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Reducing Trade Costs in East Africa: Deep Regional Integration and Multilateral Action

by
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Abstract: Evidence is now substantial that with the progressive global decline in tariffs over several decades, trade costs are a much more substantial barrier to trade than tariffs. Moreover, trade costs are especially high in sub-Saharan Africa compared to other regions in the world. We decompose trade costs into three categories: costs that can be lowered by trade facilitation; non-tariff barriers; and the costs of business services. We develop a ten region, 18 sector global trade model that includes Kenya, Tanzania, Uganda and Rwanda of the East African Customs Union (EACU). We assess the aggregate impact of the reduction of all three types of trade costs as well as the reduction of each of the barriers separately to assess the relative importance of each. We assess "deep integration" initiatives within EACU to reduce these barriers to trade and how much more there is to gain if the trade cost reduction initiatives could be extended multilaterally or to a wider regional grouping, namely the proposed Tripartite Free Trade Area among EACU, COMESA and SADC. In the cases of Kenya and Tanzania, we also assess the impact of liberalization of non-discriminatory barriers against investors in services, i.e., barriers that affect home investors equally with foreign.

We find that deep integration (the removal of the barriers within EACU) results in significant gains for our four EACU countries, especially from improved trade facilitation. Extending the lowering of non-tariff barriers and services liberalization multilaterally would increase the gains between two and seven times, depending on the EACU member country. We also find that reducing non-discriminatory services barriers that equally raise the costs of domestic and foreign providers of services in Kenya and Tanzania would increase welfare even more than multilateral reduction of discriminatory services barriers.

Our results show that the adjustment costs of regional trade preferences are considerably smaller than with multilateral liberalization. Despite the fact that the evidence shows that the adjustment costs of trade liberalization are dramatically smaller than the welfare gains, lobbying interests are much stronger among those who anticipate a negative adjustment. Thus, our results show why there can be a political economy appeal to regionalism, despite the larger net gains of multilateral reform.

This paper is innovative both conceptually and empirically. It contains foreign direct investment in services and is the first paper to numerically assess liberalization of barriers against both domestic and multinational service providers in a multi-sector, multi-region applied general equilibrium model. For this paper, the authors developed or employed new databases of the ad valorem equivalents of barriers in services and of the time in trade costs Both databases are shown to be important to the results.

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1. Introduction

Evidence is now substantial that with the progressive global decline in tariffs over several decades, trade costs are often a much more substantial barrier to trade than tariffs.[2] Moreover, trade costs are especially high in sub-Saharan Africa compared to other regions in the world. For example, the World Economic Forum (2012) found that it is still considerably more expensive to trade with Africa than with other regions, and, in many cases, the cost of trading is a more important obstacle to trade development than trade policies.[3] Some sub-Saharan countries, notably the members of the East African Customs Union (EACU, also known as the East African Community)[4] are addressing the high trade costs through regional initiatives, which may or may not become multilateral. In this paper, we assess the impacts of reducing trade barriers among the EACU members and also assess how much more there is to gain if the trade cost reduction initiatives could be extended multilaterally or to a wider regional grouping, namely the proposed Tripartite Free Trade Area among EACU, COMESA and SADC.

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[2] See, for example, Hummels (2007) or Hummels *et al*., (2007).

[3] Brenton and Isik (2012) have also documented the high costs of trading in sub-Saharan Africa. See also, the estimates of Hummels *et al*., (2007) and Minor (2013).

[4] The Treaty on the Establishment of the East African Community among Kenya, Tanzania and Uganda came into force on July 7, 2000. It stipulated that the three countries would continue to trade preferentially. On March 2, 2004, however, the Protocol for the Establishment of the East African Customs Union was signed by the Heads of State of Kenya, Tanzania and Uganda. Rwanda and Burundi joined the Customs Union in 2008. See http://www.customs.eac.int/index.php?option=com_content&view=article&id=123&Itemid=78. Although the five country grouping of Kenya, Tanzania, Uganda, Rwanda and Burundi is sometimes referred to as the East African Community (EAC), given the later developments of 2004 and 2008, we typically refer to the five country grouping as the East African Customs Union (EACU).

We decompose trade costs into three categories: costs that can be lowered by **trade facilitation; non-tariff barriers;** and the costs of **business services.** Trade facilitation addresses costs such as delays at border crossing, roadblocks for trucks and the necessity to pay bribes. Regarding **non-tariff barriers,** recent work by Cadot and Gourdon (2012) has shown that the old command and control non-tariff barrier measures have significantly declined, but standards as barriers to trade have supplanted them in importance. Further, poor **business services** for trade are also a problem. Improvements in a wide range of business services such as banking, insurance, communication and professional services such as legal, auditing, engineering and computer services would also lower trade costs. This also includes poor transportation services, such as very poor or non-existent freight train services in many countries of sub-Saharan Africa, delays at ports, poor air freight services in many countries.

In this paper we build a ten region, 19-sector global trade model, with a focus on the members of the EACU. The model contains Kenya, Tanzania, Uganda, Rwanda (the four EACU countries included in the GTAP 8.1 dataset), plus COMESA, SADC, the US, EU, China and Rest of the World.

Since the early 1990s, regional trade agreements have surged; 377 are in force and have been notified to the WTO as of January 2014.[5] Policy-makers have expressed considerable demand for analysis of their actual or potential regional agreements. Applied modelers have responded with applied general equilibrium models that focus on goods. So the literature now contains a substantial number of good studies (summarized below) that examine regional agreements in goods. But the literature does not contain any global modeling studies of regional arrangements that involve commitments to multinational firms who will undertake foreign direct investment in services. Given the inclusion of services in modern FTA agreements negotiated with the EU, the US and in some other agreements, economists need to be able to assess the impact of services commitments as part of their advice to governments regarding preferential trade agreements. We attempt to fill that gap in this paper.

This paper is innovative both conceptually and empirically. Conceptual innovation is that is the first global trade model to numerically assess regional liberalization of barriers foreign

[5] http://www.wto.org/english/tratop_e/region_e/region_e.htm. This counts goods, services and accessions separately, but does not include a significant number that are in force but which have not been notified to the WTO.

direct investors in services and to assess barriers against both domestic and multinational service providers. Given the importance of services in trade costs, we retain all seven business services sectors from the GTAP 8.1 database and ten services sectors overall.

The paper builds on the following four databases, the first two of which have not been used before in a general equilibrium model: (i) services barriers--for this project, the authors developed a new database of the ad valorem equivalents of barriers in eleven business services sectors in 103 countries. It is based on the newly released World Bank survey information on these 11 sectors in 103 countries; (ii) trade facilitation—the paper employs the database recently posted on the GTAP website entitled, "The Value of Time in Trade: GTAP Database of AVEs for Estimating the Impacts of Swift Customs Clearance and Shipping V8.1," by Peter Minor based on work of David Hummels; (iii) for foreign affiliate sales-- "Global Database of Foreign Affiliate Sales" by Fukui and Lakatos; and (iv) estimates of the ad valorem equivalents of non-tariff measures by Kee, Nicita and Olarreaga (2008; 2009). Although a central finding of the studies by Hummels, Minor and their co-authors is that the AVE of time in trade varies across products, most computable general equilibrium modeling of trade facilitation issues have used a single AVE across all products. By basing our estimates on the work of Hummels and Minor, we improve on the sector accuracy of the benefits of trade facilitation. For example, we find that the agriculture sector in Uganda expands relative to other sectors in Uganda when there are improvements in trade facilitation.

In recent years, the East African Customs Union (EACU) has initiated several steps at deep integration. In particular, the EACU is moving to improve trade facilitation, reduce non-tariff barriers and reduce barriers to foreign providers of services within the EACU.[6] There are also other deep integration initiatives being negotiated in sub-Saharan Africa, including the Tripartite Free Trade Area being negotiated among the East African Customs Union (EACU), the Common Market of East and Southern Africa (COMESA) and South African Development Community (SADC). We assess these initiatives and compare the results to broader multilateral liberalization by the EACU.

[6] The World Bank (2012) has argued that regional integration in the East African Community is a promising path that would lead to the reduction of barriers that increase trade costs among the member countries of the EACU.

The paper is organized as follows. We begin in section 2 with a brief review of the applied general equilibrium literature of regional arrangements. In section 3 we provide an overview of the model. In section 4 we explain the data that we have used in constructing this model and what the data needs are for the final report. Results based on the present data set are presented in section 5. Sensitivity analysis and conclusions are presented in sections 5 and 6, respectively. The appendices provide documentation of the background data work and further detail on the model.

2. Review of the Applied General Equilibrium Literature on Regional Agreements and Foreign Direct Investment Liberalization in Services

The previous studies that are most closely related to our studies are those that assess liberalization of foreign direct investment in services. We begin this section, however, with a review of the more notable studies of preferential liberalization of goods markets.

2.1 Applied General Equilibrium Literature Assessing Goods Market Preferential Liberalization.

The formation of the Canada-US free trade agreement led to the path-breaking work of Harris (1984) and of Cox and Harris (1986) in incorporating imperfect competition into a small open economy applied general equilibrium model. They showed that if the agreement leads to a more competitive pricing strategy by Canadian firms, there would be substantial welfare gains from rationalization. The creation of the single market in the European Union led to innovative analysis that required the use of multi-region models with imperfect competition or dynamic effects in order to capture the impacts of the key features of the single market (Harrison, Rutherford and Tarr, 1996; Smith and Venables, 1988; Baldwin, Forslid and Haarland, 2000). The North American Free Trade Agreement (NAFTA) led to a large number of CGE studies summarized in the Francois and Shiells (1994) volume. Among these, Levy and van Wijnbergen (1995) use their dynamic CGE model to argue that dynamic incentive problems in adjustment policies for Mexican agriculture imply that adjustment policies should focus on increasing the

value of the assets of poor farmers, not their incomes. Preferential arrangements of the European Union with its Mediterranean neighbors led to policy-maker requests for CGE analysis. `Using small open economy models of the developing country under perfect competition (Harrison, Rutherford and Tarr (1997a) for Turkey; Rutherford, Rutstrom and Tarr (1993) for Morocco; and Rutherford, Rutstrom and Tarr (1995) for Tunisia), these North-South arrangements were estimated to be beneficial to the developing country due to the introduction of competition into the Southern markets. Finally, Chile has adopted a strategy of negotiating preferential arrangements with all potential partners (called "additive regionalism" or "competitive regionalism"). This strategy has been controversial within Chile regarding preferential arrangements with its Southern neighbors. Using a multi-region perfect competition model, Harrison, Rutherford and Tarr (2002) estimated that Chile would lose from individual preferential arrangements with Southern neighbors unless it lowered its then eleven percent uniform tariff. But these authors show that the agreements with Southern partners are beneficial to Chile in the context of Chile's additive regionalism strategy due to substantial estimated terms of trade gains to Chile in partner markets and the reduction of trade diversion costs if the Northern partners are included in the network of agreements.[7] Rutherford and Tarr (2003) showed that simply making the Chilean model dynamic will not increase the estimated gains from these agreements if there are no endogenous productivity effects.

