RESEARCH REPORT

A Household Level Analysis of African Trade Liberalization: The Case of Mozambique

Vunrability of Low Income Households

SUBMITTED TO
World Bank, BNPP Program

SUBMITTED BY:
PETER MINOR AND
BRIAN MUREVERWI

UNDER CONTRACT NO.

April 2013

The findings, interpretations and conclusions expressed herein are those of the authors and do not necessarily reflect the view of the World Bank Group, its Board of Directors or the governments they represent. This paper was supported by a World Bank \ Bank of the Netherlands Partnership Program Grant.

Peter J. Minor is a GTAP Research Fellow, consultant to the World Bank Group, and Managing Director of Impact Economics, LLC. Correspondence may be addressed to: PeteMinor@comcast.net.

Brian Mureverwi is a Zimbabwe based consultant formally with the University of Zimbabwe. Correspondence may be addressed to brianmandudzo@yahoo.com.

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Executive Summary

With the ratification of the Abuja treaty in 1994, African countries committed themselves to a 30 years processes of trade integration. That integration started with and built on many regional economic cooperation agreements (RECs), such as the Southern African Customs Union (SACU), the Southern African Development Community (SADC), the Common Market for Easter and Southern Africa (COMESA) among others. More recently, African leaders have been proposing deeper trade integration between the RECs, to further trade integration. One effort, the Tripartite Free Trade Area (TFTA), between three RECs, COMESA, SADC and the Eastern African Community (EAC) is underway. Discussions have also advanced on completing an African Continental Customs Uunion (ACCU), which would eliminate many trade barriers between African countries and impose a common external tariff (CET) on countries outside Africa. The motivation to advance these trade objectives is to enhance regional cooperation, economic growth, and to relieve some of the persistent poverty problems prevalent in many countries on the African continent.

To date, studies have found modest and mixed impacts resulting from tariff elimination on a continental wide basis (Mevel and Karingi 2012). Aggregated welfare impacts were calculated for a single "regional" household representative of government, private households and investors. Recognizing that aggregate or "regional" welfare analysis may not illustrate the impacts these trade agreements have on poor households (those at or below the poverty line), this paper employs an alternative CGE model which disaggregates the regional household into separate private, government and investment entities. The private household is further disaggregated into ten income quintiles for both rural and urban populations based on recent household survey data. Linkages between household incomes and the prices of consumption are specified to determined the impacts of the proposed trade agreements on Mozambique poorest households (the first three quintiles represent households below or near the poverty line). The separation of the government sector from households allows for detailed analysis of government balances, which are directly impacted by the gains and losses to tax revenues.

Our analysis of Mozambique reveals that completion of the RECs will have modest, but positive impacts on pro-poor growth in Mozambique. The government of Mozambique will experience a small decline in tariff revenue's, but these revenues could be replaced through a

tax on households above the poverty line, and leave those households, nominally, no worse than before the trade agreement.

Completion of a TFTA, would increase the real incomes of poor rural households, primarily by increased exports of agricultural products to other African countries, in particular, sugar to Kenya. The impacts on urban poor households is somewhat mixed - two of the three quintiles at or below the poverty line will gain in real income terms, but the lowest quintile will be made worse off. Households above the poverty lines have increases in real income as a result of the TFTA. The government balance improves, with increased revenues and lower prices.

The ACCU poses a special challenge to pro-poor growth, and an area where further analysis will be required to assure the agreement does not undermine gains from earlier trade agreements. Assuming a CET similar to that being negotiated among COMESA members, all households under the ACCU have reduced real income. This results from the erosion of the margin of preference Mozambique experiences in other African markets for agricultural products such as sugar—rolling back some of the margins of preference Mozambique gained under the TFTA. The government balance also declines, with government revenues reduced by US$-34.0 million.

The impact on employment and wages, follows a similar pattern, with most labor categories gaining under the completion of the RECs and TFTA, but most households losing employment or reducing wages in the case of the ACCU.

Introduction

A number of studies have identified differing impacts on developing countries, both positive and negative, resulting from trade liberalization (Hertel, Preckel, and Reimer, 2001; Vanzetti D. 1998; Winters A, McCulloch and McKay 2004). Identifying and anticipating these trade liberalization impacts, especially on poor households is important for policy formulation and planning pro-poor, sustainable growth. The objective of this paper is to identify the impacts on poor households of developing countries own trade liberalization on income and consumption. Specifically, we evaluate the potential impacts of trade liberalization on Mozambique resulting from a proposed tripartite free trade area (TFTA) and eventually a continental wide customs union (CCU). This research compliments analysis of these trade agreements by Melvel and Karingi (2012), and Jensen and Sandray (2011), which focused on "regional" or "national" income impacts resulting from regional integration in Africa. In contrast, this paper focuses on the potential impacts these trade agreements might have on poor, urban and rural, households in an effort to enlighten pro-poor growth polices and strategies. The focus here is on vulnerability of poor households, not on trade policy itself: trade policy is taken as given with some basic assumptions outlined in the following sections[1]. Our analysis is limited to a selected country in Southern Africa, as an illustration of the importance of including pro-poor growth strategies into trade negotiations and complimentary national policies. The methodology can be expanded to include detailed household breakdowns for any number of countries in the GTAP database, provided data is available[2].

In the following sections, we outline our methodology, present a summary of the tariff cuts applied, the impacts on trade and output. In a separate section we detail the impacts of these tariff cuts on households in Mozambique. Although the focus of our analysis is on household income, consumption and employment, we also present impacts on government revenue and prices of government expenditure since government budgets play an important role in how poor households might ultimately be impacted.

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[1] We employ many of the trade liberalization assumptions set out in earlier papers in an effort to make results comparable.

[2] Readers are cautioned to not make generalized conclusions based on the selected country, since household impacts will be critically dependant on specific consumption and income flows as determined by household surveys.

Methodology

Trade agreements such as a Continental Free Trade Area (CFTA) or a Continental Customs Union require a methodology which can account for changes in tariffs across a broad spectrum of products, for both imports and exports. Changes in product prices or output in any one product can have impacts on employment, wages and output in other industries, government revenue and expenditures, underscoring the importance of capturing significant linkages between products and markets. For this reason, computable general equilibrium models (CGE) are well suited to the analysis of trade agreements. CGE models emphasize the linkages between product and factor markets on prices and output through detailed input-output linkages and equations which model macro-economic linkages such as investment and savings. A change in prices in one market can be linked to changes in other markets. Several types of CGE models are employed for this purpose: some are dynamic, emphasizing the impacts of investment and year-on-year growth rates in industry and trade (based on projections); others are static modeling investment purchases, but not the impacts of investment on productive capacity growth over time.

The objective of this paper is to highlight the impacts of trade agreements on poor households. Since investment and year-over-year growth rates are not a significant part of our analysis, we employ a static CGE model, augmented to include extra details on household's consumption and income. Household consumption is impacted by trade agreements through product prices; lower import taxes will likely result in lower market prices for the goods most impacted by lower tariffs and consumers will benefit as their real incomes increases *ceterus parabus*. Households' incomes are impacted when output and prices for domestically produced goods increase or decrease. Increased production would suggest that prices are higher and rates of return and employment in those industries are increasing (barring an increase in productivity). Capturing these consumption and income effects are crucial to gaining insights of how trade agreements might impact poor households.

Many of the commonly employed global CGE models in use today include a "regional household" structure which not only reduces the private household down to a single entity, but they often obscure the linkages between household incomes and expenditures by aggregating the private household with government and investment activities under a "regional household". The standard GTAP model is the most popular example of this structure (Hertel 1997). Other models often follow suit. The combined regional household has many advantages for global model over a more detailed household structure in relation to the data required to calibrate the model-often data on domestic households, income and taxes are not often readily available on a global basis and they lack uniformity.

We therefore employ the newly released MyGTAP (Minor and Walmsley, 2012a) data program and MyGTAP(Walmsley and Minor, 2012b) model which allow for the deconstruction of the GTAP regional household into individual households and separates

government expenditure and income from households activities. These modules and the data used to employ them are reviewed in the following sections.

MyGTAP Model

The MyGTAP model is described in Walmsley and Minor (2012b) and is briefly described here. The basis of the MyGTAP model is the standard, static, GTAP model widely used in international analysis of tariffs and trade agreements (Hertel 1997). As mentioned earlier, the standard GTAP model features a regional household, which combines all incomes from taxes and factors of production (land, labor, capital) and then distributes this income, based on shares, to the private household, government and savings expenditures. The benefit of this structure is that a precise specification of which agent receives taxes, transfers and factor incomes is not required—incomes from all sources are combined, then expenditure is determined. So, while a user may have good information on the structure of consumption, they will not require detailed data to establish income and these data can be obtained from national accounts.

Our analysis not only requires that income be split between government and private household income, but that the private household be split into multiple households (poor and non-poor). This requires specification of factor incomes that are directly linked to specific households. As mentioned earlier, how a particular household is impacted by trade reforms will be determined by the gains (losses) in factor incomes in contrast to changes in consumption prices.

The MyGTAP model includes this specification. By removing the regional household and including direct linkages between taxes and government expenditure as wells as factor incomes and expenditure, greater focus can be put on the distributional impacts of trade agreements.

The standard GTAP model includes a non-standard constant difference of elasticity (CDE) expenditure function. The advantages of a CDE function is that it models well a variety of consumption patterns found at differing income levels. That is to say it generates classical "Engels" curves which are characterized by shifting consumption between necessities and luxury goods. While the CDE provides a good basis for modeling private consumption across a broad range of households and countries, it is not ideal for modeling extreme situations, where poverty and subsistence expenditures are dominant. Subsistence expenditures are defined as a share of expenditure being tied to a specific consumption bundle, which must be consumed no matter what changes in prices and incomes may arise in the simulation. This structure has been employed by modelers—most frequently in the form of a Linear Expenditure System (LES) or Stone-Geary demand structure (see Crusoe, Stone, etc.).

The MyGTAP model allows a user to specify which private household demand structure to employ. In this paper, we employ the LES function for Mozambique and other poor countries

and regions and the CDE for middle income and rich countries. Thereby gaining the benefits of both structures where they are best employed.

The MyGTAP framework also has the benefit of allowing the user to specify multiple households in any number of regions while leaving un-split (regional) households in other regions not of detailed interest, thereby reducing the data requirements for employing a globally based model, with varied household structures across regions.

Finally, the MyGTAP structure allows the user to specify unique factors of production. The standard GTAP model and database include 5 standard factors of production, land, skilled and unskilled labor, capital and natural resources. In the analysis that follows, we split the standard GTAP factors of production into eight factors of production, land, four types of labor, two types of capital and natural resources. The splitting of factors of production allows for greater specificity in the sources of household incomes and can improve analysis of sector - income linkages which are of interest in trade policy analysis.

Since the standard GTAP database includes only a single, regional household, and the standard factors of production, we augment the standard GTAP database employing the MyGTAP data program and the standard GTAP database version 8a, calibrated to 2007 global trade and production.

