s6bq2	304	Water
CUTILS	s6bq2	305	Electricity
CUTILS	s6bq2	306	Paraffin(kerosene)
CFORES	s6bq2	307	Charcoal
CFORES	s6bq2	308	Firewood
CUTILS	s6bq2	309	Others
CMANF	s6bq2	451	Matches
CMANF	s6bq2	452	Washing soap
CMANF	s6bq2	453	Bathing soap
CMANF	s6bq2	454	Tooth paste
CMANF	s6bq2	455	Cosmetics
CMANF	s6bq2	456	Handbags, travel bags, etc
CMANF	s6bq2	457	Batteries
CPRISV	s6bq2	458	Newspapers and Magazines
CMANF	s6bq2	459	Others
CMANF	s6bq2	461	Tyres, Tubes, Spares, etc
CPETR	s6bq2	462	Petrol, diesel, etc
CTRANS	s6bq2	463	Taxi fares
CTRANS	s6bq2	464	Bus fares
CTRANS	s6bq2	465	Boda boda fares
CPRISV	s6bq2	466	Stamps, envelopes, etc.
CPRISV	s6bq2	467	Air time & service fee for mobile phones
CPRISV	s6bq2	468	Expenditure on fixed phones
CTRANS	s6bq2	469	Others
CPRISV	s6bq2	501	Consultation fees
CPETR	s6bq2	502	Medicines, etc
CPRISV	s6bq2	503	Hospital/clinic charges
CPRISV	s6bq2	504	Traditional doctors fees/medicines
CPRISV	s6bq2	509	Others
CPRISV	s6bq2	701	Sport, theatres etc
CPRISV	s6bq2	702	Dry cleaning and Laundry
CPRISV	s6bq2	703	Houseboys/girls, shamba boys etc
CPRISV	s6bq2	704	Barber and Beauty shops
CPRISV	s6bq2	705	Expenses in hotels, lodging places, etc
CTEXTS	s6cq2	201	Men's clothing
CTEXTS	s6cq2	202	Women's clothing
CTEXTS	s6cq2	203	Children's wear

Table 20: Mapping of SAM commodities and UNHS expenditure items

SAM account	UNHS section	Item code	Description
CTEXTS	s6cq2	209	Other clothing & clothing materials
CTEXTS	s6cq2	210	Tailoring & Materials
CTEXTS	s6cq2	221	Men's Footwear
CTEXTS	s6cq2	222	Women's Footwear
CTEXTS	s6cq2	223	Children's Footwear
CTEXTS	s6cq2	229	Other Footwear & Repairs
CMANF	s6cq2	401	Furniture Items
CTEXTS	s6cq2	402	Carpets, Mats, etc
CTEXTS	s6cq2	403	Curtains, Bed sheets, etc
CTEXTS	s6cq2	404	Bedding Mattresses
CTEXTS	s6cq2	405	Blankets
CTEXTS	s6cq2	409	Others & Repairs
CMANF	s6cq2	421	Electric iron/Kettles etc
CMANF	s6cq2	422	Charcoal & Kerosene stoves
CMANF	s6cq2	423	Electronic equipment 9TV, etc)
CMANF	s6cq2	424	Bicycles
CMANF	s6cq2	425	Motorcar, Pick-ups etc
CMANF	s6cq2	426	Motor Cycles
CMANF	s6cq2	427	Computers for household use
CMANF	s6cq2	428	Phone Handsets (Both Fixed and Mobile)
CMANF	s6cq2	429	Other equipment & repairs
CMANF	s6cq2	430	Jewelry, watches etc
CMANF	s6cq2	431	Radio
CMANF	s6cq2	441	Plastic basins
CMANF	s6cq2	442	Plastic plates/tumblers
CMANF	s6cq2	443	Jerry cans and Plastic buckets
CMANF	s6cq2	444	Enamel & mettallic utensils
CMANF	s6cq2	445	Switches, plugs, cables, etc
CMANF	s6cq2	449	Others & repairs
CPRISV	s6cq2	601	School fees including PTA
CPRISV	s6cq2	602	Boarding & Lodging
CTEXTS	s6cq2	603	School uniform
CMANF	s6cq2	604	Books & supplies
CPRISV	s6cq2	609	Other educational expenses
CPRISV	s6cq2	801	Expenditure on household functions
CPRISV	s6cq2	802	Insurance Premiums
CPRISV	s6cq2	809	Other services N.E.S
YTAX	s6dq2	901	Taxes and duties paid excluding graduated tax
GRADTAX	s6dq2	905	Graduated tax
SOCSEC	s6dq2	902	Pension and Social Security Contributions
OTRANS	s6dq2	903	Remittances, Gifts and other transfers
CPRISV	s6dq2	904	Contributions to Funeral and other Functions
CPRISV	s6dq2	909	Others (like subscription, interest to customer debts, etc)
CMANF	s7q3	3	Furniture
CTEXTS	s7q3	4	furnishings eg carpet, mat, matress, etc
CMANF	s7q3	5	Household appliances eg kettle, flat iron, etc