2.2 Applied General Equilibrium Literature Assessing Foreign Direct Investment in Services

Our paper is more closely related to studies that incorporate foreign direct investment in services. This includes the following. Markusen, Rutherford and Tarr (2005) developed a stylized model where foreign direct investment is required for entry of new multinational competitors in services, but they did not apply this model to the data of an actual economy. Jensen, Rutherford and Tarr (2007; 2010), Rutherford and Tarr (2008; 2010) and Balistreri, Rutherford and Tarr (2009) developed small open economy applied general equilibrium models in Russia, Kenya and Tanzania based on the Markusen, Rutherford and Tarr methodology. Konan and Maskus (2006) assessed services liberalization in Tunisia. But these models could not

[7] Harrison, Rutherford, Tarr and Gurgel (2004) found similar results for Brazil.

assess regional preferences in services. Brown and Stern (2001) and Dee *et al*. (2003) employ multi-country numerical models with many of the same features of Markusen, Rutherford and Tarr. Their models contain three sectors, agriculture, manufacturing and services, and are thus also rather stylized.

The model described in this paper is closest to the small open economy models developed by Balistreri, Jensen and Tarr (2011) and especially Jensen and Tarr (2012). Balistreri, Jensen and Tarr (2011) have shown that there is an imperfect competition analogy to trade diversion in goods whereby preferential commitments in to foreign investors in services could be immizerising. Jensen and Tarr (2012) extended the analysis to include the impact of improved trade facilitation and the reduction of non-tariff barriers in Armenia. But since Balistreri, Jensen and Tarr (2011) and Jensen and Tarr (2012) employed small open economy models, they were not capable of endogenously assessing the terms of trade gains from improved market access in preferential trade arrangements.[8]

3. Overview of the Model

This paper builds on the algebraic structure of the model of Jensen and Tarr (2010; 2012) and of Balistreri, Jensen and Tarr (2011). Here we provide a general description of the structure described there and provide more details where we depart from that structure. We employ the GTAP 8.1 dataset as our basic dataset.

The key extension of the earlier models we developed of Armenia, Kenya and Tanzania is that we adopt a multi-region model, rather than a small open economy model, since we need to consider the possible effects on the member countries of the EACU. That is, we need to account for the "market access" effects on Kenya, Tanzanian, Ugandan and Rwandan exports of a reduction of import tariffs by the partner countries and by agreements to facilitate trade, lower non-tariff barriers within the free trade area or allow access to service providers within the FTA.

Although the general theory of the welfare effects of preferential trading arrangements does allow for the impact of changes in partner country tariffs on the home country's market

[8] Wonnacott and Wonnacott (1981) have demonstrated the theoretical importance of assessing improved market access in regional agreements, and Harrison, Rutherford and Tarr (2002) have shown numerically that assessing market access is very important in determining the value of a preferential trade agreement.

access to partner countries and for the impact on the terms-of-trade,[9] small open economy models can't assess them endogenously. Our framework allows us to explicitly evaluate the importance to Kenya, Tanzania and the EACU members of improved market access or reduced trade costs, as well as losses EACU members may suffer as partner countries may raise export prices to each other.

There are 18 sectors in the model. The mapping from the 57 sectors in the GTAP 8.1 dataset to sectors of our model is shown in appendix A. There are three categories of firms: (1) four perfectly competitive goods and services sectors: (2) seven imperfectly competitive goods sectors; and (3) seven services sectors in which there is foreign direct investment. The cost, production and pricing structures in the three categories differ widely.

Primary factors are skilled labor, unskilled labor, capital (including land) and natural resources. Regarding capital, there is mobile capital and sector-specific capital in imperfectly competitive goods sectors and services sectors with FDI; and primary inputs imported by multinational service providers, reflecting specialized management expertise or technology of the firm. There is some sector specific capital for each imperfectly competitive firm (and for firms in services sectors with FDI) for each region of the model. In the sectors where there is sector specific capital, there are decreasing returns to scale in the use of the mobile factors and supply curves in these sectors slope up. We calibrate the elasticity of substitution between sector specific capital and other inputs in each sector so that the elasticity of supply of the firms is consistent with econometric evidence that indicates that the supply response depends on the level of development and the technological complexity of the product. We also conduct sensitivity analysis with respect to the sector elasticities of supply.

3.1 Perfectly competitive goods and services sectors

Regardless of sector, all firms minimize the cost of production. In the competitive goods and services sectors, goods or services are produced under constant returns to scale and where price equals marginal costs with zero profits. This includes agriculture, utilities, trade and "other services." In these sectors, products are differentiated by country of origin, i.e., we employ the Armington assumption. All goods producing firms (including imperfectly competitive firms) can sell on the domestic market or export. Firms optimize their output decision between exports and

[9] See Wonnacott and Wonnacott (1981) and Harrison, Rutherford and Tarr (2002).

domestic sales based on relative prices and their constant elasticity of transformation production function. Having chosen how much to allocate between exports and domestic sales, firms also optimize their output decision between exports to the three possible export regions, based on relative prices the three regions and their constant elasticity of transformation production function for shifting output between the regions.

3.2 Goods produced subject to increasing returns to scale

The cost, production and competition structure for firms in this group of industries follows Helpman and Krugman (1985). Goods are differentiated at the firm level. We assume that manufactured goods may be produced domestically or imported from firms in any region in the model. Demand in all countries for these goods is characterized by the constant elasticity of substitution demand function. As the marginal utility of a good goes to infinity as the quantity goes to zero, if a variety of the good is produced anywhere, some of it will be consumed in all regions of the model. Firms in these industries incur a fixed cost of production and set prices such that marginal cost (which is constant with respect to output) equals marginal revenue; and there is free entry, which drives profits to zero. Costs are defined by observed primary factor and intermediate inputs to that sector in the base year data. The cif import price of foreign goods is simply defined by the import price, and, by the zero profits assumption, in equilibrium the import price must cover fixed and marginal costs of foreign firms. Firms set prices using the Chamberlinian large group monopolistic competition assumption within a Dixit-Stiglitz framework, which results in constant markups over marginal cost for both foreign firms and domestic firms.

In this model, all imperfectly competitive domestic firms (both goods and services producers) face a downward sloping demand curve in each of their nine export markets. It follows from symmetrically applying the Dixit-Stiglitz demand structure in all regions of the model, where there is imperfect competition, that the elasticity of demand in each of the export markets is the Dixit-Stiglitz elasticity of demand. Firms then set marginal revenue equal to marginal costs in each of their nine export markets; then the export markets contribute to the quasi-rents of the firm and affect the entry and exit decisions of firms.

For simplicity we assume that the ratio of fixed to marginal costs is constant with respect to the non-output variables and parameters in the model in all firms producing under increasing

returns to scale (in both goods and services). This assumption in our Dixit-Stiglitz based Chamberlinian large-group model assures that output per firm for all firm types remains constant, i.e., the model does not produce rationalization gains or losses.

The number of varieties affects the productivity of the use of imperfectly competitive goods based on the standard Dixit-Stiglitz formulation. The effective cost function for users of goods produced subject to increasing returns to scale declines in the total number of firms in the industry. But, since all countries consume some of any variety that is produced, the number of varieties is determined by global demand and one country can affect the number of varieties only insofar as it affects global demand.

3.3 Service sectors in which foreign direct investment occurs

These sectors are telecommunications, insurance services, other financial services, water transportation services, air transportation services, other transportation services and professional business services. In these services sectors, we observe that some services are provided by foreign service providers on a cross border basis analogous to goods supply from abroad. But a large share of business services are provided by service providers with a domestic presence, both multinational and local.[10] Our model allows for both types of provision of foreign services in these sectors.

The cost, production, demand and competition structure for firms in this group of industries follows the same structure as the imperfectly competitive goods firms with two differences.[11] The first difference is that we allow multinational service firms to establish a local presence to compete with local firms directly. Multinational service firms produce a home region specific variety, which is differentiated from domestic and other home region varieties. The second difference, which is in contract to Balistreri, Jensen and Tarr (2011), is that downstream firms do not experience a productivity increase from additional varieties, i.e., no variety externality. Given that there are no rationalization gains or variety externalities, the model exhibits an equivalence with respect to our policy changes to one in which all multinationals

[10] One estimate puts the world-wide cross-border share of trade in services at 41% and the share of trade in services provided by multinational affiliates at 38%. Travel expenditures 20% and compensation to employees working abroad 1% make up the difference. See Brown and Stern (2001, table 1).
[11] See Balistreri, Jensen and Tarr (2011) for greater detail.

from a specific home region are in perfect competition with each other.[12] That is, it is analogous to the Armington structure, except that production also takes place in the host country.

For domestic firms, costs are defined by the costs of local primary factors and intermediate inputs. When multinationals service providers decide to establish a local presence, they will import some of their technology or management expertise. That is, foreign direct investment generally entails importing specialized foreign inputs. Thus, the cost structure of multinationals differs from national-only service providers. Multinationals incur costs related to both imported primary inputs and local primary factors, in addition to intermediate factor inputs. Foreign provision of services differs from foreign provision of goods, since the service providers use local primary inputs. For multinational firms, the barriers to foreign direct investment raise their costs of production. The reduction of the barriers lowers these costs, freeing the capital and labor that was used to overcome the barriers for use elsewhere in the economy. Thus, the reduction in the constraints on foreign direct investment allows the domestic economy to capture rent rectangles. In addition, reducing barriers induces foreign entry until profits are driven to zero, so there are also triangles of efficiency gains.