MODEL CLOSURE

The standard GTAP model assumes full employment of endowment commodities (land, labor, capital), perfect competition (zero economic profits), mobile factors (except land which moves sluggishly between uses), a flexible trade balance and mobile capital between regions (which responds to variations in rates of return on capital). We make several changes to the standard GTAP closure:

- Unemployment of labor in the rest of Africa;
- Unemployment of uneducated labor, partial primary and secondary school labor, and full employment of labor with at least some tertiary education;
- Fixed trade balance relative to regional income;
- Fixed proportion of capital investment as a ratio to total global investment.

The assumption of unemployment in the rest of Africa recognizes the high unemployment levels in Africa. Our aggregation of the GTAP data combines all labor into one category (skilled and unskilled are combined into "labor"), so we are unable to provide a refined specification which recognizes the likely full employment of skilled labor in Africa.

Fixing the trade balance to regional income assures that Mozambique will not run any trade deficits (surpluses) beyond what they already maintain in the base database.

Finally, we assume the investment is a fixed proportion of global investment[3]. This assumption stands in contrast to the standard GTAP model, which includes investment equations which are largely driven by rates of return and a parameter called "RORFLEX". Although the GTAP investment equations are sophisticated and can provide insights, the equations are dependent on the value of RORFLEX, for which there is no known empirical estimate. In truth, investment is a variable which is not well represented in the static GTAP model, except in a theoretical sense. We therefore leave investment as a fixed proportion of global savings and investment. In Appendix D, we explore the sensitivity of the results to two different investment assumptions: activating the GTAP investment equations to ascertain any insights they may suggest; we explore a long run closure to capital markets, sometimes referred to as the Baldwin approach as outlined in (Francois and McDonald (1996) and Walmsley (1998)).

A final alternative closure explored is a tax replacement scenario, which assumes that any lost government tax revenue is "replaced" by a consumption tax on all households. This last alternative closure is stylized, since there are numerous methods for raising tax revenue and it is beyond the scope of this paper to explore more than an illustration in this regard.

GTAP Database

The data employed in this study are as provided in the GTAP database version 8a (Narayanan, Aguiar and McDougall, 2012). The GTAP database includes data from input-output tables, macro, tariff and trade database for 129 countries and regions. The data are calibrated to 2007. While it is possible to "project" the GTAP database to more recent years, applying data on factor growth rates and productivity, we do not employ this method in this paper. The standard GTAP database includes data sufficient to derive gross domestic product (GDP). The MyGTAP data program also includes data on foreign aid, remittances and foreign income flows, which can be used to derive gross national product (GNP) a better measure of national income for national consumption. However, after considering the inclusion of the MyGTAP data, we opted to not apply it in this paper. Mozambique has substantial net outflows of foreign income (most related to the MOZAL aluminum smelter). In the standard GTAP database, it would appear that these data were included in factor incomes for capital, but high direct tax rates on capital factor income remove this outflow from household consumption and allocate it to government income in the form of taxes. This results in a high savings rate for the government of Mozambique. This simply allocates that foreign income to national savings which are then allocated to the global bank in GTAP. Inserting further accounting [4]to separate out these flows would require more data on taxes and would provide few benefits in terms of insights in our case, so we omit these data from our analysis.

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[3] In GTAP, this is the same as setting RORDELTA = 0.

[4] Some CGE models include an enterprise account which facilitates the transfer of capital rents to the government, business sector and households. The GTAP database does not include an enterprise account and

Table 1
Countries and Regions GTAP V8a Database

Country\Region	Country\Region
N. America	Kenya
EU-25	Madagascar
Rest of World	Malawi
China	Mauritius
Brazil	**Mozambique**
North Africa n.e.c.	Tanzania
West Africa	Uganda
Central Africa n.e.c.	Zambia
Central Africa	Zimbabwe
Ethiopia	East Africa n.e.c.

Source: See appendix A for more details.

For the purposes of this study, we aggregate the 129 countries\regions to twenty-one regions and countries. Table 1 summarizes the countries and regions we employ and appendix A details the countries and regions as specified in the GTAP database. Our aggregation includes most African countries in the GTAP database with several large players in world trade.

Table 2
Sector Aggregations of the GTAP Database

Sector	Sector
Rice (paddy and processed)	Fishing
Wheat	Coal, oil, gas
Maize and cereals	Bovine, sheep, goat meet
Plant fibers and crops n.e.c.	Vegetable oils and fats
Vegetables, fruit and nuts	Dairy products
Oil seeds	Sugar (processed)
Cane and beet sugar	Textile, apparel, leather
Cattle, sheep and goats	Manufactures
Animal products n.e.c.	Minerals and metals
Forestry	Services
Transport and trade margins	

Source: Author's aggregation..

The GTAP database includes 57 sectors and 5 factor endowments. Our focus is on poor households in Mozambique, and most poor households are in rural areas or have farming as a

does not treat returns to capital differently from returns to any other endowment, except that depreciation is subtracted before being allocated to the regional household.

major income source. Also, the largest share of subsistence income is food (approximately 75 percent) in Mozambique. For these reasons, we aggregate many manufactured commodities, while providing less aggregation for agricultural and food commodities. Table 2 provides a summary of our commodity aggregation.

The GTAP database includes five main factors of production, land, unskilled and skilled labor, capital and natural resources. The split between skilled and unskilled labor in the GTAP database is determined by using a regression estimate for a given country. As will be seen in the following section, we employ a household survey for Mozambique which includes detailed information on the education of labor. We, therefore, aggregate labor up to one labor category and then split labor into four labor categories employing the MyGTAP data application, with the splits derived from the Mozambique household survey-not the standard regression estimates.

The factor employed in our analysis are listed in Table 3.

Table 3
Factor Splits Employed

Split\GTAP Factors	GTAP Database Factors
Land	Land
Natural resources	Natural Resources
Agricultural capital (split)	Capital
Non-Agricultural capital (split)	Capital
Labor - no education (split)	Labor (skilled and unskilled)
Labor - some primary education (split)	Labor (skilled and unskilled)
Labor -some secondary education (split)	Labor (skilled and unskilled)
Labor-some tertiary education (split)	Labor (skilled and unskilled)

Source: Author's analysis.

Tariff Data

Trade agreements such as a tripartite free trade area or a continental customs union are negotiated in relation to detailed tariff lines - usually the harmonized six digit level or more detailed. The GTAP database specifies tariffs at the GTAP 57 commodity\sector level. In order to specify tariff cutting formulas and sensitive products for exclusion, a detailed database is required. The CEPII research institute and the United Nations Trade and Development (UNCTAD) have developed the MAcMaps database for this purpose[5]. The MAcMaps database specifies tariffs at the harmonized tariff system six digit level, the most

[5] http://www.cepii.fr/anglaisgraph/bdd/macmap.htm.

detailed tariff description common across countries. The MacMap data set is largely consistent with the GTAP database, although some differences exist[6].

MacMap tariff data include both *ad valorem* tariffs and *ad valorem* equivalents of specific duties. It is assumed that when we discuss tariffs, we mean both types of duties when combined.

We create three distinct sets of tariff cuts:

1. Cuts to complete existing regional free trade agreements such as the SADC, COMESA and EAC free trade protocols;
2. Cuts to implement the tripartite free trade area in Africa;
3. Changes (raising or lowering tariffs) to implement an Africa wide customs union (requires a comment external tariff or CET).

In each case we assume that the agreements include provision for sensitive products, resulting in less complete tariff elimination or reductions. Sensitive product lists exist for some of the agreements discussed here, but in some cases they are incomplete or are not yet in the public domain. We therefore employ a standard formula for defining sensitive products in accordance with the formula specified by Jean, Labourde and Martin (2008). The formula is based on the concept of defining products which result in the highest tariff revenues for a country. The combination of the tariff rate and the volume of trade are usually reasonable predictors of sensitive products.

In each case we define 5 percent of products to be sensitive. In the case of SADC, although the stated goal is to achieve zero duties, many tariffs still exist, as is the case with Mozambique, Zambia and Zimbabwe[7]. We therefore consider these free trade areas to be incomplete and apply the 5 percent rule.

In many cases, implementation of the trade protocols are largely complete, with few exceptions, such as the case of SACU in SADC (that is for SACU imports from SADC) and in selected cases for the EAC and COMESA. Our sensitive product methodology does not raise tariffs beyond their base line 2007 level, it only exempts them from further cuts[8]. So, if a country had implemented a trade agreement completely by 2007, with zero duties on all products eliminated, the sensitive product formula will have no impact.

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[6] Differences arise from the fact that the GTAP database algorithms leverage the higher level of aggregation required for the GTAP database to improve on aggregated tariff estimates. Bilateral trade flows at the HS-6 level can be inaccurate leading to faulty trade weights being employed in aggregation. The GTAP database uses unique trade flow values derived from their own programs to trade weight average tariffs.

[7] Sensitive product lists are available from the authors.

[8] At the time analysis was being conducted, the WITS database included a variety of updated tariffs for African countries; however, the years covered varied greatly from country to country. Mozambique's tariff data was updated to 2009, but was employing the revised HS commodity system released in 2008. Due the significant effort involved in incorporating this data, to gain only two years of tariff revisions, we elected to employ the sensitive product method used for all other African countries.

Household Data

Our methodology requires that the single regional household in the standard GTAP database be split into multiple households for analysis of distributional impacts. Mozambique has conducted several household surveys for the purposes of monitoring changes in poverty rates in the country. The most recent survey, Household Budget Survey 2008/2009 (IOF 2008/2009), includes detailed expenditure and income data for over 10,000 households, including poor, non-poor, urban and rural areas. The survey data can be projected to a representation of national data employing household weights estimated by the Instituto National de Statastica, providing a comprehensive national view.

The survey data from the IOF 2008/2009 has been cleaned and incorporated into the World Bank Africa Region Poverty Program for Harmonized Household Surveys (SHIP). The details of the SHIP database and structure can be found in the Reference Manual (World Bank 2011) and Stata programs establishing the database. The SHIP database provides many advantages over accessing the raw data. Data fields have been harmonized and categories of expenditures and incomes are translated (from the national language) from the original database by researchers familiar with the survey. The SHIP database includes categorizations of households as rural and urban, as well as classification of households by expenditure quintiles within rural and urban areas. National weights are provided to scale households representation in national data.

While the SHIP data provided an excellent starting point for our classification and household descriptions, household survey data is well known to include errors and omissions due to the vast undertaking of carrying out a national survey; the database, therefore, was subject to further analysis, cleaning and eventual augmentation. Initial summaries of expenditures across all product and services categories revealed several aberrant values which required correction[9]. We therefore trimmed the household data, removing the upper and lower 2% of observations in each quintile.