Table 20: Mapping of SAM commodities and UNHS expenditure items

SAM account	UNHS section	Item code	Description
CMANF	s7q3	6	Electronic equipment rg TV, Radio, Casette, etc
CMANF	s7q3	7	Bicycle
CMANF	s7q3	8	Other transport equipment
CMANF	s7q3	9	Jewelry & watches
CMANF	s7q3	10	Other household assets
CMANF	s7q3	11	Other household assets
CMANF	s7q3	12	Other household assets

Table 21: Mapping of SAM activities and ISIC industries

SAM account	ISIC code	Category	Description
CROP	11	A	Growing of crops; Market gardening; horticulture
ALVSTK	12	A	Farming of animals
ALVSTK	13	A	Growing of crops combined with farming of animals (mixed farming)
ALVSTK	14	A	Agricultrual and animal husbandry service activities, except vetreinary activities
ALVSTK	15	A	Hunting, trapping and game propagation including related service activities
AFORES	20	A	Forestry, logging and related activities
AFISH	50	B	Fishing, operation of fish hatcheries and fish farms; services activities incidental to fishing
APETR	101	C	Mining and agglomeration of hard coal
APETR	102	C	Mining and agglomeration of lignite
APETR	103	C	Extraction and agglomeration of peat
APETR	111	C	Extraction of crude petroleum and natural gas
AMANF	120	C	Mining of uranium and thorium ores
AMANF	130	C	Mining of iron ores
AMANF	131	C	Minig of non-feorus metal ores, except uranium and thorium ores
AMANF	132	C	Mining of non-ferrous metal ores, except uranium and thorium ores
AMANF	141	C	Quarrying of stone sand and clay
AMANF	142	C	Mining and quarrying not elsewhere classified
AMEAT	151	D	production, processing and preserving of meat fish, fruit, vegetables,oils and fats
AMEAT	152	D	manufacture of diary products
AMILL	153	D	manufacture of grain mill products, starches and starch products,a nd prepared animal feeds
AMANF	154	D	Manufacture of other food products
ABEV	155	D	Manufacture of beverages