4. Data of the Model and Evidence for Key Elasticities

4.1 Ad Valorem Equivalents (AVEs) of the Barriers Against Foreign Suppliers of Business Services.

A new database of the ad valorem equivalents of barriers against foreign providers of services in eleven business services sectors in 103 countries was developed for this project. We also commissioned new surveys of the regulatory regimes in services of Kenya and Tanzania as a basis of estimating both the discriminatory barriers against foreign service providers as well as the non-discriminatory regulatory barriers that impact both domestic and foreign suppliers of services. This work is documented in Jafari (2014a; 2014b; 2014c; 2014d and 2014e).

[12] Development of a multi-region model version that includes the full monopolistic competition structure for services found in the small-economy model of Balistreri, Jensen and Tarr (2011) is a challenging goal for future research. The formulation would require significant first-order data development, however, that reconciles the multi-region GTAP accounts on cross-border service provision with country-level data. Faced with the data challenges we are more comfortable in this report to make the conservative assumption that there are no variety-induced productivity impacts in the business services sectors.

4.1.1World Bank Services Trade Restrictiveness Indices Database. The data for the estimates of the barriers faced by foreign suppliers of services comes from the recently released World Bank database of survey information on these 11 sectors in 103 countries. The World Bank survey is a 169 page questionnaire of the regulatory regimes of these 11 sectors that was completed by law firms resident in each of the 103 countries.[13] Combining the data and methodology, they produced "Services Trade Restrictiveness Indices," for all eleven sectors in all of the 103 countries.

4.1.2 Methodology based on the Australian Productivity Commission Methodology. Although we use the data of the World Bank database, we are unable to use the Borchert *et al*. Services Trade Restrictiveness Indices, since they did not transform these into ad valorem equivalents. Our methodology builds on a series of studies supported by the Australian Productivity Commission, which develop alternate Services Trade Restrictiveness Indices and also convert these indices into ad valorem equivalents. We rely especially on the papers by Warren (2000) in telecommunications, Kalirajan *et al*., (2000) in financial services, Kang (2000) in transportation services and Nguyen-Hong (2000) in engineering services. For each of these service sectors, the authors first developed a matrix to evaluate and score the regulatory environment in the sector. The regulatory regimes are evaluated on criteria such as ease of getting a license; measures that restrict a form of commercial presence; maximum ownership shares allowed for foreign investors; and whether senior executives are allowed to work in the country either permanently or temporarily. They collected data and assessed the regulatory regimes of many countries. Evaluations of each criterion were transformed into a quantitative score and weights were assigned to each criterion so that the regulatory regimes of each country were transformed a "restrictiveness index." They then regressed the price of services against

[13] The database is available at http://iresearch.worldbank.org/servicetrade/. See Borchert, Gootiiz and Mattoo (2012) for a guide to the database. They also developed a methodology for evaluating the restrictiveness of the services regimes against foreign suppliers.

their restrictiveness index and other relevant variables to determine the impact of the regulatory barriers on the price of services.[14] Through this regression, it is possible to obtain ad valorem equivalents of the regulatory barriers in the countries of their sample.

Our methodology defines a mapping from the World Bank database to the scoring matrices of the Australian authors. In this manner, we score the regulatory regimes of the 11 sectors in the 103 countries according to the Australian authors' criteria. We adopt the World Bank terminology and call these scores Services Trade Restrictiveness Indices (STRIs).

Our methodology assumes that the international regressions estimated by the Australian authors to get AVEs applies to our 103 countries, and this allows us to convert our STRIs into AVEs. The estimates and documentation are available in Jafari (2014c).

Since our model contains the eight business services sectors of the GTAP database, not all 11 of the World Bank dataset, we had to aggregate fixed line and mobile telecommunications into communications; road and rail transport into transport not otherwise classified; and legal and accounting and auditing services into business services, not otherwise classified. In addition, since our model contains ten regions, we had to aggregate regions according to our mapping in appendix A. The results for our six African regions are in tables 4a to 4f. Jafari (2014d) explains the methodology and data used in these aggregations to arrive at the ad valorem equivalents of the sectors and regions of our model.

Kenya and Tanzania. We refer the reader to Balistreri, Jensen and Tarr (2011) for a summary of the key institutional and policy issues in telecommunications, banking, insurance and transportation in Kenya; and to Jensen, Rutherford and Tarr (2010) for Tanzania. We note, however, that there have been substantial changes in the services regulatory regimes in both countries in the past few years. Probably the most significant development has been the failure in both countries of the private company commissioned to regenerate freight train traffic. Cargo traffic on the roads is very overloaded, as the volume of freight traffic vastly exceeds the capacity of the facilities.

[14]Warren estimated quantity impacts and then using elasticity estimates was able to obtain price impacts.

4.2 Ad Valorem Equivalents (AVEs) of the Non-Discriminatory Barriers Against Suppliers of Business Services in Kenya and Tanzania

Some regulatory barriers, such as complete bans on entry, are non-discriminatory in that sense that they impose costs on both domestic suppliers of services and foreign suppliers of services. In the cases of Kenya and Tanzania, we also estimate the AVEs of non-discriminatory barriers. We commissioned new updated surveys (using the World Bank survey instrument) and obtained supplemental information on the regulatory regimes.[15] Based on these surveys and supplementary information in both countries, Jafari (2014a; 2014b) scored the regulatory regimes according to the Australian methodology to develop services trade restrictiveness indices (STRIs) for the non-discriminatory barriers to services providers in the 11 sectors of the World Bank survey in Kenya and Tanzania. He then used these STRIs and the Australian regressions to estimate the ad valorem equivalents of the non-discriminatory barriers in Kenya and Tanzania. The results for the AVEs are in tables 4a and 4b.

4.3 Estimates of the Ad Valorem Equivalents of the Costs of Time in Exporting and Importing.

In order to estimate the impact of improved trade facilitation, in this paper we apply a new dataset based on the path-breaking work of David Hummels and his co-authors (Hummels, 2007; Hummels and Schaur, 2013; Hummels *et al*., 2007). Using the estimates of Hummels and his co-authors, Peter Minor (2013) provided estimates for the regions and products in the GTAP database on a bilateral basis. We use estimates from Peter Minor, which we aggregate to the sectors and regions of our model.[16] Documentation of the steps we have taken,a brief explanation of the methodology and a detailed explanation of our aggregation methodology are in appendix C.

[15] We thank Ms. Sonal Sejpal of the law firm of Anjarwalla & Khanna Advocates in Nairobi and Cyril Pesha and his law firm associates in Dare es Salaam for leading this research effort in Kenya and Tanzania, respectively.

[16] We thank Peter Minor for his cooperation with us in this process.

4.4 Estimates of the Ad Valorem Equivalents (AVEs) for Non-Tariff Measures (NTMs) for the Regions of our Model

Our estimates of the AVEs of NTMs are based on the estimates of Kee *et al*., (2008; 2009), which in turn are based on the theoretical developments of Anderson and Neary (1996; 2003). Kee *et al*. estimate the AVEs of NTMs for 105 countries at the 6 digit level. These estimates, as well as aggregated estimates for manufacturing and agriculture for the 105 countries, are available on the World Bank website.[17]

The measure we use from Kee *et al*. is the uniform tariff equivalent that generates the same level of import value for the country in a given year.[18] Kee *et al*. provide estimates based on both applied and MFN tariffs; the measure we use is based on applied tariffs, which take into account bilateral trade preferences. At the six digit level, the estimates of Kee *et al*. are sometimes subject to a substantial margin of error that may lead to misleading results in a CGE model policy analysis. Consequently, we have chosen to use the aggregated estimates of Kee *et al*. at the sector level, i.e., for each country, we have two AVEs for each country: one AVE of the NTMs in manufacturing and one AVE of the NTMs in agriculture. We then further aggregate these values for 93 countries to the regions of our model. Details are available in appendix B.

4.5 Tariff Data

4.5.1 Kenya. Most-Favored Nation (MFN) tariff rates at the eight digit level were taken from the website of the Kenyan government: www.kra.go.ke/customs/customsdownloads.php. These tariff rates were then aggregated to the 55 sectors of the model of Balistreri, Rutherford and Tarr (2009), using simple averages. Since these are MFN tariff rates, they exceed the collected tariff rates due to tariff preferences to regional partners and due to other preference items or tariff exemptions. Thus, they exaggerate the protection received by Kenyan industry and agriculture. Consequently we obtained the value of overall customs duties and other taxes applied only on imports from the Kenyan *Economic Survey* for 2006. We then took the ratio of the total taxes on imports to the total value of imports to obtain the average value of import taxes

[17] The dataset is available at http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:22574446~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html

[18] Specifically, we take the difference between the Overall Trade Restrictiveness Index (OTRI) and for the Tariff-only OTRI (OTRI_T), which gives us the AVE of the NTMs.

in the Kenyan economy. In 2005, this was 8.4 percent. That is, on average, Kenyan importers paid 8.4 percent of the value of imports on import taxes that did not apply to domestic production. We then scaled all the MFN tariffs in the model of Balistreri, Rutherford and Tarr (2009) so that the weighted average import tax is 8.4 percent. For the present model, we mapped the 55 sectors of Balistreri, Rutherford and Tarr (2009) to the 18 sectors of our model and took a trade weighted average of the tariff rates of the 55 sectors of Balistreri, Rutherford and Tarr (2009) to obtain the tariff rates for the 18 sectors of the present model. The results are presented in table 4a.

4.5.2 Tanzania. We were fortunate to receive unusually detailed collected tariff data from the Tanzania Revenue Authority. That is, we received data on collected import duties (tariffs) and import values at the eight digit tariff line level. The collected tariff rates for the sectors in our model are obtained by first aggregating the eight digit tariff line level tariff collections and import values to the 52 sectors of our the model of Tanzania by Jensen, Rutherford and Tarr (2010). The ratio of tariff collections to import values for each sector of the model of Jensen and Tarr (2010) is then calculated to give estimates of the collected tariff rates. Applying these tariff rates across all sectors implies that tariff revenue in the revised database is about 1.3% of GDP, which is consistent with collected revenues in Tanzania.[19] The data for import tariffs are replaced with collected tariff rate data for the year 2006. For the present model, we mapped the 52 sectors of Jensen, Rutherford and Tarr (2010) to the 18 sectors of our model and took a trade weighted average of the tariff rates of the 52 sectors of Jensen, Rutherford and Tarr to obtain the tariff rates for the 18 sectors of the present model.