Comparisons of household income and expenditure were analyzed and compared to measures of wealth included in the survey - this analysis revealed inconsistencies between measures of wealth and expenditures\incomes, especially in regards to rural households, where expenditure data revealed a low correlation to measures of wealth. Data for urban households had much higher correlations between measures of wealth, expenditure and income. Generally it is found in household surveys that measures of expenditure are more complete and accurate then measures of income - this result holds for urban households in the Mozambique data, but, once again, does not hold for rural households. The results we found in the Mozambique SHIP data have been confirmed by World Bank staff (Alfani *et. Al.* 2012) and have been attributed to poor survey implementation. Alfani *et. al.* find there is reason to

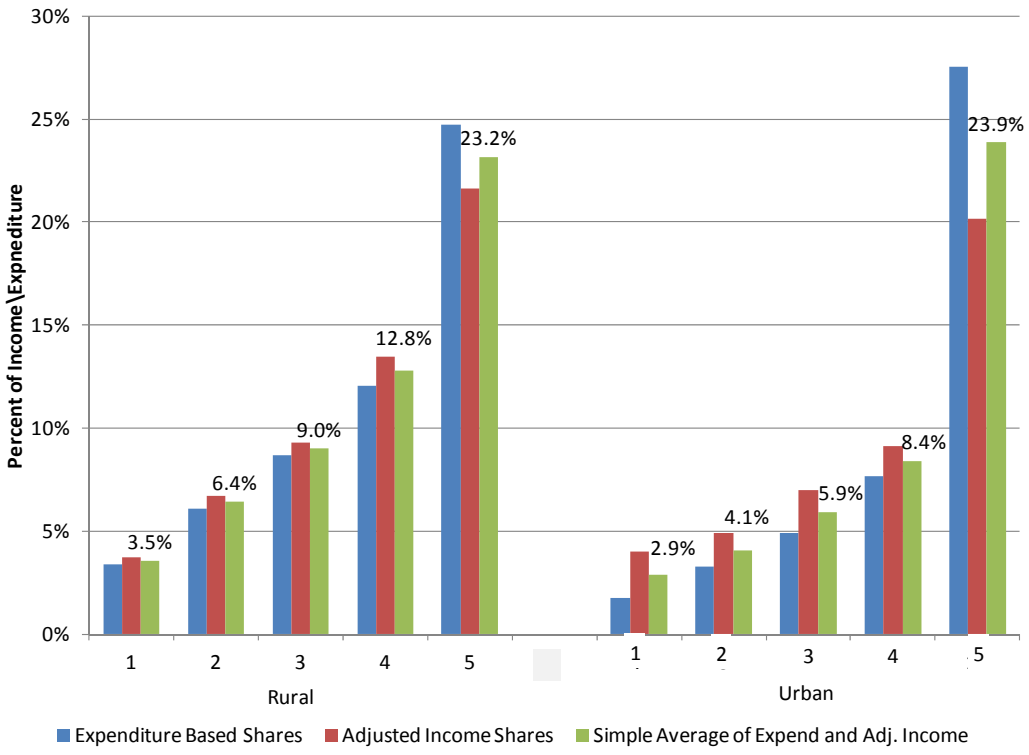
[9] For example, education spending in some households were 90% of household consumption with no food expenditures.

believe expenditure data is systematically under reported in Urban households, due to survey limitations. They also find that some of the food price indexes employed to adjust rural and regional consumption may have led to an overstatement of food consumption in certain households at the regional level. Alfani *et. al.* report that the Mozambique data are more reliable at the national level, but still undertake adjustments to the data based on earlier surveys (in effect including data from earlier surveys into estimates derived from the current survey).

HOUSEHOLD INCOME SHARES

For this studies purposes, a first step in our analysis was to derive the proportion of each quintile in total national income. These proportions (by quintile) would then be used to divide the factor incomes in the GTAP database. Recognizing the limitations and inconsistencies in the data mentioned above, we derive the proportions of each household's income in total national income by combining the expenditure and income data to create an average distribution which lies between the two estimates - based on income and expenditure data.

Figure 1
Distribution of Income by Quintile, Rural and Urban, Mozambique



Source: Authors calculations from the SHIP database, Mozambique.

First we adjusted the income data to include auto-consumption, that is the income equivalent of self produced and consumed goods, primarily food, to create an income equivalent of the expenditure data. Figure 1 illustrates our findings. As concluded in earlier World Bank research, our analysis estimates urban household income from adjusted income data were

significantly higher than the expenditure data would suggest. While for rural households the two estimates were reasonably close, except for the fifth quintile. For the purposes of our analysis, we estimate the share of each household in national income as the average of the expenditure and adjusted income shares-to moderate some of the biases suggested in the data the survey's limitations (calculations provided in Appendix C).

FACTOR INCOME SHARES

The SHIP survey reports each workers main and secondary sectors of employment. It also reports the education level for each worker. The sectors reported in the survey are based on the United Nations Central Product Classification (CPC). First the CPC codes were corresponded to the GTAP sectors to provide a breakdown of labor income by GTAP sector and education level. The standard GTAP labor category estimates were aggregated to just "labor" and then split according to the shares estimated from the reported incomes in the household survey. This provide the factor splits for labor by GTAP commodity. Capital was split between agricultural and non-agricultural capital based on the sector in which the capital resided. Land and natural resources were not split.

In 2008/2009, it is estimated that 49.6 percent of urban households and 56.9 percent of rural households lived at or below the poverty line in Mozambique (Third National Poverty Assessment, Ministry of Planning and Development p. 26).

Table 4
Estimated Factor Incomes by Household 2007 (Millions of US$)

	Rural Expenditure Quintiles)					Urban (Expenditure Quintiles)				
Factor	**1st**	**2nd**	**3rd**	**4th**	**5th**	**1st**	**2nd**	**3rd**	**4th**	**5th**
Land	27.3	56.6	102.6	27.0	32.6	--	--	--	-	--
Natural Res.	--	--	--	43.9	76.9	--	--	--	18.5	48.8
Labor -no education	30.2	44.2	37.2	11.5	18.9	21.2	12.4	14.2	7.1	3.3
Labor-some primary	63.7	183.1	253.9	73.6	89.1	78.2	90.9	120.7	68.4	49.2
Labor-some secondary	45.0	66.4	96.9	42.9	84.9	58.5	103.7	154.9	105.3	145.7
Labor-some tertiary	38.0	18.0	27.0	10.3	109.5	6.7	27.8	51.9	61.4	540.5
Capital-Ag	--	--	--	88.0	154.2	--	--	--	37.2	98.0
Capital-Other	--	--	--	438.1	767.7	--	--	--	185.2	487.8
Total	204.3	368.3	517.6	735.2	1,333.9	164.6	234.8	341.7	483.1	1,373.3

Source: GTAP database V8a and Mozambique Household Survey.

For the first through third quintiles, comprising households at or below the poverty line, it was assumed that all household incomes derived from land and labor (table 4). Returns to

capital and natural resources were assumed to accrue to households above the poverty line, or the fourth and fifth quintiles.

CONSUMPTION SHARES

The final element required to complete the description of the households in our model are data on consumption. The SHIP database included several broad categories of consumption expenditure goods, include food, alcohol, tobacco, education, textiles and clothing, autos, transportation, fuel, firewood, energy, health etc. While the SHIP data were adequate for defining broad categories, such as food, it lacked details on food composition e.g. grains, meat, milk, sugar etc. We therefore augmented the SHIP data with data from the original OAF2008/2009 survey as reported in the Ministry of Planning report on poverty and wellbeing (2010, pp 119-132). Consumption shares were first split employing the SHIP data, to derive shares of food and non-food in the household consumption bundles. Detailed food shares within the food bundle for the first three quintiles were derived from the Ministry of Planning report. Since these tables were specifically developed using data from the first three quintiles (i.e., poor households). The fourth and fifth quintiles detailed shares of food within the food bundle were derived, in part, as the residuals of food consumption left over after allocating the food within the first three quintiles.

Non-Food consumption was based on the shares reported in the GTAP model. For most poor households, these data were of second order consequences, since food consumption shares exceeded 75% of all goods and services consumed[10]. Table 5 illustrates the consumption shares for each of the ten households in our analysis.

[10] The GTAP database structure allocates "trade margins" to a unique sector. Trade margins are the mark-ups by wholesale and retailers to pay for delivering and selling products. Ideally, the trade margins would be allocated by sector and household, but the data do not support this type of breakdown. We, therefore, allocate trade margins by first taking the share of non-food consumption in total consumption. In the cases of the forth and fifth rural quintiles, the shares of margins had to be reduced to allow for a reasonable allocation of consumption to non-food commodities (e.g., employing this method resulted in very high shares of trade margins within those two rural quintiles.

Table 5

Consumption Shares by Household, Mozambique, 2007

	Percent									
	Rural (Quintile)					Urban (Quintile)				
	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th
Rice (paddy and processed)	4.5%	4.6%	4.3%	4.3%	2.9%	8.6%	8.1%	7.6%	2.9%	1.3%
Wheat	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Maize and cereals	19.5%	20.0%	18.8%	0.8%	0.5%	10.9%	10.2%	9.7%	0.5%	0.2%
Plant fibers and crops n.e.c.	10.6%	10.9%	10.2%	13.5%	9.2%	7.8%	7.3%	6.9%	9.2%	4.2%
Vegetables, fruit and nuts	21.4%	22.0%	20.7%	3.4%	2.3%	19.6%	18.4%	17.4%	2.3%	1.1%
Oil seeds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cane and beet sugar	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cattle, sheep and goats	0.2%	0.2%	0.2%	0.4%	0.3%	0.1%	0.1%	0.1%	0.3%	0.1%
Animal products n.e.c.	0.1%	0.1%	0.1%	3.4%	2.3%	0.1%	0.1%	0.1%	2.3%	1.1%
Forestry	8.5%	7.1%	6.1%	5.1%	3.7%	4.6%	4.8%	4.2%	3.2%	1.2%
Fishing	2.6%	2.7%	2.5%	1.2%	0.8%	2.6%	2.4%	2.3%	0.8%	0.4%
Coal, oil, gas	6.1%	5.4%	3.9%	3.5%	3.1%	6.0%	5.0%	3.6%	2.4%	0.6%
Bovine, sheep, goat meet	2.1%	2.1%	2.0%	3.3%	2.3%	1.2%	1.1%	1.0%	2.3%	1.0%
Vegetable oils and fats	11.8%	12.3%	11.9%	26.5%	19.3%	16.3%	15.3%	15.3%	20.1%	13.0%
Dairy products	1.4%	1.4%	1.4%	0.7%	0.5%	1.4%	1.3%	1.2%	0.5%	0.2%
Sugar	1.0%	1.0%	0.9%	2.9%	1.9%	2.4%	2.3%	2.2%	2.0%	0.9%
Textile, apparel, leather	1.6%	2.0%	2.6%	2.0%	4.2%	0.7%	1.3%	1.7%	2.3%	3.9%
Manufactures	6.0%	5.3%	4.7%	4.1%	3.8%	4.0%	4.9%	4.7%	4.3%	7.4%
Minerals and metals	0.2%	0.2%	0.2%	0.3%	0.5%	0.2%	0.3%	0.3%	0.5%	1.0%
Services	2.0%	2.2%	2.5%	3.4%	5.9%	4.9%	7.0%	8.2%	11.2%	20.1%
Transport and trade margins	0.3%	0.5%	6.8%	21.4%	36.6%	8.5%	10.3%	13.6%	32.9%	42.3%
Household Consumption (Millions of US$)	207.6	374.3	525.9	747.1	1355.5	167.3	238.6	347.2	490.9	1395.5

Source: Author's calculations based on SHIP data, Ministry of Planning 2008/2009. Total values for household consumption are from the GTAP database calculations presented earlier.