Table 21: Mapping of SAM activities and ISIC industries

SAM account	ISIC code	Category	Description
AMANF	160	D	Manufacture of tobbacco products
ATEXTS	171	D	spinning, weaving and finishing of textiles
ATEXTS	172	D	Manufacture of other textiles
ATEXTS	173	D	manufacture of knitted and crocheted fabrics and articles
ATEXTS	181	D	manufacture if wearing apparel; except fur apparel
ATEXTS	182	D	Dressing and dyieng of fur; manufacture of articles of fur
ATEXTS	191	D	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness
ATEXTS	192	D	manufacture of foot wear
AMANF	201	D	Sawmilling and planning of wood
AMANF	202	D	manufacture of products of wood, cork, straw and paliting materials
AMANF	210	D	manufacture of paper and paer products
AMANF	221	D	Publishing
AMANF	222	D	printing and service activities related to printing
AMANF	223	D	Reproduction of recorded media
APETR	231	D	manufacture of coke oven products
APETR	232	D	manufacture of refined petrouluem products
APETR	233	D	Processing of nuclear fuel
APETR	241	D	manufacture of basic chemicals
APETR	242	D	manufacture of other chemical products
AMANF	243	D	Manufacture of man-made fibres
AMANF	251	D	manufacture of rubber products
AMANF	252	D	manufacture of plastic products
AMANF	261	D	manufacture of glass and glass products
AMANF	269	D	Manufacture of non-metallic mineral products not elsewhere classified
AMANF	271	D	manufacutre of basic iron and steel
AMANF	272	D	Manufacture of basic precious and non-ferrous metals
AMANF	273	D	Casting of metals
AMANF	281	D	Manufacture of structural metal products, tanks, reserviors amd steam generators
AMANF	289	D	Manufacture of other fabricated metal products; metal working service activities
AMANF	291	D	Manufacture of general purpose machinery
AMANF	292	D	Manufacture of special purpose machinery
AMANF	293	D	manufacture of domestic appliances not elsewhere classified
AMANF	300	D	Manufacture of office, accounting and computing machinery
AMANF	311	D	manufacture of electric motors, generators and transformers

Table 21: Mapping of SAM activities and ISIC industries

SAM account	ISIC code	Category	Description
AMANF	312	D	manufacture of electricity distribution and control apparatus
AMANF	313	D	manufacture of insulated wire and cable
AMANF	314	D	manufacture of accumulators primary cells and primary batteries
AMANF	315	D	Manufacture of electric lamps and lighting equipment
AMANF	319	D	manuacture of other electrical equipment not elsewhere classified
AMANF	321	D	manufacture of electronic values and tubes and other electronic components
AMANF	322	D	manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
AMANF	323	D	manufacture of television and radio recievers, sound or video recording of reproducing apparatus, and associated goods
AMANF	331	D	manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating
AMANF	332	D	Manufacture of optical intruments and photographic equipment
AMANF	333	D	maufacture of watches and clocks
AMANF	341	D	manufacture of motor vehicles
AMANF	342	D	manufacture of bodies (coach work) formotor vehicles, trailers and semi trailers
AMANF	343	D	manufacture of parts and accessories for motor vehicles and thier engines
AMANF	351	D	Building and repairing of ships and boats
AMANF	352	D	manufacture of railway and tramway locomotives and rolling stock
AMANF	353	D	Manufacture of aircraft and spacecraft
AMANF	359	D	manufacture of other transport equipment not elsewhere classified
AMANF	361	D	manufacture of furniture
AMANF	369	D	manufacturing not elsewhere classified
AMANF	371	D	Recycling of metal waster and scrap
AMANF	372	D	recylcing of non - metal waste and scrap
AUTILS	401	E	Production, collections and distribution of electricity
AUTILS	402	E	Manufacture of gas; distribution of gaseuos fuels through mains
AUTILS	403	E	Steam and hot water supply
AUTILS	410	E	collection, purification and distribution of water
ACONS	451	F	Site preparation