Given that Tanzania participates in preferential trade areas with the East Africa Customs Union and the South African Development Community, it was necessary to make further adjustments. That is, since, in principle, tariff rates should be zero within these preferential trade areas, we set tariff collections on imports from SADC, Kenya, Uganda and Rwanda at zero. We then increased the tariff rates for the other regions in our model so that the overall weighted average collected tariff rate is unchanged. We used the trade flow data, disaggregated by regions and sectors of our model to weight the tariff rates. This adjustment has the impact of raising the collected tariff rates for the regions in our model where positive tariff rates apply. The resulting adjusted tariff rates are reported in Table 4b.

[19] For the year 2006, aggregate data from Tanzania show that tariff collections are 1.47 percent of GDP.

4.5.3. Regions other than Kenya or Tanzania. Tariff rates for the eight regions other than Kenya and Tanzania in our model are taken from the GTAP 8.1 database. GTAP 8.1 uses the third version of the MAcMap-HS6 database. This database is jointly developed by the Paris based think tank CEPII and the International Trade Center (ITC) of Geneva and is documented in Guimbard, Jean and Mimouni (2011). It is based on the ITC's raw data. The authors calculated applied protection, including incorporating preferential tariff protection in 2007 and the ad valorem equivalents of specific tariffs. They estimate the world average applied protection level in 2007 to be 4.4 percent. Compared to 2004, this is a decline by nearly 0.7 percentage points, mainly due to unilateral liberalizations and to new preferential trade agreements. The increasing share of developing countries in world trade, where protection is higher, tended to raise the world average, but this was counterbalanced by the decline in the ad valorem equivalent of specific tariffs, linked to the surge in world prices of agricultural products. The results for our sectors and African regions other than Kenya and Tanzania are in tables 4c, 4d, 4e and 4f.

4.6 Social Accounting Matrices

The core data of the model comes from the GTAP 8.1 dataset, described on the GTAP website: https://www.gtap.agecon.purdue.edu/databases/default.asp. The GTAP 8.1 dataset contains 57 sectors and 129 regions. We explain our aggregation of the data set in appendix A.

4.7 Trade Data by Regional Partner and Sector

To obtain data on imports and exports from the different regions of our model, we used trade data from the GTAP 8.1 data set. Although trade data are available from WITS access to the COMTRADE database, the data must constitute a balanced data set that satisfies all accounting identities. For example, exports of any product from a region of our model must equal the imports of the rest of the world for this product from that region. And for each region and product, exports plus domestic consumption must equal imports plus domestic production. The GTAP data set satisfies all accounting identities.

4.8 Share of Market Captured by Foreign Direct Investors in Services and by Cross-Border Sales of Services

It was necessary to calculate the market share of foreign direct investors by source region in the services sectors of our model by host region. That is, take the banking sector in Tanzania

as an example. We need to know the share of the market captured by banks from all the regions of our model, i.e., Tanzania, Kenya, Uganda, Rwanda, COMESA, SADC, the EU, US, China and the Rest of the World. The results of our calculations for our African regions are available in tables 6a to 6f. It is also necessary to calculate the share of cross border services in each of our regions for these seven sectors. For cross-border sales of services, we use the data from the GTAP 8.1 dataset.

4.8.1 Kenya and Tanzania. In the cases of Kenya and Tanzania, we built the dataset for this project. Detailed commercial databases were employed, where available. This included Bankscope for banking and Axco for insurance, which list all companies active in Kenya and Tanzania in these sectors. For ownership shares of the companies by region of our model, the websites of the companies often had to be consulted. In telecommunications, the telecommunication regulatory authorities in Kenya and Tanzania list all active companies and their market shares in mobile and fixed line services. Details and documentation of the calculations are available in Jafari (2014e), who built on and updated earlier work by Worley (2009). The results for Kenya and Tanzania are presented in tables 6a and 6b.

4.8.2 Regions other than Kenya and Tanzania. Other than for our seven business services sectors in Kenya and Tanzania as discussed above, and insurance and communications services in our Africa regions, the basic data source for foreign affiliate sales is the database developed by Fukui and Lakatos (2012). This database has some advantages over earlier efforts to develop databases of foreign affiliate sales. First, it is based on sales data, rather than using investment data as a proxy for sales data. Second, Fukui and Lakatos use the Eurostat database of data on foreign affiliate sales in 41 countries (including the United States), rather than relying on data from the United States alone. Despite having data for 41 countries, there are a large number of countries in the GTAP dataset for which the foreign affiliate sales data are missing. Fukui and Lakatos use an econometric model to estimate the missing values and thus produce estimates for all regions and sectors in the GTAP dataset. For the share of sales in the sector by the host country, we use the GTAP dataset for total sales in the sector; we subtract the total of foreign affiliate sales from total sales to obtain the host country share of sales.

In the case of insurance services in African regions, we used the Axco database as our primary data source. Documentation is in appendix D. In the case of telecommunications

services in our six African regions, we used communications commission data and other publicly available sources, taking South Africa as our proxy for SADC. Details are in appendix E.

4.9 Share of Expatriate Labor Employed by Multinational Service Providers.

The impact of liberalization of barriers to foreign direct investment in business services sectors on the demand for labor in these sectors will depend on the share of expatriate labor used by multinational firms. We explain in the results section that despite the fact that multinationals use domestic labor less intensively than their domestic competitors, if multinationals use mostly domestic labor, their expansion is likely to increase the demand for domestic labor in these sectors.[20] For this version of the paper, we used representative estimates from earlier studies of the share of expatriate labor or specialized technology not available to domestic firms. In earlier studies we have found that multinational service providers use mostly local primary factor inputs and only small amounts of expatriate labor or specialized technology.

4.10 Key Elasticities

Our key elasticities are shown in table 7. Dixit-Stiglitz elasticities in services are based on estimates from Broda and Weinstein (2006). Dixit-Stiglitz elasticities in goods are the estimates of the elasticity of substitution for imports from different regions in the GTAP dataset. Armington elasticities of substitution of domestic for foreign are from the GTAP dataset. Armington elasticities of substitution of imports from different regions in the four CRTS sectors listed in table 7 are based on the estimates of Reidel (1988). Supply elasticities are based on the estimates of Schiff, Wang and Olarreaga (2002) and Schiff and Wang (2006); the methodology and additional empirical and theoretical justification for the supply elasticities is provided in Jensen and Tarr (2010).

5. Results for East African Customs Union Preferential and Multilateral Policies to Reduce Trade Costs

[20] See Markusen, Rutherford and Tarr (2005) for a detailed explanation on why FDI may be a partial equilibrium substitute for domestic labor but a general equilibrium complement.

5.1 Deep Preferential Integration Within the East African Customs Union (EACU)

We execute several scenarios in our multi-region trade model to assess the impacts of the reduction in trade costs by the East African Customs Union on Kenya and Tanzania, as well as on Uganda and Rwanda.[21] We decompose the trade costs into three categories: excessive trade facilitation costs; non-tariff barriers; and barriers on foreign providers of services. In the case of trade facilitation, as we have explained in more detail in appendix C, there are several reasons to take modest cuts in these barriers. These include that the most efficient countries in the world, such as Singapore, South Korea and Hong Kong have not cut the time cost of trade to zero; and part of the costs are due to infrastructure deficiencies which can't be addressed through policy alone. There are, however, some collaborative projects and plans among members of the EACU (see East African Community Secretariat, 2011), such as common customs posts, designed to cut the time costs of trade. Consequently, we assume a 20 percent cut in the ad valorem equivalents of the time cost of trade within EACU. Since there is likely a spillover benefit of these measures that will cut the time costs of trade outside of the EACU, we take a five percent cut in these costs for trade with countries outside of the EACU.

Similarly, under the auspices of the East African Community, the member countries are undertaking collaborative efforts to reduce non-tariff barriers (see, for example, East African Community, 2012). Non-tariff measures, however, have become much more subtle in the post-Uruguay Round world. Most measures have a legitimate regulatory function and distinguishing the legitimate regulations from protective or inefficient regulations is complicated. Consequently, we take a more modest 20 percent reduction in the ad valorem equivalent of these barriers.

Finally, on July 1, 2010, the East African Community adopted a Common Market protocol that called for the free movement of services within the five member states, along with the free movement of goods, capital and labor.[22] We take a fifty percent cut in these barriers.

5.1.1 Aggregate Welfare Effects of Deep Preferential Integration by the East African Customs Union. Our aggregate results for Kenya, Tanzania, Uganda and Rwanda are presented in table 8. Under the column labeled "EACU Central," we report our findings for the

[21] Burundi is a fifth member of the EACU. Since Burundi is not represented as a separate region in the GTAP 8.1 dataset, it is not a separate region of our model and we do not have separate results for Burundi.

[22] For the text of the protocol, see: http://www.eac.int/commonmarket/index.php. See also Dihel, Fernandes, Mattoo and Strychacz (2010) for a discussion of liberalization of professional services in East Africa.

impacts of combined cuts in trade facilitation, non-tariff barriers and services barriers. The welfare gains are presented as Hicksian equivalent variation as a percent of consumption. We find that all four countries gain from this deep integration, with gains ranging from a low of 0.9 percent of consumption in the case of Tanzania to a high of 1.4 percent of consumption in the case of Rwanda. To examine the source of these gains, we execute three additional scenarios in which we allow only one of the reforms to be implemented in each case.

5.1.2 Preferential Reduction of Time in Trade Costs by EACU. In the case of deep preferential integration within the East African Community (EAC), the reduction in time in trade costs constitute the largest share of the gains—about two-thirds of the total gains in the cases of Kenya and Tanzania, but over 80 percent of the gains in the cases of Uganda and Rwanda. We assume that the time in trade costs consume capital and labor in the home country equal to the ad valorem equivalent of the time costs of the imported product (from a country) times the benchmark value of the imports plus the time costs of the exported product (to a country) times the benchmark value of the exports. Reduction of the time in trade costs by 20 percent within the EACU and by 5 percent for countries outside the EACU, leads to freeing up of 20 percent of the capital and labor devoted to overcoming the time costs of trade within the EACU on both imports and exports and five percent of the capital and labor devoted to overcoming the time costs of trade outside the EACU on both imports and exports. To provide concrete values for these estimates, in table 9 we show the value of the rents recaptured by any of the policies simulated. In the case of improved trade facilitation, we see that rents recaptured as a percent of domestic consumption are 0.37 percent in Kenya and 0.41 percent in Tanzania. These are "rectangles" of gains. The reduction of the costs of trade results in an increase in the returns to exporting relative to domestic sales and a decrease in the cost of imports relative to domestic production. As a result, there are also "triangles" of efficiency gains from increased trade. Aggregate trade increases in all four EACU countries, ranging from 2.7 percent in Tanzania to 8.8 percent in Rwanda. Rents as a share of the total welfare gain range from 50 percent in the case of Uganda to about 83 percent in the case of Rwanda. .