Trade Agreements - Production, Trade and Prices

Our analysis of African trade agreements is based on the GTAP V8a database. The version 8a database includes trade, production and tariffs for 2007. In order to simulate tariff removal due to the Tripartite Free Trade Area and the African Customs Union, we first simulate the completion of the regional economic cooperation\free trade agreements (RECs). The focus of our analysis is Mozambique, but it is still useful to accurately reflect the completion of RECs outside Mozambique.

Hence, we first estimate the completion of three RECs in our analysis:

- Southern African Development Community (SADC);
- Common Market for Eastern and Southern Africa (COMESA);
- East African Community (EAC).

Then, as mentioned above, we estimate the effects of the two main trade agreements under consideration in this paper:

- Tripartite Free Trade Areas; and
- The African Customs Union.

Appendix E in this report describes these RECs in more details. An important aspect of these trade agreements is the sometimes uneven coverage and progress in implementing tariff cuts. A number of allowances have been made for countries to declare goods sensitive and exempt from tariff reduction or elimination. Or, in some instances, REC members are very slow in meeting their obligations. We, therefore, project a "dirty" completion of the RECs, based on the assumption that countries which have not as of 2007 reduced or eliminated their tariffs, will likely keep many of them in place by the time the TFTA is negotiated. Furthermore, we assume these sensitive products will not have their tariffs effectively reduced or eliminated in the tripartite trade negotiations. We allow up to 5 percent of a RECs tariffs to be considered sensitive.

When considering the tripartite FTA, we also allow for up to 5 percent of a countries tariffs to be considered sensitive. In choosing the 5 percent sensitive products, we also apply the rule that all tripartite members apply a most favored nation rule and that they offer their currently lowest tariff rate to all tripartite members, that is no tariff may rise as a result of the tripartite negotiations.

Finally, we consider the African Customs Union which assumes that all tariffs between African countries are eliminated and that a common external tariff (CET) is adopted. There are two significant impacts related to the ACU: the elimination of all remaining tariffs and duties from the tripartite agreement, that is the elimination of all duties, including sensitive products); and the recalibration of external duties to the CET levels. In regards to the CET, we assume that 5 percent of the products imported from outside Africa are defined as sensitive[11]. The CET levels are assumed to be the same as the CET levels negotiated by COMESA in its customs union negotiations. The choice of applying the COMESA CET is based in part on the fact that there are 19 COMESA countries and 8 SADC countries in addition to the facts that COMESA members have already initiated negotiations for a CET and that a number of countries in COMESA are already SADC members[12].

Table 6
COMESA ACCU Common External Tariffs

Category	Rates
Raw materials	0.0
Capital goods	0.0
Semi-processed\intermediate goods	10.0
Consumption goods	25.0

Source: COMESA Secretariat.

Tariff Reductions

We model three tariff reduction scenarios, one is the completion of the RECs and two are new trade agreements to be negotiated. In all cases, tariffs will change for Mozambique's exports and imports. Table 7 illustrates the trade weighted changes to Mozambique's import tariffs. Mozambique's trade weighted import tariffs in 2007 ranged from a low of zero on cane and beet sugars, to a high of 18.8 percent on bovine, goat and sheep meat. The 17.3 percent tariff on textiles and wearing apparel is also notable, since the trade volume is significant. Table 8 illustrates tariffs Mozambique faces in its export markets (trade weighted). While

[11] The 5 percent sensitive products are defined by aggregating across all of Africa in contrast to a country-by-country definition.
[12] Of course, SACU, the oldest and most advanced customs union in Africa has a different CET structure and this is likely to influence any final CET structure adopted.

Mozambique faces relatively low tariffs on the majority of its goods exports, several notable exceptions include agricultural products sugar (45.5), oil seeds(47.0), plant based fibers (74.1), and grains(32.6).

Table 7
Mozambique Trade Weighted Import Tariffs, Baseline 2007, Completion of RECs, Tripartite FTA, and African Customs Union

			Model Scenarios (Percentage Point Change)		
GTAP Commodity	Baseline Imports 2007 (Millions of US$)	Base Tariff 2007 (a)	Completion of RECs	Tripartite Free Trade Agreement	African Continental Customs Union
Rice	141.1	7.1	0.0	0.0	17.7
Wheat	93.6	2.5	0.0	0.0	-2.5
Maize and cereals	8.7	6.1	-3.6	-1.6	-0.8
Plant fibers and crops n.e.c.	14.8	3.9	-1.2	-0.1	-0.9
Vegetables, fruit and nuts	33.3	17.9	-2.4	-0.1	-14.8
Oil seeds	1.7	2.8	-0.4	0.0	-2.3
Cane and beet sugar	0.0	0.0	0.0	0.0	0.0
Cattle, sheep and goats	0.5	3.6	-2.8	0.0	-0.6
Animal products n.e.c.	5.7	7.5	-0.9	0.0	-6.5
Forestry	16.2	1.2	-0.2	0.0	-0.9
Fishing	1.1	17.9	-8.1	0.0	-7.2
Coal, oil, gas (b)	437.6	6.9	0.0	0.0	12.2
Bovine, sheep, goat meet	22.3	18.8	-2.6	0.0	-13.0
Vegetable oils and fats	253.6	13.0	-1.3	-0.1	-2.9
Dairy products	32.7	12.6	-2.7	0.0	-8.4
Sugar	90.8	7.5	0.0	0.0	-7.4
Textile, apparel, leather	119.0	17.3	-3.1	-0.1	-2.2
Manufactures	1,341.8	7.2	-1.3	0.0	-1.2
Minerals and metals	948.7	3.4	-0.9	0.0	-0.6
Services	537.8	0.0	0.0	0.0	0.0
Transport and trade margins	183.8	0.0	0.0	0.0	0.0
Total	4,284.8	--	--	--	--

Source: GTAP V8 database and author's calculations from MacMap database.

(a) Trade weighted.

(b) A number of petroleum products such as processed fuels and liquefied gas are defined as consumption goods in the harmonized system. Therefore, tariffs on these products will rise to 25 percent (see Table 6).

COMPLETION OF RECS

Completion of the RECs, in Mozambique's case, SADC, results in a number of import tariff cuts ranging from -8.1 percent on fish imports to a trade weighted reduction of -3.6 percent on maize and cereal grains (Table 7). The cuts result largely from the high tariffs Mozambique is reported to apply to imports from South Africa. These cuts are high despite the 5 percent sensitive products allowed in our tariff cutting formula, underlining the substantial degree of protection Mozambique applied against imports from South Africa in 2007.

Table 8
Mozambique Trade Weighted Export Tariffs, Baseline 2007, Completion of REC, Tripartite FTA, and African Customs Union

		Model Scenarios (Percentage Point Change)			
GTAP Commodity	Baseline Exports 2007 (Millions of US$)	Base Tariff 2007 [a]	Completion of RECs [a]	Tripartite Free Trade Agreement [a]	African Continental Customs Union [a]
Rice	2.0	2.1	-0.7	-1.5	0.0
Wheat	10.6	0.0	0.0	0.0	0.0
Maize and cereals	13.4	21.4	0.0	-0.3	-0.4
Plant fibers and crops n.e.c.	207.3	5.3	0.0	-0.7	0.0
Vegetables, fruit and nuts	52.2	16.0	-0.1	-0.4	0.0
Oil seeds	30.4	2.6	0.0	0.0	-0.1
Cane and beet sugar	0.0	0.0	0.0	0.0	0.0
Cattle, sheep and goats	0.1	0.0	0.0	0.0	0.0
Animal products n.e.c.	4.2	1.4	-1.3	0.0	0.0
Forestry	112.6	0.0	0.0	0.0	0.0
Fishing	5.1	1.2	0.0	0.0	-1.0
Coal, oil, gas	573.7	0.0	0.0	0.0	0.0
Bovine, sheep, goat meet	0.6	2.1	0.0	0.0	-2.1
Vegetable oils and fats	130.7	1.0	-0.2	-0.6	-0.3
Dairy products	0.2	14.3	-7.6	-0.3	0.0
Sugar	85.7	48.1	0.0	-18.0	-0.1
Textile, apparel, leather	14.0	3.3	-1.2	-0.3	-0.7
Manufactures	121.4	81.9	-0.2	-0.4	-1.3
Minerals and metals	1,880.8	0.1	0.0	0.0	0.0
Services	1,084.6	0.0	0.0	0.0	0.0
Transport and trade margins	215.7	0.0	0.0	0.0	0.0
Total	4,545.5	--	--	--	--

Source: GTAP V8 database and author's calculations from MAcMap database.

(a) Trade weighted.

The completion of the RECs (SADC) has only modest impacts on the tariffs Mozambique's exports faced in 2007, underlining the fact that most tariffs Mozambique faces in the SADC region are already low. Still, our tariff cutting formula results in cuts to the tariffs Mozambique faces on milk and dairy products by slightly more than seven percentage points (resulting largely from concessions from Zimbabwe) and a drop of more than one percent on animal products.

TRIPARTITE FTA (TFTA)

The Tripartite FTA requires only modest tariff reductions to Mozambique's trade weighted import tariffs. This is, in part, due to the fact that most tariff reductions that matter to Mozambique have been undertaken under the SADC trade protocol. Again, Mozambique is allowed to designate 5 percent of its tariff lines as sensitive products, further reducing Mozambique's need to lower its import tariffs. The only tariff reduction over one percent is for maize, cereals, grains and crops.

The tripartite FTA offers some market access in the form of lower tariffs in Africa. Most notably, a large reduction in tariffs Mozambique faces on its sugar exports to other African countries - most notably Kenya, which maintains a very high tariff on its imports of sugar from Mozambique. Other products with improved market access include plant fiber and other crops, vegetables and nuts (Malawi and Zimbabwe).

AFRICAN CUSTOMS UNION (ACCU)

The Abuja treaty came into force in 1994 after gaining the required signatories. The Abuja treaty established an agenda for achieving an African wide Continental Customs Union based in large part on the processes currently under way, including the RECs and Tripartite agreement - it is the next logical step in a 30 year process. Though the Abuja treaty suggests a completion date for an African wide continental customs union by the end of this decade, there are still considerable steps to be undertaken, including the completion of the RECs and a continental FTA.

A customs union introduces two important elements into the African trade liberalization processes: the elimination of all intra-African tariffs; and the establishment of a common external tariff (CET). A customs union is intended to facilitate trade in several ways, but most notably, by eliminating the requirement for customs inspections and paper work between its members. The achievement of a customs union and the free flow of good across borders is not trivial, in fact reduced time to trade due to simplified customs procedures has been shown to exceed the benefits that can often be gained through tariff liberalization (Minor and Tsigas 2008). To gain this free flow of goods, incentives to circumvent tariffs and duties by transshipping goods must be reduced or eliminated. This means that in order for goods to flow freely across Africa, African countries must present a common tariff to non-African trade, or their will be an incentive to transship goods between African countries to avoid duties. This gives rise to the requirement for a CET.