Table 21: Mapping of SAM activities and ISIC industries

SAM account	ISIC code	Category	Description
ACONS	452	F	Building of complete constructions or parts thereof; civil engineering
ACONS	453	F	Building insitillation
ACONS	454	F	Building completion
ACONS	455	F	Renting of construction or demolition equipment with operator
ATRADE	501	G	Sale of motor vehicles
ATRADE	502	G	Maintenance and repiar of motor vehciles
ATRADE	503	G	sale of motor vehicle parts and accessories
ATRADE	504	G	Sale, maintenance and repiar of motorcycles and related parts and accessories
ATRADE	505	G	Retail sale of automotive fuel
ATRADE	511	G	Wholsale on a fee or contract basis
ATRADE	512	G	Wholesale of agricultural raw materials live animals, food, beverages and tobacco
ATRADE	513	G	Wholesale of household goods
ATRADE	514	G	Whole sale of non-agricultural intermediate products, waste and scrap
ATRADE	515	G	Wholesale of machinery, equipment and supplies
ATRADE	519	G	Other wholesale
ATRADE	521	G	Non-specialised retail trade in stores
ATRADE	522	G	Retail sale of food, beverages and tobbacco in specialised store
ATRADE	523	G	Other retail trade of new goods in specialised stores
ATRADE	524	G	Retail slae of second-hand goods in stores
ATRADE	525	G	Retail trade not in stores
ATRADE	526	G	Repair of personal and household goods
APRISV	551	H	hotels, camping sites and other provision of short stay accomodation
APRISV	552	H	Restaurants, bars and canteems
ATRANS	601	I	land transport including via railways
ATRANS	602	I	Other land transport
ATRANS	603	I	Transport via pipelines
ATRANS	611	I	Sea and coastal water transport
ATRANS	612	I	Inland water transport
ATRANS	621	I	scheduled air transport
ATRANS	622	I	Non scheduled air transport
ATRANS	630	I	supporting and auxilliary transport activities; activities of travel agencies
ATRANS	641	I	Post and courier activities
APRISV	642	I	Telecommunications
APRISV	651	J	Monetary intermediation
APRISV	659	J	Other financial intermediation
APRISV	660	J	insurance and pension funding except compulsory social security

Table 21: Mapping of SAM activities and ISIC industries

SAM account	ISIC code	Category	Description
APRISV	671	J	activities auxilliary to financial intermediation except insurance and pension funding
APRISV	672	J	Activities auxiallary to insurance and pension funding
APRISV	701	K	Real estate activities with own or leased property
APRISV	702	K	Real estate activities on a fee or contract basis
APRISV	711	K	Renting of other machinery
APRISV	712	K	Renting of other machinery and equipment
APRISV	713	K	Renting of personal and household goods not elsewhere classified
APRISV	721	K	Hardware consultancy
APRISV	722	K	Software consultancy and supply
APRISV	723	K	Data processing
APRISV	724	K	Data base activities
APRISV	725	K	Maintenance and repair of office, accounting and computing machinery
APRISV	729	K	Other computer related activities
APRISV	731	K	Research and experimental development on natural scineces and engineering (NSE)
APRISV	732	K	Research and experimental development on social sciences and humanities (ssh)
APRISV	741	K	Legal, accounting, book keeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy
APRISV	742	K	Architectural, engineering and other techinical activities
APRISV	743	K	Advertising
APRISV	749	K	Business activities not elsewhere classified
APUBSV	751	L	Administration of the state and the economic and social policy of the community
APUBSV	752	L	provision of services to the coummunity as a whole
APUBSV	753	L	Compulsory social security activities
APRISV	801	M	Primary education
APRISV	802	M	Secondary education
APRISV	803	M	Higher education
APRISV	809	M	Adult and other activities
APRISV	851	N	Human health services
APRISV	852	N	Veterinary activities
APRISV	853	N	Social work activities
AUTILS	900	O	sewerage and refuse disposal, sanitation and similar activities
APRISV	911	O	Activities of business, employers and professional organisations
APRISV	912	O	Activities of trade unions

Table 21: Mapping of SAM activities and ISIC industries

SAM account	ISIC code	Category	Description
APRISV	919	O	Activities of other membership organisations
APRISV	921	O	Motion picture, radio, televisioni and other entertainment activities
APRISV	922	O	News agency activities
APRISV	923	O	Library, archives, museums and other cultural activities
APRISV	924	O	sporting and other recreational activities
APRISV	930	O	other service activities
APRISV	950	P	private household with employed persons
APRISV	990	Q	extra-territorial organisations and bodies

Mapping used for manipulation of the SAM's activity to labor skill payment shares and to translate changes in sector specific factor payments from the CGE simulation to the microsimulation. ISIC code 13 is omitted during the manipulation of the SAM to get a clearer picture of the labor payment share differences between the crop and livestock sectors.

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