5.1.4 Reduction of Non-Tariff Barriers within the EACU. For Tanzania and Kenya, the next most important source of gains is the reduction of non-tariff barriers within EACU by 20 percent. Hicksian equivalent variation increases by 0.1 percent in the case of Kenya and 0.17 percent in the case of Tanzania. As with the time costs of trade, we assume that the non-tariff

barriers result in a loss of capital and labor in the home country devoted to overcoming these barriers. Total rents from the non-tariff barriers are equal to the ad valorem equivalent of the non-tariff barrier of the product times the benchmark value of the imports. Since we assume a 20 percent reduction in barriers, 20 percent of the benchmark value of the rents are captured and are "rectangles" of gains. Unlike improved trade facilitation, non-tariff barriers only result in captured rents on the import value. We also limit the reduction in non-tariff barriers to partner countries within the EACU. We can see from table 9 that there are substantially fewer rents affected by the reduction of non-tariff barriers, compared with trade facilitation. Recaptured rents are equal to .016 percent of consumption for Kenya and 0.218 percent of consumption in the case of Tanzania. Since the ad valorem equivalents of the non-tariff barriers are not large in the cases of Uganda and Rwanda, the welfare gains are only .04 and .03 percent of consumption, respectively. Analogous to the reduction in trade costs, the reduction of the non-tariff barriers results in a decrease in the cost of imports relative to domestic production. As a result, there are also "triangles" of efficiency gains from increased trade. Trade increases in all four countries, with the maximum increase of 1.8 percent in Tanzania.

5.1.5 Preferential Reduction of Barriers against EACU Service Providers. Fifty percent preferential liberalization of services barriers results in gains of .04 percent of consumption in the case of Kenya and .03 percent of consumption in the case of Tanzania. Only in the case of Rwanda within the EACU are the gains from services liberalization greater than reduction of non-tariff barriers. In our central scenario, we assume that it takes domestic capital and labor to overcome the costs of the barriers against foreign providers of services, both those that supply the domestic markets through FDI and also through cross-border services. Thus, there are potentially rectangles of recaptured rents from reducing the barriers on EACU foreign suppliers of services in other EACU markets. We say potential, since if there are no sales of services from partner countries initially, there are no rents to be recaptured. In table 9, we show separately the recaptured rents on FDI and the recaptured rents on cross-border sales of in services. The recaptured rents on FDI from partner countries in the EACU are equal to .026 percent of consumption in the case of Kenya and .006 of consumption in the case of Tanzania. There are very small flows of cross-border trade in our business services within EACU, however, so only Rwanda has a positive rent rectangle, when measured at three digits. With the reduction in the barriers on EACU suppliers of services within EACU, there are production and

consumption efficiency gains, which explain the difference between the total welfare gains and the recaptured rents.

5.1.6 Why the Lack of Trade Diversion. Economic theory of preferential tariff liberalization has demonstrated the possibility of losses to the member countries from preferential reduction of tariffs. Imports from countries that are not partner countries will be displaced and the welfare loss in consumers' surplus analysis may be measured by the loss of tariff revenue on those imports. The higher the tariffs on excluded countries, the greater the possibility of welfare losses from preferential tariff liberalization. Nonetheless, in the three preferential reforms that we have considered, we have shown gains for all four countries for all three reforms. Although there is no tariff revenue that is lost from any of these three reforms, Jensen and Tarr (2011) have shown that if some of the rents from the barriers are captured by domestic agents, then these rents play the same role as tariffs in the welfare analysis of preferential trade policy. Key to the explanation is that in our central scenario, we have assumed that the rents are dissipated, so there is no welfare loss on displaced imports or services from suppliers of excluded countries. In the sensitivity analysis, we assess the implications of the rent capture assumption.

In Balistreri, Jensen and Tarr (2011), we have shown that there is the possibility of welfare reducing preferential liberalization of barriers against FDI in services. If the excluded countries are more efficient suppliers of services or have better technologies that increase productivity more, then this could result in welfare reducing preferential liberalization of services. Unlike the driving mechanism of Balistreri, Jensen and Tarr (2011), in the present model, additional foreign suppliers of services do not induce productivity increases in the country that has the additional suppliers of services. So this mechanism for potential welfare reducing preferential liberalization of FDI is not present. Balistreri, Jensen and Tarr (2011) have shown, however, that preferential liberalization of services can be expected to increase welfare unless there is initial rent capture of the barriers against FDI. So again, we will investigate the important issue of initial rent capture in the sensitivity analysis below.

5.2 EACU Multilateral Liberalization

While the above estimates indicate that there are gains from deep integration within the EACU, with a combined GDP of only $85 billion, the EACU is not a large market and economic

theory indicates that there should be substantially greater gains from integrating more deeply into the world trading environment. In the scenario labeled "EACU Liberal," we assess the extent of these larger gains. In EACU Liberal, we extend the liberalizations of non-tariff barrier and services barriers implemented in "EACU Central" to all trading partners in the world. That is, we assume a 20 percent cut in the ad valorem equivalents of the non-tariff barriers applied on imports from all regions in the model into Kenya, Tanzania, Uganda and Rwanda. And we assume that the member countries of the EACU implement reforms that result in a 50 percent cut in the ad valorem equivalents of the barriers on foreign providers of services from all regions. In the case of the time in trade costs, we do not extend these multilaterally on the grounds that the improvements that can be made are primarily regional and we already convey a five percent cut in these barriers for countries outside of the EACU.

We see that the gains for all four of our EACU countries increase substantially. For Kenya and Uganda, the gains are about twice as large; for Rwanda the gains increase substantially from 1.4 percent to 4.95 percent of consumption. The biggest increase in welfare is for Tanzania; the welfare gain dramatically increases from 0.95 percent of consumption to 7.11 percent of consumption.

We execute two new policy scenarios to decompose the policy changes in EACU Liberal. We assess EACU Liberal with only services liberalization and EACU Liberal with only non-tariff barrier liberalization. The trade facilitation results are the same as under EACU Central (only Trade Facilitation), so are already reported and discussed above. In the case of Tanzania, the big increase in welfare is clearly due to the broader liberalization of non-tariff barriers. The wider liberalization of non-tariff barriers results in a welfare gain of more than five percent of consumption, whereas the welfare gains were only 0.17 percent of consumption in the EACU Central case. This large increase is explained by two factors: (i) as shown in table 4b, the ad valorem equivalents of the non-tariff barriers are 47.4 percent in manufacturing and 22.2 percent in agriculture. This is substantially higher than the estimates for the other EACU countries; and (ii) as shown in table 5b, the vast majority of Tanzania's trade is with countries outside of the EACU. Thus, the reduction of NTB barriers impacts a much larger share of trade, generating more recaptured rents and greater efficiency gains.

The other country in EACU to see much larger gains is Rwanda, but in the case of Rwanda it is due to wider services liberalization. We see in table 4d, that the ad valorem

equivalents of the non-tariff barriers are less than five percent, so the gains from NTB liberalization are much smaller than in Tanzania. But the ad valorem equivalents of barriers to foreign service providers are substantial, with four sectors having AVEs of between 25 and 62 percent. From table 6d, we see the market share of EACU services firms is zero except of Kenyan insurance firms, but there is substantial FDI in Rwandan services from regions outside of EACU; so the broader liberalization has a much larger impact.

5.3. Reduction of Non-Discriminatory Barriers in Services in Kenya and Tanzania

In table 10, we present the results of two scenarios where we assess the impacts in Kenya and Tanzania, respectively, of reform of domestic regulations that impose costs on both domestic and foreign suppliers of business services in a non-discriminatory manner. We implement two symmetric scenarios. In the scenario for Kenya (Tanzania), we assess the impacts in Kenya (Tanzania) of a fifty percent reduction of the ad valorem equivalents of the non-discriminatory barriers to suppliers of services in Kenya (Tanzania). We see that the fifty percent reduction in the non-discriminatory barriers result in gains in Hicksian equivalent variation equal in Kenya equal to 1.4 percent of domestic consumption and equal to 2.2 percent of domestic consumption in the case of Tanzania. Comparing results in table 10, this exceeds the gains from the fifty percent reduction in discriminatory barriers in the EACU Liberal scenario, where Kenya is seen to gain 1 percent of consumption and Tanzania gains 1.2 percent. Thus, while the discriminatory barriers are important and are the focus of international negotiation, the regulatory barriers that impose costs on domestic suppliers and foreign suppliers of services in a non-discriminatory manner are quantitatively more important in these cases.

The larger gains from the reduction of non-discriminatory barriers is due to the larger base from which the barriers are reduced. The non-discriminatory barriers affect all providers of services, so the base of the recaptured rents and the distortion triangle is larger. That is, as in our central scenarios above, we assume that it takes domestic capital and labor to overcome the costs of the barriers. Thus, when there are positive AVEs of the barriers, there are “rectangles” of recaptured rents from reducing the barriers; and there are recaptured rents from all forms of supply of services: domestic sales, FDI and cross-border supply. There are also “triangles” of efficiency gains as there will be more business services supplied at a lower price when the inefficient regulatory barriers are reduced.