The COMESA CET, as illustrated in Table 6, was applied in our study. This CET has four tariff bands: raw materials, capital good, semi-processed, consumer goods. Applying this CET to Mozambique results in a wide array of changes to Mozambique's import tariff structure. Two categories of goods, coal, oil, and gas, and rice actually experience tariff increases, while all other products result in tariff cuts.

The tariffs Mozambique faces also decease as a result of the customs union: these deceases result from the total elimination of tariffs between African countries. As we noted earlier in the cases of the RECs and the TFTA, African countries were allowed to maintain 5 percent sensitive products. The adoption of the customs union would require the RECs to eliminate their sensitive products between one another or customs agencies would have the burden of monitoring imports from African countries to assure smuggling was not taking place and proper duties were being applied. Table 8 illustrates that Mozambique will face lower tariffs on bovine, sheep and goat meat (--4.0 percent) and fish (-1.0 percent).

GDP and Production

Table 9 illustrates the impacts of our three scenarios on real GDP—that is changes in output measured at base prices. The impacts on GDP of tariff reforms in all three scenarios is modest, ranging from zero percent of -4.0 percent for Mauritius in the case of the African Customs Union (Table 9). The vast majority of GDP impacts are less than two percent with many less than one percent. Mauritius, therefore, is an exceptional case. Mozambique's GDP impacts range from positive 0.2 percent resulting from the completion of the RECs (mainly SADC in the case of Mozambique) to -0.8 percent in the case of the African Customs Union with the impacts from the Tripartite Free Trade area in-between at 0.1 percent of GDP.

Changes to Mozambique's real output are reported in Table 10. The completion of the RECs has a negligible impact on overall output, as suggested by the GDP changes. However, there are some sectors that win and others that lose from the completion of the RECs. On a dollar value basis, minerals and metals is impacted the most, with a US$ 16.2 million increase in output, measured in 2007 prices (1.2 percent of baseline). Manufactures output is most negatively impacted with a loss of output of US$-2.1 million. Most agricultural products are only modestly impacted with impacts of less than US$ 1.0 million, with the exception of bovine meats and forestry products. A notable change in output is in the services sector, for trade and transport services which increase by US$ 16.2 million.

Changes in output across sectors is more varied in the case of the TFTA. Overall changes to output are still modest, but there are some notable shifts between sectors in output. Sugar output increases by US$ 102.5 million or 121 percent. As was demonstrated earlier, tariffs on sugar are reduced in the Africa region, in particular, by Kenya. The following section on trade provides more details on the causes of these impacts on sugar. Other agricultural sectors gain as well, including cane and beet sugar (inputs into refined sugar), other animal products and cattle sheep and goats. Losing agricultural sectors include plant based fibers, US$ -10.0 million, forestry products, oil seeds, and rice. Manufacture output is negatively impacted, with output down in all manufacturing sectors, led by minerals and metals US$ -39.8 million (2.0 percent). Services are mixed, with trade and transport once again gaining and other services losing, both of these impacts are less than one percent of output of services.

The impacts of the ACCU are more varied than the prior two cases. The impacts of the ACCU on agricultural products is mixed. Gains in sugar output under the TFTA are rolled back, with production of refined sugar decreasing by US$ -68.8 million (-36.7 percent). Production of cane and beat sugar, inputs into refined sugar, also decline. Output of animal products declines by -7.1 percent or US$-12.8 million and vegetable fruits and nuts experience a decline in output of US$ -15.5 million or -2.8 percent. Manufacturing output generally does well under the ACCU scenario modeled here, with manufacturing output increasing by US$ 16.4 million or 5.9 percent. Textiles and apparel, once again is not a leader in output growth, with a decline of output of US$ -4.1 million or 5 percent. Services output are negatively impacted by the ACCU, with general services and trade and transport margins declining modestly.

Table 9
Changes in Real GDP, Constant 2007 Dollars (Millions of US$ and Percent Change)

		Completion of RECs		Tripartite Free Trade Agreement			African Continental Customs Union		
Country\Region	(A) Baseline Value (US$ Millions) 2007	(B) Chang Value	(C) Change Percent	(A+B) = (D) Baseline	(E) Change Value	(F) Change Percent	(D+E) = (G) Baseline	(H) Change Value	(I) Change Percent
N. America	16,519,626.0	0.0	0.0	16,519,626.0	1.7	0.0	16,519,627.7	-39.6	0.0
EU-25	16,792,316.0	0.0	0.0	16,792,316.0	3.4	0.0	16,792,319.4	-691.8	0.0
Rest of World	16,330,752.0	0.0	0.0	16,330,752.0	-1.6	0.0	16,330,750.4	-222.1	0.0
China	3,494,058.0	0.0	0.0	3,494,058.0	-4.9	0.0	3,494,053.1	12.6	0.0
Brazil	1,365,983.4	0.0	0.0	1,365,983.4	0.5	0.0	1,365,983.9	36.5	0.0
North Africa nec	449,477.8	0.0	0.0	449,477.8	-3.0	0.0	449,474.8	-13.7	0.0
West Africa	280,519.2	128.5	0.0	280,647.7	-135.4	0.0	280,512.4	634.5	0.2
Central Afr. nec	41,363.4	0.4	0.0	41,363.8	2.1	0.0	41,365.9	443.0	1.1
Central Africa	69,240.6	-0.2	0.0	69,240.4	-1.1	0.0	69,239.3	-98.3	-0.1
Ethiopia	19,182.3	0.7	0.0	19,183.0	3.0	0.0	19,185.9	15.9	0.1
Kenya	27,166.4	0.3	0.0	27,166.7	52.6	0.2	27,219.3	-10.1	0.0
Madagascar	7,342.9	-0.1	0.0	7,342.8	0.7	0.0	7,343.5	-66.4	-0.9
Malawi	3,585.9	9.8	0.3	3,595.6	22.7	0.6	3,618.3	-8.2	-0.2
Mauritius	7,521.2	-0.2	0.0	7,521.0	1.5	0.0	7,522.5	-299.7	-4.0
Mozambique	8,030.0	17.1	0.2	8,047.1	9.3	0.1	8,056.3	-63.5	-0.8
Tanzania	16,825.4	5.6	0.0	16,831.0	10.2	0.1	16,841.1	-85.9	-0.5
Uganda	11,892.3	0.1	0.0	11,892.4	28.2	0.2	11,920.6	-26.9	-0.2
Zambia	11,541.4	26.0	0.2	11,567.4	41.1	0.4	11,608.5	78.9	0.7
Zimbabwe	4,423.8	26.0	0.6	4,449.8	12.4	0.3	4,462.2	117.0	2.6
East Afr. nec	58,477.0	-0.5	0.0	58,476.5	-0.1	0.0	58,476.4	1,299.7	2.2
SACU	312,019.1	150.5	0.0	312,169.7	340.5	0.1	312,510.2	-1,107.1	-0.4

Source: MyGTAP Model.

Table 10
Changes in Mozambique's Output\Production Constant 2007 Prices (Percent and Millions US$)

Commodity	(A) Baseline Value 2007	Completion of RECs (5% Sensitive)		Tripartite FTA (5% Sensitive)			African Continental Customs Union (5% Sensitive)		
		(B) Chang Value	(C) Change Percent	(A+B) = (D) Baseline	(E) Change Value	(F) Change Percent	(D+E) = (G) Baseline	(H) Change Value	(I) Change Percent
Rice	83.6	0.1	0.1	83.7	-3.0	-3.6	80.7	26.0	32.2
Wheat	9.9	0.0	-0.1	9.9	-0.5	-5.5	9.4	0.3	3.6
Maize and cereals	375.8	0.8	0.2	376.5	-0.9	-0.2	375.6	-2.2	-0.6
Plant fibers	777.4	0.2	0.0	777.6	-10.0	-1.3	767.6	9.6	1.2
Vegetables, fruit, nuts	539.9	0.5	0.1	540.4	5.3	1.0	545.7	-15.5	-2.8
Oil seeds	34.6	0.1	0.4	34.7	0.1	0.2	34.8	-1.1	-3.3
Cane and beet sugar	2.9	0.0	0.4	2.9	3.2	111.0	6.2	-2.2	-35.3
Cattle, sheep, goats	37.5	-0.2	-0.5	37.4	2.1	5.5	39.4	-3.7	-9.5
Animal products	172.9	0.0	0.0	172.9	8.7	5.0	181.6	-12.8	-7.1
Forestry	338.8	2.4	0.7	341.2	-3.5	-1.0	337.7	-5.6	-1.7
Fishing	118.4	0.5	0.4	118.9	1.4	1.2	120.3	-2.6	-2.2
Coal, oil, gas	542.9	-1.4	-0.3	541.5	-1.8	-0.3	539.7	24.4	4.5
bovine, sheep, goat meet	83.0	-1.4	-1.6	81.6	-2.0	-2.4	79.6	-9.5	-11.9
Veg. oils and fats	806.8	0.7	0.1	807.6	-3.7	-0.5	803.8	-7.6	-0.9
Dairy products	4.3	0.0	0.1	4.3	0.0	-0.7	4.2	-0.8	-18.5
Sugar	84.6	0.4	0.5	85.0	102.5	121.1	187.5	-68.8	-36.7
Textile-apparel	87.5	-4.3	-4.9	83.2	-1.7	-2.0	81.4	-4.1	-5.0
Manufactures	286.7	-2.1	-0.7	284.6	-8.4	-2.9	276.2	16.4	5.9
Minerals-metals	2,007.7	23.2	1.2	2,031.0	-39.8	-2.0	1,991.2	6.5	0.3
Services	5,072.8	-1.7	0.0	5,071.1	-30.9	-0.6	5,040.2	-10.7	-0.2
Transport and trade margins	3,257.1	16.2	0.5	3,273.3	31.3	1.0	3,304.6	-50.8	-1.5
Total	14,725.2	34.1	0.0	14,759.3	48.2	0.3	14,807.5	-114.8	-0.8

Source: MyGTAP model.

Imports and Exports

Tables 11 and 12 illustrate the simulated changes in Mozambique's imports and exports resulting from the three simulations. In the case of the completion of the RECs Mozambique's imports and exports change almost equally resulting in no change in the trade balance. On the imports side, the most notable changes is for Mozambique's imports of fish products, this is due, in large part to tariff changes and imports from South Africa rising. With the exception of textiles and apparel, imports of manufactures and services increase slightly. Most agricultural products experience increases in imports from zero to five percent. Mozambique's exports increase consistent with the tariff concessions reported in Table 8 with the largest increase in exports in the milk and dairy sector of US$ 0.3 million (this results largely from the removal of tariffs on these products by Zimbabwe). Animal products and rice also see modest rises in exports, again, consistent with the tariff changes Mozambique faces in its export markets consistent with Table 8.