5.4 The Tripartite Free Trade Area: EACU Deep Integration with COMESA and SADC

In the Tripartite preferential liberalization scenario, all six of our African regions execute identical preferential liberalization, analogous to the EACU Central scenario. Take Kenya as an example. We assume that the ad valorem equivalents of the trade facilitation barriers (on both exports and imports) are reduced by 20 percent for partner countries (Tanzania, Uganda, Rwanda, COMESA and SADC) and 5 percent for non-partner countries (USA, EU, China and ROW). We assume that the ad valorem equivalents of the non-tariff barriers are reduced by 20 percent for partner countries in the Tripartite grouping, but no reduction for non-partner countries. In the case of discriminatory barriers against foreign investors in services, we assume that the initial ad valorem equivalents of the discriminatory barriers against foreign suppliers of services are reduced by 50 percent of their benchmark value in the seven business services sectors for partner countries; we assume no change in the barriers for excluded regions. Finally, we impose zero tariffs in trade within the Tripartite region. Kenya already practices tariff free trade with EACU and COMESA countries, so this implies a lowering of tariffs against SADC countries that were not members of COMESA, and improved market access for Kenyan exporters in SADC countries that were not members of COMESA. We assume that non-tariff barriers apply to all countries, so in this scenario, the cuts in non-tariff barriers result in improved market access for the members of the Tripartite Free Trade Area to each others markets. In order to assess the relative importance of each of the three components of the trade costs reduction scenario, we execute three additional scenarios where each of the three components is liberalized separately, and where we simulate preferential tariff reduction.

The results are presented in table 11. For all four EACU countries, the aggregate welfare gains exceed deep integration within the EACU alone, but are considerably less than multilateral liberalization by the EACU. In the cases of Tanzania and Rwanda, the gains are very significantly smaller than with multilateral liberalization. In the case of preferential liberalization of services alone, the gains are very significantly reduced compared with the multilateral liberalization scenarios due to the relatively low market shares of partner countries in the services sectors of the Tripartite countries. The exception to this pattern is Kenya, which has a significant share of the insurance market in COMESA, where we estimate a very high ad

valorem equivalent of the barriers to services providers. The improved market access for Kenyan insurance suppliers under the protected umbrella of very high barriers creates substantial gains for insurance services suppliers from Kenya in COMESA markets. The trade facilitation gains are larger than in the EACU Central or EACU Liberal scenarios, since the reductions in the AVE of time costs of trade extend to two additional regions of the model. In the case of Kenya, trade diversion dominates the tariff reduction scenario and there is a slight loss from tariff liberalization, despite the improved market access.

5.5 Sector Impacts: Diverse Trade Facilitation Impacts and the Political Economy of Regionalism

In tables 12a-12e, we present the results at the sector level for output in the six African regions of our model. These results are presented for all the scenarios discussed above. Given that we assume that total employment and the capital stock are fixed in the medium term, if labor expands in some sectors, it must contract in other sectors. There are two key insights from the results on the changes in sector output.

5.5.1 Trade Facilitation Impacts on Sector Output vary with the Ad Valorem Equivalents at the Sector Level. First, our more accurate database on the time costs of trade leads to a much more diverse and accurate assessment of the output changes at the sector level. Previous efforts at simulating sector output changes from trade facilitation used uniform ad valorem equivalents across sectors, which led to more uniform impacts on sector output. The dataset we have used has the barriers varying by product and by country of origin or destination (due to the product mix of exporting and importing). Consequently, the predicted changes in output at the sector level vary considerably. For example, in Uganda, one of the sectors with the highest AVE of the time costs of exporting (importing) within EACU is agricultural products, where the Ugandan AVE is about 40 (30) percent, depending on the destination (origin) country.[23] Reduction of the time costs of trade barriers then leads to an expansion of agriculture in Uganda relative to other sectors.

5.5.2 Political Economy of Regional Trade Liberalization The trade liberalization scenario we consider is the liberalization of non-tariff barriers. We find that preferential liberalization results in a substantially muted output change compared with multilateral

[23] The partner country AVE is also relevant in assessing impacts.

liberalization. Take Tanzania as an example (which has the highest AVEs of its NTBs in our dataset). The gains from multilateral reduction of NTB barriers alone are about 25 times greater than the gains from liberalization within EACU alone. But, the maximum output decline at the sector level from NTB liberalization within EACU alone is two percent, compared with output declines of 9.5 percent for textiles and apparel, 11.8 percent for other manufacturing and 13.8 percent for wood and paper products. Thus, although the welfare gains of preferential liberalization are dramatically smaller than multilateral liberalization, the adjustment costs are also smaller. Empirical studies have shown that the adjustment costs of trade liberalization are dramatically smaller than the welfare gains.[24] However, policy-makers often receive strong lobbying from those who suffer adjustment costs from trade liberalization, while those who gain are more diverse and may not realize they gain from trade liberalization, and typically do not lobby for liberalization or lobby much less vigorously. Thus, these results explain some of the appeal of regional liberalization to policy-makers, despite the larger net gains of broader liberalization.

6. Sensitivity Analysis

In this section we assess the impact of parameter values and the key modeling assumption of rent capture on the results. Through our "piecemeal sensitivity analysis" we will determine the most important parameters for the results, and we will assess how important the rent capture assumption is for the results. We examine the two most important aggregate policy scenarios: EACU Deep Integration and EACU Multilateral Liberalizaiton. Our resuIts are presented in tables 13a-13d.

6.1 Impact of Rent Capture Assumption

In our central scenarios we assume that it takes capital and labor to overcome the barriers, that the rents from the barriers are "dissipated," and are recaptured by the domestic economy in the central scenarios. The value of the capital and labor freed up by the reduction of the barriers we call the rents available in the scenario and these values are displayed in table 9. It is possible, however, that some of the barriers are not dissipated, but instead generate rents that are captured by domestic agents in our initial equilibrium. In the counterfactual scenario then, the rents that

[24] Matusz and Tarr (2000) summarize the evidence on the adjustment costs of trade liberalization.

are captured rents initially by domestic agents are not available as a net welfare gain since they are a loss to domestic agents. The “triangle” of efficiency gains will remain, but there will not be a gain of rents if they are initially captured by domestic agents, so the welfare gains should be smaller when there are initial rents captured by domestic agents.

In tables 13a-13d, the row labeled θr represents the share of rents captured initially by domestic agents. We retain all other modeling and parameter assumptions, but allow the initial rent capture share to be either zero (central value) or 1 (upper value). In the case of Kenya, we see that the welfare gains do not change considerably in the case of deep integration within EACU (reflecting small available rents), but the welfare gains fall by more than fifty percent in the case of EACU liberal. This reflects large available rents in the case of services and non-tariff barriers. In the case of Tanzania, the impact is very dramatic. In the case of EACU multilateral liberalization, the welfare gain falls from more than 7 percent of consumption to about 1 percent of consumption, deriving mostly from the large rents that are impacted by multilateral liberalization of NTBs in Tanzania. Results for Uganda and Rwanda are between Kenya and Tanzania in terms of percentage reduction of the gains due to initial rent capture.

6.2 Piecemeal Sensitivity Analysis

We see that central results are rather robust with respect to most of the parameters. In the case of EACU Central (deep integration within EACU), the parameter that has the strongest impact on the results is the elasticity of substitution between firm varieties in imperfectly competitive goods sectors, σ(qi, qj). In the case of Kenya (Tanzania), the welfare gains as a percent of consumption vary from 0.78 (0.85) to 1.16 (1.06) percent of consumption, with greater gains at the upper elasticity values. Following from the Le Chatelier principle, larger elasticities typically lead to larger welfare gains in response to welfare improving reforms, as the economy can adapt more readily. In the case of this parameter, however, there are offsetting impacts. Lower values of this elasticity imply that varieties are less close to each other, so additional varieties are worth more. In the case of multilateral liberalization in Kenya, the variety impact slightly dominates the Le Chatelier principle in interpreting the results, but the Le Chatelier principle still dominates in Tanzania. The elasticity of substitution between imports from different regions in CRTS sectors, σ(M, M), also has a modest impact. The gains are larger in the EACU Liberal case for Tanzania, Uganda and Rwanda, as the larger elasticities allow substitution toward the most efficient supplier. In the case of EACU Central, however, there is a

preference induced substitution away from non-EACU suppliers and trade diversion slightly dominates in the cases of Kenya and Tanzania, but not for Uganda and Rwanda.

Finally, we examine the impact of varying the seven vectors of elasticities of firm supply with respect to price for imperfectly competitive goods and services sectors. (We have one vector for each of our ten regions, but there are only seven distinct vectors since all four EACU regions are assumed to have identical vectors for these elasticities of firm supply.) In the EACU liberal case, the welfare gains are about five percent larger in Kenya, Uganda and Rwanda with larger elasticities of firm supply.[25]

7. Conclusions

In this paper we have developed an innovative multi-region computable general equilibrium model with a focus on Kenya, Tanzania and their trade partners in the East Africa Customs Union. We have assessed three kinds of deep integration for these countries: trade facilitation, services liberalization and reduction of non-tariff barriers. We assessed the impacts of these reforms within the EACU alone; within a Tripartite agreement among the EACU, COMESA and SADC; and multilaterally. The analysis is based on two new datasets of the ad valorem equivalents of the barriers against foreign suppliers of services and the time costs of trade, which we have shown are important to the results.

We estimate that deep integration within the EACU alone will produce benefits, and if expanded to include COMESA and SADC would produce larger benefits for all four of our EACU countries. Schiff and Winters (2003) have found that the largest gains from regional integration come from the deep aspects of the agreements, so our results are consistent with the broader empirical and theoretical literature.

We find that extending the same three reforms multilaterally, generates substantially larger gains than EACU only reform, ranging from twice the size of the gains for Kenya to seven times the gains for Tanzania. We estimate that the impact on sector output, however, is substantially greater with multilateral reform, leading to larger adjustment costs of trade liberalization. Despite the fact that the evidence shows that the adjustment costs of trade

[25] In Tanzania the gains are approximately unchanged. If available varieties in IRTS goods fall, the welfare gain is smaller. In the EACU Central case, possible trade diversion leads to ambiguous results.

liberalization are dramatically smaller than the welfare gains, lobbying interests are much stronger among those who anticipate a negative adjustment. Thus, our results show why there can be a political economy appeal to regionalism, despite the larger net gains of multilateral reform.

We have also assessed the impact of reform of domestic regulations that impose costs on both domestic and foreign suppliers of business services in a non-discriminatory manner. We found that while the discriminatory barriers are important and are the focus of international negotiation, the regulatory barriers that impose costs on domestic supplier and foreign suppliers of services in a non-discriminatory manner are quantitatively more important. The larger gains from the reduction of non-discriminatory barriers is due to the larger bases from which the barriers are reduced. The non-discriminatory barriers affect all providers of services, so the bases of the recaptured rents and the distortion triangles are larger.

In our central scenarios, we assume that the barriers result in costs that are dissipated and liberalization releases labor and capital for productive purposes in the domestic economy. In our sensitivity analysis, we have shown that the magnitude of the gains are in some cases very strongly impacted by this assumption. In rents are captured by domestic agents, the gains are reduced by as much as 80 percent in one case.

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Tables

Table 1: List of Sectors, Regions and Factors of Production in the East Africa Model

Business Services with FDI	**Dixit-Stigliz Goods**
Air Transport	Chemicals Mineral and Metal Products
Communication	Energy and Minerals
Insurance	Food Products
Business Services nec	Petroleum and Coal Products
Financial Services nec	Other Manufacturing
Transport nec	Textile, Apparel and Leather Products
Water Transport	Wood and Paper Products
CRTS Goods and Services	**Regions**
Agriculture and Forestry	Kenya
Other Services	Tanzania
Trade	Uganda
Utilities	Rwanda
	COMESA
Factors of Production	SADC
Skilled labor	USA
Unskilled labor	European Union (EUR)
Capital	China
Natural Resources	Rest of the World (ROW)

Table 2a. Sector Value Added in Kenya (Percentage unless otherwise indicated)

	Labor				GDP	
	Skilled labor	Unskilled labor	Capital	Natural Resources	USD in billion	% of total
Business Services						
Air Transport	9.6	41.6	48.8	0.0	0.3	1.3
Communication	12.0	17.5	70.6	0.0	0.6	2.5
Insurance	27.0	39.3	33.8	0.0	0.2	0.6
Business Services nec	24.1	35.0	40.9	0.0	0.8	3.3
Financial Services nec	24.7	36.0	39.2	0.0	0.5	2.0
Transport nec	10.4	45.0	44.6	0.0	0.8	3.4
Water Transport	9.1	39.5	51.5	0.0	0.1	0.4
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	6.6	35.2	58.3	0.0	0.7	2.9
Energy and Minerals	6.8	47.1	21.9	24.2	0.0	0.1
Food Products	4.5	23.5	71.9	0.0	7.1	28.3
Petroleum and Coal Products	8.2	37.8	54.0	0.0	0.0	0.0
Other Manufacturing	5.8	34.7	59.5	0.0	0.5	2.1
Textile and Apparel	9.1	60.0	31.0	0.0	0.3	1.3
Wood and Paper Products	7.5	46.0	46.5	0.0	0.5	2.2
CRTS						
Agriculture and Forestry	0.6	68.7	28.7	2.1	6.1	24.2
Other Services	33.2	34.4	32.4	0.0	4.8	19.2
Trade	7.1	30.8	62.1	0.0	1.3	5.2
Utilities	26.0	49.2	24.8	0.0	0.3	1.2

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 2b. Sector Value Added in Tanzania (Percentage unless otherwise indicated)

	Labor				GDP	
	Skilled labor	Unskilled labor	Capital	Natural Resources	USD in billion	% of total
Business Services						
Air Transport	10.3	44.3	45.5	0.0	0.0	0.1
Communication	15.5	22.6	61.9	0.0	0.1	0.8
Insurance	24.9	36.5	38.5	0.0	0.0	0.1
Business Services nec	0.0	74.3	25.7	0.0	1.0	6.7
Financial Services nec	22.6	33.1	44.3	0.0	0.0	0.0
Transport nec	11.0	47.7	41.3	0.0	0.2	1.1
Water Transport	8.2	35.3	56.5	0.0	0.1	0.8
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	4.4	23.9	71.7	0.0	0.6	4.5
Energy and Minerals	0.2	1.5	88.8	9.4	0.3	2.4
Food Products	8.3	43.5	48.2	0.0	1.1	7.5
Petroleum and Coal Products	0.0	0.0	0.0	0.0	0.0	0.0
Other Manufacturing	2.7	14.1	83.2	0.0	0.1	0.8
Textile and Apparel	6.8	45.6	47.6	0.0	0.1	1.0
Wood and Paper Products	3.4	23.3	73.3	0.0	0.1	0.4
CRTS						
Agriculture and Forestry	0.5	60.4	38.1	1.0	4.6	32.2
Other Services	32.3	46.5	21.2	0.0	2.9	20.3
Trade	10.6	45.6	43.8	0.0	2.6	18.0
Utilities	6.9	12.9	80.2	0.0	0.5	3.3

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 2c. Sector Value Added in Uganda (Percentage unless otherwise indicated)

	Labor				GDP	
	Skilled labor	Unskilled labor	Capital	Natural Resources	USD in billion	% of total
Business Services						
Air Transport	8.9	38.8	52.3	0.0	0.0	0.1
Communication	20.2	29.5	50.3	0.0	0.1	1.1
Insurance	0.0	17.5	82.5	0.0	0.0	0.1
Business Services nec	36.9	53.7	9.4	0.0	0.5	4.7
Financial Services nec	35.4	51.5	13.1	0.0	0.2	1.5
Transport nec	7.4	32.4	60.2	0.0	0.2	2.0
Water Transport	3.2	13.8	83.0	0.0	0.0	0.0
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	3.3	17.8	78.9	0.0	0.3	2.8
Energy and Minerals	2.7	15.4	43.2	38.7	0.8	7.7
Food Products	9.5	47.0	43.5	0.0	0.5	4.9
Petroleum and Coal Products	6.5	30.1	63.3	0.0	0.0	0.0
Other Manufacturing	5.0	26.9	68.1	0.0	0.2	1.9
Textile and Apparel	6.2	41.0	52.8	0.0	0.1	0.6
Wood and Paper Products	7.6	45.1	47.3	0.0	0.0	0.3
CRTS						
Agriculture and Forestry	0.6	74.1	22.6	2.7	2.6	24.4
Other Services	24.8	22.6	52.7	0.0	3.5	32.7
Trade	6.7	29.2	64.0	0.0	1.3	12.6
Utilities	4.2	7.9	87.9	0.0	0.3	2.8

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 2d. Sector Value Added in Rwanda (Percentage unless otherwise indicated)

	Labor				GDP	
	Skilled labor	Unskilled labor	Capital	Natural Resources	USD in billion	% of total
Business Services						
Air Transport	13.5	58.7	27.8	0.0	0.0	0.3
Communication	23.5	34.3	42.2	0.0	0.0	1.6
Insurance	32.1	46.7	21.2	0.0	0.0	0.8
Business Services nec	32.6	47.6	19.8	0.0	0.1	3.0
Financial Services nec	30.3	44.2	25.4	0.0	0.1	4.2
Transport nec	14.1	61.4	24.5	0.0	0.1	2.9
Water Transport	13.1	57.0	29.9	0.0	0.0	0.1
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	3.2	17.3	79.6	0.0	0.0	1.2
Energy and Minerals	2.9	18.0	38.0	41.1	0.2	6.0
Food Products	5.5	34.7	59.8	0.0	0.1	4.7
Petroleum and Coal Products	7.1	33.0	59.9	0.0	0.0	0.0
Other Manufacturing	4.7	24.6	70.8	0.0	0.0	0.7
Textile and Apparel	7.9	53.4	38.7	0.0	0.0	0.3
Wood and Paper Products	5.0	33.2	61.8	0.0	0.0	0.3
CRTS						
Agriculture and Forestry	0.6	70.0	28.6	0.9	1.2	39.8
Other Services	26.3	32.6	41.2	0.0	0.7	23.9
Trade	9.9	42.8	47.3	0.0	0.3	9.4
Utilities	12.2	23.0	64.9	0.0	0.0	0.9

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 2e. Sector Value Added in COMESA (Percentage unless otherwise indicated)

	Labor				GDP	
	Skilled labor	Unskilled labor	Capital	Natural Resources	USD in billion	% of total
Business Services						
Air Transport	10.7	49.0	40.3	0.0	0.7	0.4
Communication	18.3	24.9	56.8	0.0	5.5	3.1
Insurance	36.4	48.7	14.9	0.0	1.7	1.0
Business Services nec	32.1	43.6	24.3	0.0	7.9	4.4
Financial Services nec	34.1	45.6	20.3	0.0	4.0	2.3
Transport nec	12.0	54.9	33.1	0.0	6.6	3.7
Water Transport	11.8	53.4	34.8	0.0	0.5	0.3
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	7.1	36.8	56.1	0.0	10.0	5.6
Energy and Minerals	1.8	9.5	54.5	34.2	24.2	13.5
Food Products	7.2	38.8	54.0	0.0	9.8	5.5
Petroleum and Coal Products	1.9	8.9	89.2	0.0	1.0	0.6
Other Manufacturing	9.8	49.1	41.1	0.0	5.4	3.0
Textile and Apparel	4.8	31.4	63.8	0.0	8.5	4.8
Wood and Paper Products	7.5	43.6	48.9	0.0	2.2	1.2
CRTS						
Agriculture and Forestry	0.7	60.1	36.9	2.3	28.1	15.7
Other Services	27.0	31.6	41.4	0.0	42.0	23.5
Trade	10.9	49.9	39.2	0.0	17.3	9.7
Utilities	5.1	9.9	85.0	0.0	3.5	2.0

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 2f. Sector Value Added in SADC (Percentage unless otherwise indicated)

	Labor				GDP	
	Skilled labor	Unskilled labor	Capital	Natural Resources	USD in billion	% of total
Business Services						
Air Transport	11.9	49.2	38.9	0.0	1.6	0.5
Communication	18.2	25.9	55.9	0.0	7.6	2.2
Insurance	24.3	34.3	41.4	0.0	12.7	3.7
Business Services nec	20.9	29.7	49.4	0.0	23.8	6.9
Financial Services nec	24.1	34.4	41.5	0.0	5.9	1.7
Transport nec	12.5	51.4	36.1	0.0	7.8	2.3
Water Transport	11.4	47.0	41.6	0.0	0.7	0.2
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	6.7	32.2	61.2	0.0	31.6	9.1
Energy and Minerals	2.5	14.7	48.9	33.9	42.4	12.3
Food Products	7.3	35.6	57.1	0.0	12.2	3.5
Petroleum and Coal Products	6.3	25.5	68.2	0.0	0.3	0.1
Other Manufacturing	7.9	37.1	54.9	0.0	13.6	3.9
Textile and Apparel	8.9	55.8	35.3	0.0	5.5	1.6
Wood and Paper Products	9.7	51.2	39.1	0.0	5.2	1.5
CRTS						
Agriculture and Forestry	0.4	41.7	52.2	5.6	21.4	6.2
Other Services	33.7	30.9	35.4	0.0	99.9	28.8
Trade	9.6	39.7	50.7	0.0	44.8	12.9
Utilities	12.2	22.9	64.9	0.0	9.4	2.7