The most notable impact of the TFTA on Mozambique is the reduction in Kenyan sugar tariffs, which results in the -18.0 percentage point drop in the tariffs Mozambique faces (see Table 8). The large reduction in this tariff rate increases Mozambique's exports of sugar by over 100 percent or US$ 83 million. This rise in exports drives much of the results in imports found in Table 11, notably the 205 percent rise in cane and beet sugar (albeit, from a very low level).

In contrast to the Tripartite FTA, the ACCU influence on Mozambique's trade results from Mozambique's own tariff changes after the CET is imposed, with one notable exception, sugar. Under the ACCU, Mozambique's margin of preference in export markets (notably Kenya) is reduced by the CET being imposed on imports from outside Africa. This results in a near reversal of Mozambique's gains in sugar it experienced under the TFTA. Other sectors impacted by the ACCU include rice which see imports fall by US$21 million or -14.7 percent and livestock (tariffs on imports rise 17.7 percentage points) and meats imports rise by 33 percent. Manufactures and services imports see only modest changes. However, on the export side, manufactures and services see increases of US$23.6 million and US$ 24.0 million respectively.

Table 11
Mozambique Imports Constant 2007 Dollars (Percent and Millions of US$)

Commodity	(A) Baseline Value (US$ Millions) 2007	Completion of RECs (Max 5% Sensitive)		Tripartite FTA (5% Sensitive)			African Continental Customs Union (5% Sensitive)		
		(B) Chang Value	(C) Change Percent	(A+B) = (D) Baseline	(E) Change Value	(F) Change Percent	(D+E) = (G) Baseline	(H) Chang e Value	(I) Change Percent
Rice	141.1	0.8	0.5	141.9	4.8	3.4	146.7	-21.5	-14.7
Wheat	93.7	0.1	0.1	93.7	-0.4	-0.5	93.3	-0.7	-0.7
Maize and cereals	8.8	0.4	4.7	9.2	0.4	4.4	9.6	-0.2	-2.5
Plant fibers	14.8	0.7	4.8	15.5	1.2	7.7	16.7	-0.3	-1.9
Vegetables, fruit, nuts	33.3	1.3	3.9	34.6	1.5	4.2	36.1	7.2	20.0
Oil seeds	1.7	0.0	0.7	1.7	0.1	7.5	1.8	0.0	-2.7
Cane and beet sugar	0.0	0.0	-0.1	0.0	0.0	205.5	0.0	0.0	-50.2
Cattle, sheep, goats	0.5	0.0	4.5	0.5	0.1	12.8	0.6	-0.1	-16.4
Animal products	5.7	0.1	1.3	5.8	0.5	8.0	6.2	-0.2	-3.0
Forestry	16.2	0.1	0.5	16.3	0.4	2.2	16.7	0.0	0.2
Fishing	1.1	0.1	11.8	1.2	0.0	1.6	1.2	0.1	9.3
Coal, oil, gas	437.6	2.2	0.5	439.8	3.6	0.8	443.5	2.5	0.6
bovine, sheep, goat meet	22.3	2.2	9.7	24.5	2.0	8.1	26.5	9.0	33.8
Veg. oils and fats	253.6	4.4	1.7	258.0	5.0	2.0	263.1	11.0	4.2
Dairy products	32.7	0.6	1.8	33.3	0.3	0.8	33.6	0.6	1.9
Sugar	90.8	0.4	0.5	91.2	6.2	6.8	97.4	-3.1	-3.2
Textile-apparel	119.0	8.2	6.9	127.2	1.3	1.0	128.4	3.6	2.8
Manufactures	1,341.8	7.0	0.5	1,348.8	0.6	0.0	1,349.4	7.4	0.5
Minerals, metals	948.7	6.8	0.7	955.5	-2.0	-0.2	953.6	4.7	0.5
Services	537.8	-4.0	-0.7	533.8	4.0	0.7	537.7	-8.1	-1.5
Transport and trade margins	183.8	1.0	0.5	184.7	2.6	1.4	187.3	0.3	0.2
Total	4,284.8	32.3	0.8	4,317.1	32.1	0.7	4,349.2	12.1	0.3

Source: MyGTAP model.

Table 12

Mozambique Exports Constant 2007 Dollars (Percent and Millions of US$)

Commodity	(A) Baseline Value (US$ Millions) 2007	Completion of RECs (Max 5% Sensitive)		Tripartite FTA (5% Sensitive)			African Continental Customs Union (5% Sensitive)		
		(B) Chang Value	(C) Change Percent	(A+B) = (D) Baseline	(E) Change Value	(F) Change Percent	(D+E) = (G) Baseline	(H) Chang e Value	(I) Change Percent
Rice	2.0	0.0	2.1	2.1	0.0	1.4	2.1	0.1	3.5
Wheat	10.6	0.0	-0.1	10.6	-0.6	-5.5	10.0	0.4	3.7
Maize and cereals	13.4	-0.1	-0.7	13.3	-0.6	-4.2	12.7	0.7	5.9
Plant fibers	207.4	-0.7	-0.3	206.7	-10.8	-5.2	195.8	14.3	7.3
Vegetables, fruit, nuts	52.2	0.1	0.1	52.3	-3.0	-5.6	49.3	2.9	5.8
Oil seeds	30.4	0.2	0.6	30.6	-1.6	-5.1	29.1	-0.1	-0.2
Cane and beet sugar	0.0	0.0	0.9	0.0	0.0	-56.4	0.0	0.0	74.1
Cattle, sheep, goats	0.1	0.0	0.2	0.1	0.0	-11.4	0.1	0.0	12.6
Animal products	4.2	0.1	2.9	4.3	-0.3	-6.5	4.0	0.2	6.2
Forestry	112.6	0.9	0.8	113.5	-4.6	-4.0	108.9	-3.3	-3.0
Fishing	5.1	0.0	0.2	5.1	-0.1	-2.2	5.0	0.1	1.1
Coal, oil, gas	573.7	-1.5	-0.3	572.2	-1.9	-0.3	570.3	25.1	4.4
bovine, sheep, goat meet	0.6	0.0	0.8	0.6	-0.1	-19.0	0.5	0.2	40.0
Veg. oils and fats	130.7	1.0	0.8	131.7	-3.1	-2.3	128.6	7.1	5.6
Dairy products	0.2	0.3	119.1	0.5	-0.1	-29.4	0.3	0.0	13.0
Sugar	85.7	0.4	0.5	86.1	111.8	129.8	198.0	-74.0	-37.4
Textile-apparel	14.0	1.6	11.5	15.6	-0.7	-4.2	15.0	-0.2	-1.1
Manufactures	121.4	1.6	1.3	123.0	-7.8	-6.3	115.3	23.6	20.5
Minerals, metals	1,880.8	27.8	1.5	1,908.6	-36.2	-1.9	1,872.4	7.0	0.4
Services	1,084.6	6.9	0.6	1,091.5	-24.2	-2.2	1,067.3	24.1	2.3
Transport and trade margins	215.8	-0.1	0.0	215.7	-3.0	-1.4	212.7	-4.9	-2.3
Total	4,545.5	38.6	0.8	4,584.1	13.4	0.3	4,597.4	23.6	0.0

Source: Authors calculations from MyGTAP model.

Household Income, Employment and Vulnerability of the Poor

The analysis so far has focused on the impacts commonly discussed in the environment of trade policy analysis: GDP, output and trade flows. A unique feature of the MyGTAP model is the capability to disaggregate the regional household into both private and government entities. We further disaggregates the private households into rural and urban quintiles. Since half of the population of Mozambique lives below the poverty line (references from poverty report), the first two quintiles in each category includes families below the poverty line. The third quintile includes households above, below and at the poverty line, and the fourth and fifth quintiles are above the poverty lines. Table 4 illustrated the sources of factor incomes for each household (labor, land, and capital). Table 5 illustrated the expenditure patterns for each household. Combing this information allows us to examine the impacts of changing prices and quantities on household incomes and consumption by household. This disaggregate analysis stands in contrast to a typical "national welfare analysis" often cited in CGE analysis in that we do not assume that all parties will be impacted equally - the assumption is that trade policy will have distributional impacts and that the impacts on poor households should be given special consideration when making trade policy.

In addition to a focus on households, we bring into focus the importance of trade policy on government revenue and expenditure. Trade policy, tariff reforms in this case, result in changes to government revenues - taxes collected at the border, and possibly elsewhere in the economy, will be impacted by changes to imports, exports and output. Import tax revenues are often a major source of government revenue for developing countries. In the case of Mozambique, import tax revenues make up US$247 million of total government income of US$ 1,550 million or 16 percent of government revenues in 2007. Losses to these revenues due to tariff reforms will likely have to be replaced by taxes elsewhere in the economy. Not properly accounting for these revenue changes would potentially distort the analysis, since an overall positive impact on households might be countered by much lower government revenue, which will have to be made up, usually through taxes on the households. The ultimate impacts on households would depend on the tax instrument employed to recover revenues - would they be pro-poor tax and revenue replacements? Would the government replace the revenue or cut services, and if so, which services would be cut? In the processes of answering these questions, pro-poor policies can be brought to light and play a part in informed policy debate from at an earlier time.

Nominal Income (Levels)

Table 13 illustrates the impacts on real income for each of the private households and the government for each of the three scenarios. In the first two scenarios, completion of the RECs

and the TFTA agreement causes all households to experience an increase in income. In the case of the ACCU, all households experience a decrease in household income (although this is only half the story, since we have not considered the impacts on consumption prices). Government revenues will also be of concern. In the case of completion of RECs, government revenue falls by US$-34.2 million, more than the US$ 25.3 million increase in household incomes. The net balance on income within Mozambique will be US$ -8.9 million. How this government balance is recovered or from where it will be cut should be made a part of policy discussions.

In the case of the tripartite free trade agreement, both household incomes and government revenues are positive, relieving the government's need to raise revenue or cut services. Importantly, income in the first three quintiles increase more than the average 1.1 percent. This suggests the Tripartite agreement is possibly a pro-poor agreement. Notably, urban households in the second the third quintiles experience positive growth, but below the average for all households.

Table 13
Impacts on Household and Government Nominal Income (Income in Millions US$ 2007)

		Completion of RECs (Max 5% Sensitive)			Tripartite Free Trade Agreement			African Continental Customs Union		
	Population	Baseline	$	%	Baseline	$	%	Baseline	$	%
Rural-1	2,997,295	204.3	0.6	0.3	204.8	2.8	1.4	207.6	-2.7	-1.3
Rural-2	2,997,295	368.3	1.0	0.3	369.4	6.0	1.6	375.4	-6.4	-1.7
Rural-3	2,997,295	517.6	1.5	0.3	519.1	8.9	1.7	528.0	-9.5	-1.8
Rural-4	2,997,295	735.1	4.3	0.6	739.4	11.1	1.5	750.5	-4.8	-0.6
Rural-5	2,997,295	1,333.6	7.6	0.6	1341.2	18.9	1.4	1,360.2	-7.3	-0.5
Urban-1	1,309,041	164.7	0.4	0.3	165.1	1.8	1.1	166.9	-2.1	-1.3
Urban-2	1,309,041	234.8	0.6	0.3	235.5	2.2	0.9	237.6	-2.5	-1.1
Urban-3	1,309,041	341.7	0.9	0.3	342.6	3.0	0.9	345.5	-3.4	-1.0
Urban-4	1,309,041	483.0	2.2	0.5	485.3	5.6	1.2	490.8	-3.0	-0.6
Urban-5	1,309,041	1,373.1	6.2	0.5	1379.3	15.0	1.1	1,394.3	-5.6	-0.4
Total - Private Household	21,531,684	5,756.2	25.3	0.4	5,781.5	75.2	1.3	5,856.7	-47.4	-0.8
Government	--	1,550.2	-34.2	-2.2	1516.1	14.9	1.0	1,531.0	-2.2	-0.1
Total	21,531,684	7,306.4	-8.9	-0.1	7,297.6	90.1	1.2	7,387.7	-49.6	-0.7

Source: authors calculations from the MyGTAP model.

In contrast to the tripartite agreement, which has a generally positive impact on income and revenues for all parties, the proposed ACCU with a CET, modeled on the COMESA CET, has the opposite effects--household incomes and government revenues all decline. Moreover, the impacts on poor households in the first three quintiles, for both urban and rural households is not only negative, but are greater loses then the average impacts on all households.

The gains and losses to household incomes in the tripartite free trade agreement and the ACCU arise from a similar source - refined sugar exports (Table 12). Sugar manufacture requires a relatively large proportion of uneducated labor and sugar exports increase dramatically in the case of the tripartite FTA (due to Kenya lowering its tariffs). Uneducated labor is disproportionately represented in the first three quintiles of each household. In the case of the ACCU, Mozambique losses substantial exports of refined sugar to African countries, as the duties on these products from countries outside Africa decline, leading to a reduction in Mozambique's exports of sugar. Policy makers will have to carefully consider pro-poor growth policies when entering into negotiations for the ACCU.

Real Income Impacts

Of course, income is only a part of the story. What matters to households is real income, which takes into account both changes in income and changes in the prices of consumption goods. Table 5 illustrated the distribution of consumption by households across 10 commodities, including food, non-food and services. Tables 14 - 16 includes the changes in income from Table 13 and adds a price index for household consumption. The consumption price index is household specific and accounts for differences in the composition in consumption across households.

In the case of the completion of the RECs (Table 14), price movements complement the rise in income to result in an even higher level of real income and consumption. So, while increases in income for most households was approximately 0.3 percent, the fall in the price of household consumption goods by -0.3 percent roughly doubles real income growth. In the case of the government, the fall in prices is moderate, at about -0.2 percent, and reduces the need for the government to raise additional revenues somewhat. However, with a US$ -31 million government shortfall, the government will have to cut services or increase revenues. Data in Table 14 suggest the government could tax households and make up the deficit and still be slightly better off (US$43.2 vs. US$-31.0 million). Taxes on the top two quintiles could eliminate the deficit, keeping those households at a constant income level, with a slight improvement in real income for the first three quintiles in rural and urban households.

Table 14
Completion of RECs
Household and Government Real Income in Mozambique

		Completion of RECs			
		Percent Change			
Household Quintile	(A) Income (Millions US$)	(B) Prices	(C) Income	(D) =(- A +B) Real Income (Income-Prices)	(E) =(D* A) Change in Real Income (US$ Millions)
Rural-1	204.3	-0.3	0.3	0.6	1.2
Rural-2	368.3	-0.3	0.3	0.6	2.2
Rural-3	517.6	-0.3	0.3	0.6	3.1
Rural-4	735.1	-0.3	0.6	0.9	6.6
Rural-5	1,333.60	-0.3	0.6	0.9	12.0
Urban-1	164.7	-0.2	0.3	0.5	0.8
Urban-2	234.8	-0.3	0.3	0.5	1.2
Urban-3	341.7	-0.3	0.3	0.5	1.7
Urban-4	483	-0.3	0.5	0.7	3.4
Urban-5	1,373.10	-0.3	0.5	0.8	11.0
Total Households	5,756.20	-0.3	0.5	0.8	43.2
Government	1550.2	-0.2	-2.2	-2.0	-31.0

Source: Author's calculations from MyGTAP model.

Note. The measure of real income is descriptive of the movement in prices and income relative to the base consumption basket and does not strictly reflect changes in utility which might be calculated.

In the case of the TFTA (Table 15), prices and incomes are both positive, with rising income outpacing the rise in prices for most households, except the second and third urban quintiles, which see prices rise faster than incomes, and hence resulting in reduced real income for those households. Finally, the government sees prices rise slightly, reducing the advantages of additional revenue, but is left in a positive position of US$9.1 million.

Table 15
Tripartite Free Trade Area
Household and Government Real Income in Mozambique

		Tripartite Free Trade Area (TFTA)			
		Percent Change			
Household Quintile	(A) Income (Millions US$)	(B) Prices	(C) Income	(D) =(- A +B) Real Income (Income-Prices)	(E) =(D* A) Change in Real Income (US$ Millions)
Rural-1	204.8	1.3	1.4	0.1	0.2
Rural-2	369.4	1.3	1.6	0.3	1.1
Rural-3	519.1	1.3	1.7	0.5	2.6
Rural-4	739.4	0.9	1.5	0.6	4.4
Rural-5	1341.2	0.7	1.4	0.7	9.4
Urban-1	165.1	1.1	1.1	0	0.0
Urban-2	235.5	1.0	0.9	-0.1	-0.2
Urban-3	342.6	1.0	0.9	-0.1	-0.3
Urban-4	485.3	0.7	1.2	0.4	1.9
Urban-5	1379.3	0.5	1.1	0.6	8.3
Total Households	5,781.50	0.8	1.3	0.5	27.4
Government	1516.1	0.4	1	0.6	9.1

Source: Author's calculations from MyGTAP model.

In contrast to the TFTA, which has a generally positive impact on income and revenues, the proposed ACCU with a CET, modeled on the COMESA CET, has the opposite effects--household incomes and government revenues all decline. Moreover, the impacts on poor households in the first three quintiles, for both urban and rural households is not only negative, but are greater than the average loses on all households. The loses in real government income and real household incomes combined would total nearly US$-80 million.

Table 16
African Continental Customs Union (ACCU)
Household and Government Real Income in Mozambique

		Tripartite Free Trade Area (TFTA)			
		Percent Change			
Household Quintile	(A) Income (Millions US$)	(B) Prices	(C) Income	(D) =(- A +B) Real Income (Income-Prices)	(E) =(D* A) Change in Real Income (US$ Millions)
Rural-1	207.6	-0.3	-1.3	-1.1	-2.3
Rural-2	375.4	-0.4	-1.7	-1.4	-5.3
Rural-3	528	-0.4	-1.8	-1.4	-7.4
Rural-4	750.5	-0.2	-0.6	-0.5	-3.8
Rural-5	1,360.20	0.1	-0.5	-0.6	-8.2
Urban-1	166.9	0.4	-1.3	-1.7	-2.8
Urban-2	237.6	0.3	-1.1	-1.4	-3.3
Urban-3	345.5	0.2	-1	-1.2	-4.1
Urban-4	490.8	0.0	-0.6	-0.6	-2.9
Urban-5	1,394.30	0.0	-0.4	-0.4	-5.6
Total Households	5,856.70	0.0	-0.8	-0.8	-45.7
Government	1531.0	0	-2.2	-2.2	-33.7

Source: Author's calculations from MyGTAP model.

The three scenarios reviewed in Tables 14-16 suggest differing, if modest impacts. Completion of the RECs is largely underway and our analysis suggests that the major impact will be on government revenue, which will be negative in the case of Mozambique. However, households will be better off, and there is room to recover government revenues from households, without making them worse than before the RECs are completed. The Tripartite agreement will positively impact government revenues and will improve real income in all but two urban quintiles. The ACCU would appear to offer few bright spots and will reduce both real household incomes and government incomes.

Employment and Wage Impacts

Income is a function of wage rates and employment. In our model, we assume unemployment of all labor categories, except labor with some tertiary education. As a result, wage rates for all but the most educated labor is held fixed[13]. All other endowments are assumed to be fully employed and changes in their wage or rental rates are observed.

[13] Assuming unemployment is the same as fixing the wage rate, sine we assume that labor can be readily hired without driving up the wage rate. We do not specify a pool of labor, so the assumption is that labor is pulled

Table 15 illustrates changes in employment and wage rates for each endowment factor in our model. Under the first scenario, completion of the RECs, increased demand results in modest increases in wages and employment across endowments-labor categories except the highly educated experience increases in employment. All the changes are less than one percent.

The Tripartite Free Trade Agreement has mixed results on the prices of endowments: land and agricultural capital have increased rental rates but natural resources and other capital have decreasing rental rates. The strong influence of sugar exports can be seen in the higher rental rates for land and agricultral capital. Employment of uneducated and labor with some primary education, the lowest educated labor categories increases, while employment of labor with some secondary education falls. Again, this results from the high proportion of low educated labor in the sugar sector, which see large increase in output under this trade scenario.

Table 15
Employment and Wage Rates (Percent Change)

	Completion of RECs (Max 5% Sensitive)		Tripartite Free Trade Agreement		African Continental Customs Union	
Endowments	Employment	Real Wage	Employment	Real Wage	Employment	Real Wage
Land	--	0.6	--	2.5	--	-2.8
Natural resources	--	0.7	--	-1.3	--	11.7
Labor-no education	0.4	--	0.3	--	-0.5	--
Labor-some primary	0.6	--	1.0	--	-2.3	--
Labor-some secondary	0.5	--	-0.8	--	-0.2	--
Labor-tertiary	--	0.6	--	0.0	--	-0.3
Capital-agriculture	--	0.7	--	4.4	--	-3.9
Capital-other	--	0.7	--	-0.3	--	-0.4

Source: Authors calculations from MyGTAP model.

Under the ACCU scenario, all wages and employment, except natural resources, fall. Rental rates on natural resources rise a substantial 11 percentage points due to the large rise in metal product exports. Of concern, employment in all labor categories declines by between -0.2 and -2.3 percent. The fall in agricultural rental rates is due to the large drop in sugar exports.

from an unspecified - infinite-pool of labor. Since the changes in employment in our simulations are modest, this assumption seems reasonable.

Conclusions

CGE models based on a single regional household abstract from the distributional consequences of policy impacts. National welfare is rarely independent of who wins and losses; the welfare of the most vulnerable, poor households is a major concern. In addition, developing country governments are dependent on tax revenues to finance government services. The analysis in this paper employed the new MyGTAP framework to highlight these distributional consequences of three tariff reforms: completion of the regional economic agreements (RECs such as SADC), the Tripartite FTA and an African Continental Customs Union.

We found that the consequences of completing the RECs on Mozambique to be minimal, the main impact being the loss of tariff revenue for the government, which could be made up from taxing the top two urban and rural quintiles. In the case of the TFTA, we found that increased exports of one commodity (sugar) exported to another country (Kenya) comprised the majority of impacts on households. Agricultural poor households (the first three quintiles) gained in terms of real income, due to the relatively high proportion of lower educated workers in that sector. The top two quintiles in both rural and urban areas also gain real income since they are the primary beneficiaries of higher rents on capital in the agricultural sectors. In contrast to these households (agricultural poor and upper income households), poor urban households (second the third quintiles) experience a negative impact on real incomes, since they are neither holders of agricultural capital nor are they major suppliers of the lowest education workers. However, the impact on government revenues is positive in the case of the TFTA, and government transfers to the urban poor could potentially make up for these negative impacts, with no need to increase taxes elsewhere to make up for increased expenditures.

The case of the African Continental Customs Union gives reason for pause, since its impacts on Mozambique households is negative, with poor households (those in the first three quintiles) bearing a disproportionate burden. The reason for this negative impact are due, in part, to the rolling back of the margin of preference Mozambique enjoyed in its sugar exports, again, underscoring the importance of this sector in forming policy. Of additional concern, real government income is also projected to fall, leaving a deficit in government services, or a further need to raise taxes.

When considering the metric of employment, we find the RECs increase employment of labor with no education, some primary and secondary education between 0.4 and 0.6 percent. Labor with tertiary education also experience a similar boost in wage rates (assuming full employment with this endowment). The TFTA generates employment for labor with no educational and some primary education (between 0.3 and 1.0 percent), but results in employment reduction for labor with some secondary education. Labor with tertiary education is not significantly impacted by the TFTA. Finally, the ACCU results in losses for all

labor categories, but of most concern, labor with some primary education (a low education category with a high number of poor households dependant on income generated by these workers) experience a 2 percent reduction in employment.

Several issues should be included in future policy debate. First, in regards to the TFTA, sugar exports will be of significant interest—any effort to protect this sector in importing countries could reduce the benefits of this agreement to Mozambique. Second, also with regard to the tripartite agreement, the negative impacts on the poor urban households is of concern. With rising migration of rural populations to urban centers, these impacts have to be given further consideration and analysis. Finally, with regard to the ACCU, policy makers will want to ensure that hard won gains from the TFTA are not undermined by the proposed ACCU and CET.

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Appendix-A GTAP Country\Regional Aggregations

GTAP Countries and Regions

GTAP Code	GTAP Label
NAFTA	North America Free Trade Area (USA, Canada, Mexico)
EU25	European Union
ROW	Rest of the World
CHN	China
BRA	Brazil
XNF	Rest of North Africa (Algeria, Morocco, Libya, Tunisia)
XWF	Rest of Western Africa (Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Saint Helena, Sierra Leone, Togo)
XCF	Rest of Central Africa (Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, Gabon, Sao Tome and Principe
XAC	Rest of Southern Africa (Angola, Democratic Republic of Congo)
ETH	Ethiopia
KEN	Kenya
MDG	Madagascar
MWI	Malawi
MUS	Mauritius
MOZ	Mozambique
TZA	Tanzania
UGA	Uganda
ZMB	Zambia
ZWE	Zimbabwe
XEC	Rest of Eastern Africa (Burundi, Comoros, Djibouti, Eritrea, Mayotte, Reunion, Rwanda, Seychelles, Somalia, Sudan)
XSC	South African Customs Union (South Africa, Botswana, Lesotho, Namibia, Swaziland)

Appendix-B Correlations of Household Survey Income , Expenditure, Wealth and Education

Spearman Correlation Coefficients (Urban Households)

	Gross Income	Per Capita Expenditure
Education Level of Household (higher indicator corresponds to higher education)	0.42	0.39
Main cooking fuel (lower values represent wood and kerosene, higher values are gas and electric)	0.45	0.51
Own house	0.36	0.43
Own electronics, car, bike, TV, radio etc. (index higher index represents more goods owned)	0.42	0.44

Source: Mozambique SHIP Data 2008/2009.

Spearman Correlation Coefficients (Rural Households)

	Gross Income	Per Capita Expenditure
Education Level of Household (higher indicator corresponds to higher education)	0.21	0.06
Main cooking fuel (lower values represent wood and kerosene, higher values are gas and electric)	0.11	0.09
Own house	0.08	0.07
Own electronics, car, bike, TV, radio etc. (index higher index represents more goods owned)	0.30	0.16

Source: Mozambique SHIP data 2008/2009.

Appendix - C Distribution of Income and Consumption by Quintiles

Calculation of Household Income by Quintiles

	Rural					Urban				
	1	2	3	4	5	1	2	3	4	5
					Population					
Population (000's)	2,998	2,998	2,998	2,998	2,998	1,310	1,310	1,310	1,310	1,310
					Estimates of Income Distribution (Expenditure Based)					
Survey Distribution	3.4%	6.1%	8.7%	12.1%	24.7%	1.7%	3.2%	4.9%	7.7%	27.5%
by Quintile (millions of US$)	289.3	524.2	747.2	1,039.5	2,129.0	149.5	279.4	420.8	659.9	2,371.2
per Capita	96.5	174.8	249.3	346.9	710.5	114.2	213.3	321.6	503.8	1,812.9
					Estimates of Income Distribution (Income Based - Unadjusted for Autosonsumption)					
Survey Distribution	2.7%	3.8%	4.1%	6.2%	11.6%	6.0%	6.8%	9.9%	14.1%	34.8%
by Quintile (millions of US$)	73.9	104.6	113.9	173.4	323.4	167.3	187.6	275.0	390.8	966.0
per Capita	24.7	34.9	38.0	57.9	107.9	127.8	143.2	210.1	298.3	738.6
					Autoconsumption					
Auto-consumption (LCU - Millions)	2,725	5,570	8,476	12,070	18,278	770	1,402	1,793	1,577	1,034
by Quintile (millions of US$)	112.9	230.9	351.3	500.3	757.6	31.9	58.1	74.3	65.4	42.9
Auto-consumption per capita (US$)	37.7	77.0	117.2	167.0	252.8	24.4	44.4	56.8	49.9	32.8
					Estimates of Income Distribution (Income Based - Adjusted for Autosonsumption)					
by Quintile (millions of US$)	186.9	335.5	465.2	673.7	1,081.0	199.2	245.7	349.3	456.1	1,008.9
Adjusted Income w\Auto per capita	62.3	111.9	155.2	224.8	360.8	152.2	187.6	266.9	348.2	771.3
	3.7%	6.7%	9.3%	13.5%	21.6%	4.0%	4.9%	7.0%	9.1%	20.2%
					Imputed Income Shares by Quartile (Simple Average Expenditure and Adj. Income)					
Simple Average of Adjusted Income and Expenditure Shares	3.5%	6.4%	9.0%	12.8%	23.2%	2.9%	4.1%	5.9%	8.4%	23.9%

Source: 2008/2009 SHIP Survey for Mozambique. Author's calculations.

Appendix-D Model Closures

```
Exogenous
    poph
    qoh_s
    pfactwld
    psaveslack profitslack incomeslack endwslack
    cgdslack tradslack
    gincomeslack hincomeslack
    ams atm atf ats atd
    aosec aoreg avasec avareg
    afcom afsec afreg afecom afesec afereg
    aoall afall afeall
    dppriv dpgov dpgsave dphsave dphsave_all
    to tp tm tms tx txs tpdh tpmh toh
    emplh empl
    sremoh sremih remavo
    sfyoh sfyih fyavo
    saidout saidin aidavo
    realTRNH realTRNG
    s_sub ;
Rest Endogenous ;
!Fix the trade Balance in Africa, relative to government savings
swap DTBALR(AFR) = dpgsave(AFR);
!Allow for unemployment of uneducated labor and some primary school labor;
swap empl("flno", "MOZ") = pfactreal("flno", "MOZ");
swap empl("flpr", "MOZ") = pfactreal("flpr", "MOZ");
swap empl("flse", "MOZ") = pfactreal("flse", "MOZ");
!General unemployment in Africa!
swap empl("labor",AFRNOMOZ) = pfactreal("labor", AFRNOMOZ);
```

Appendix-D Summary of Key RECs

SADC

The Southern Africa Development Coordinating Conference (SADCC) was established in 1980 as Frontline States. The primary objective of the REC was to wean region's economic dependence on the then apartheid South Africa. Cooperation among the eight member states was purely on political matters, especially liberation struggle. In 1996, the bloc was transformed into Southern Africa Development Community (SADC) after the independence of South Africa, which also joined in the same year. Upon the accession of South Africa to the SADC Treaty, the region launched the Regional Indicative Strategic Development Programme (RISDP) which set out the attainment of an FTA in 2008, customs union in 2010, common market in 2015, and monetary union in 2016. The FTA was officially launched in 2008, but some member states within the region still impose high customs duties on others. These include Angola, DRC, Malawi, and Zimbabwe.

The customs union failed to be launched in 2010 as scheduled amid disagreements among member states regarding the "form" of the customs union. The presence of SACU within SADC is a major challenge to the attainment of a deeper form of integration. SACU member states prefer a rollover of the existing customs union to the rest of SADC while other member states are vying for a new form of a customs union. At the same time, there is also a general consensus among countries that consolidation of the FTA is an important step before moving to a customs union.

In 2000, intra-SADC trade amounted to US$6.67 billion. By 2009, trade had over tripled to over US$18 billion. However, exports from South Africa to non-SACU SADC countries played a significant role in this increase, with more than US$5.2 billion export going to non-SACU SADC member states in 2009. Four broad sectors accounted for over 98% of the intra-SADC trade namely agricultural raw materials, food manufacturers, clothing and textiles. Trade within SADC is governed by SADC Protocol on Trade which entered into the 12th year of implementation in 2012

However, despite the imposition of tariffs and disagreements regarding the form of the customs union, there is strong political belief that trade liberalization can improve the welfare of the people. Coupled with that belief, SADC is taking part in the establishment of the COMESA-EAC-SADC Tripartite Free Trade Area by 2016, and CFTA by 2017.

COMESA

COMESA was established in 1996 after being transformed from the Preferential Trade Area (PTA) which had been in existence since 1982. Premised upon strong economic cooperation of basically 19 homogenous states, COMESA established an FTA in 2000. With the exception of the Djibouti, DRC, Eritria and Ethiopia , the rest of the countries are participating in the FTA. The customs union was launched in 2009 but is not yet operational. At the 16th COMESA Summit held in Kampala, countries agreed to postpone the implementation of the customs union to 2015. The main constraint to the implementation of the customs union is revenue sensitivities

as many countries do not have sustainable alternatives to customs duties. Kenya, Egypt, Tanzania and Zimbabwe have more diversified economies, the rest of the countries are more agro-based economies.

Intra-COMESA trade grew by 8% in 2011 over the 2010 levels, from US$17.3 billion in 2010 to US$18.8 billion in 2011. The region's growth was driven by Kenya, Zambia, Burundi, Mauritius and Uganda who exported copper ores, black tea, crude petroleum, tobacco, cane sugar, and maize. Major export trading partners for COMESA continue to be the EU, China, South Africa, UAE, and South Africa.