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 3a. Trade Flows of Kenya

	Imports			Exports		
	USD in billion	% of total	% of supply	USD in billion	% of total	% of output
Business Services						
Air Transport	0.1	0.8	17.5	0.6	9.6	69.1
Communication	0.1	1.4	12.6	0.3	4.8	40.5
Insurance	0.0	0.5	12.4	0.0	0.5	10.2
Business Services nec	0.2	2.2	9.8	0.0	0.6	2.4
Financial Services nec	0.0	0.4	3.9	0.0	0.5	4.3
Transport nec	0.1	0.7	4.5	0.1	1.8	7.3
Water Transport	0.0	0.2	10.2	0.1	2.2	58.9
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	2.2	23.7	53.3	0.8	12.2	33.8
Energy and Minerals	0.8	8.9	91.8	0.1	0.9	68.6
Food Products	0.6	5.8	3.7	0.7	10.9	4.9
Petroleum and Coal Products	0.9	9.1	44.0	0.1	1.7	11.1
Other Manufacturing	2.9	30.4	57.1	0.3	4.0	14.6
Textile and Apparel	0.5	5.5	23.1	0.5	7.2	22.7
Wood and Paper Products	0.3	3.4	21.1	0.1	1.8	9.1
CRTS						
Agriculture and Forestry	0.4	3.7	3.8	1.8	27.3	16.7
Other Services	0.2	2.5	2.4	0.9	13.9	8.6
Trade	0.1	0.5	2.6	0.0	0.1	0.3
Utilities	0.0	0.0	0.3	0.0	0.2	1.1

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 3b. Trade Flows of Tanzania

	Imports			Exports		
	USD in billion	% of total	% of supply	USD in billion	% of total	% of output
Business Services						
Air Transport	0.0	0.9	50.1	0.0	1.0	47.6
Communication	0.0	0.4	7.7	0.0	1.1	16.8
Insurance	0.1	1.0	95.3	0.0	0.8	104.0
Business Services nec	0.2	3.0	8.3	0.3	7.1	14.4
Financial Services nec	0.0	0.6	89.0	0.0	0.2	80.8
Transport nec	0.2	3.0	39.7	0.2	4.8	49.1
Water Transport	0.0	0.1	26.1	0.0	0.2	2.0
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	1.3	23.6	58.9	0.8	23.4	54.0
Energy and Minerals	0.0	0.3	7.4	0.3	7.6	60.0
Food Products	0.4	7.7	13.6	0.5	12.8	15.2
Petroleum and Coal Products	0.6	11.9	90.0	0.0	0.0	0.0
Other Manufacturing	1.6	29.6	78.6	0.1	2.2	23.2
Textile and Apparel	0.3	5.5	51.1	0.1	4.0	45.7
Wood and Paper Products	0.1	2.6	51.8	0.0	1.3	31.4
CRTS						
Agriculture and Forestry	0.2	2.9	3.0	0.8	22.2	13.9
Other Services	0.3	5.1	4.7	0.2	5.0	3.2
Trade	0.1	1.7	2.7	0.2	5.8	5.8
Utilities	0.0	0.0	0.3	0.0	0.4	1.9

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 3c. Trade Flows of Uganda

	Imports			Exports		
	USD in billion	% of total	% of supply	USD in billion	% of total	% of output
Business Services						
Air Transport	0.1	3.2	69.4	0.0	0.1	6.0
Communication	0.0	0.6	5.5	0.0	1.1	12.3
Insurance	0.0	1.8	36.9	0.0	0.5	16.2
Business Services nec	0.1	3.7	13.4	0.0	0.6	2.7
Financial Services nec	0.0	0.4	2.0	0.0	0.4	2.4
Transport nec	0.0	1.3	7.8	0.1	4.6	31.6
Water Transport	0.0	0.1	40.8	0.0	0.0	20.4
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	0.7	23.8	45.7	0.3	8.8	28.8
Energy and Minerals	0.0	0.9	14.2	1.2	40.3	90.5
Food Products	0.2	6.9	8.5	0.3	11.1	14.6
Petroleum and Coal Products	0.3	11.0	64.9	0.0	0.2	4.7
Other Manufacturing	0.8	30.4	62.8	0.0	1.4	9.8
Textile and Apparel	0.1	4.9	40.4	0.0	1.1	16.8
Wood and Paper Products	0.1	3.7	31.5	0.0	0.5	6.6
CRTS						
Agriculture and Forestry	0.1	2.6	2.8	0.6	18.9	18.6
Other Services	0.1	2.1	1.1	0.2	6.6	3.8
Trade	0.1	2.0	3.0	0.1	2.6	4.3
Utilities	0.0	0.6	3.0	0.0	1.4	8.2

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 3d. Trade Flows of Rwanda

	Imports			Exports		
	USD in billion	% of total	% of supply	USD in billion	% of total	% of output
Business Services						
Air Transport	0.0	1.4	33.3	0.0	0.5	16.1
Communication	0.0	0.5	4.5	0.0	0.6	5.9
Insurance	0.0	0.4	9.0	0.0	0.2	3.7
Business Services nec	0.1	9.7	36.7	0.0	0.5	3.1
Financial Services nec	0.0	0.1	0.6	0.0	0.1	0.5
Transport nec	0.0	2.3	9.0	0.1	7.4	23.6
Water Transport	0.0	0.2	9.6	0.0	0.2	11.4
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	0.2	21.5	48.5	0.0	1.1	4.7
Energy and Minerals	0.0	1.6	33.2	0.4	60.8	95.2
Food Products	0.1	12.8	18.0	0.0	3.6	5.1
Petroleum and Coal Products	0.1	10.3	71.2	0.0	0.4	13.9
Other Manufacturing	0.2	23.6	58.3	0.0	0.7	5.0
Textile and Apparel	0.0	2.8	35.2	0.0	0.5	8.7
Wood and Paper Products	0.0	3.3	46.4	0.0	0.1	2.9
CRTS						
Agriculture and Forestry	0.0	1.7	1.1	0.1	9.9	5.1
Other Services	0.0	4.1	3.0	0.1	10.4	6.2
Trade	0.0	3.3	7.2	0.0	1.6	3.3
Utilities	0.0	0.6	6.3	0.0	1.3	12.4

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 3e. Trade Flows of COMESA

	Imports			Exports		
	USD in billion	% of total	% of supply	USD in billion	% of total	% of output
Business Services						
Air Transport	1.3	2.0	49.2	2.1	4.0	63.4
Communication	0.4	0.6	4.1	1.3	2.4	16.3
Insurance	1.0	1.5	26.8	0.3	0.5	10.5
Business Services nec	2.9	4.4	16.1	1.7	3.2	11.6
Financial Services nec	0.2	0.3	2.9	0.4	0.7	7.1
Transport nec	1.2	1.8	8.5	8.1	15.4	44.2
Water Transport	0.2	0.3	7.4	0.2	0.4	7.1
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	13.7	20.9	32.1	6.6	12.4	19.9
Energy and Minerals	1.7	2.6	7.9	14.6	27.5	42.8
Food Products	4.4	6.7	11.7	2.0	3.8	6.0
Petroleum and Coal Products	3.4	5.2	15.9	3.3	6.2	15.8
Other Manufacturing	20.1	30.7	49.4	1.7	3.1	8.5
Textile and Apparel	3.6	5.5	14.7	3.1	5.9	13.6
Wood and Paper Products	2.6	3.9	25.6	0.6	1.1	7.9
CRTS						
Agriculture and Forestry	5.0	7.6	11.2	2.7	5.1	6.5
Other Services	3.0	4.6	3.6	3.6	6.8	4.2
Trade	0.9	1.4	3.1	0.8	1.5	2.8
Utilities	0.1	0.1	0.5	0.1	0.2	0.8

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 3f. Trade Flows of SADC

	Imports			Exports		
	USD in billion	% of total	% of supply	USD in billion	% of total	% of output
Business Services						
Air Transport	2.5	2.1	32.8	2.5	1.8	37.1
Communication	0.1	0.1	0.4	0.6	0.4	3.0
Insurance	0.8	0.6	2.3	0.8	0.6	3.1
Business Services nec	7.8	6.6	10.4	2.4	1.7	4.2
Financial Services nec	0.8	0.7	4.6	0.9	0.6	6.3
Transport nec	1.8	1.5	6.2	2.9	2.0	10.8
Water Transport	0.5	0.4	17.2	0.5	0.3	18.8
Dixit-Stigliz Goods						
Chemicals Mineral and Metal Products	21.4	18.0	21.5	36.8	25.6	32.9
Energy and Minerals	8.8	7.4	39.5	60.2	41.9	83.2
Food Products	6.5	5.5	10.5	4.6	3.2	7.9
Petroleum and Coal Products	4.3	3.6	21.6	1.4	0.9	8.5
Other Manufacturing	43.8	36.9	37.9	13.2	9.2	16.6
Textile and Apparel	4.8	4.0	18.3	3.4	2.4	14.8
Wood and Paper Products	2.9	2.4	12.9	2.4	1.7	11.5
CRTS						
Agriculture and Forestry	1.6	1.3	4.3	4.8	3.3	11.9
Other Services	6.3	5.3	3.3	4.3	3.0	2.3
Trade	3.7	3.1	4.1	1.4	0.9	1.6
Utilities	0.7	0.6	3.5	0.5	0.4	2.5

Source: Authors' calculations based on the GTAP 8.1 dataset.

Table 4a: Benchmark Distortions in Kenya (Ad valorem values in percentage)

Ad Valorem Values or Equivalents

	Barriers Against Service Providers									
	Discriminatory									Non-Discriminatory
	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW	
Business Services										
Air Transport	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	0.0
Communication	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	3.4
Insurance	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	32.0	11.6
Business Services nec	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	13.0
Financial Services nec	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	18.6
Transport nec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
Water Transport	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0	0.0
	Tariff Rates on Goods									Non-Tariff Measures
	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW	
Goods										
Chemicals Mineral and Metal Products	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5	7.5	0.3
Energy and Minerals	0.0	0.0	0.0	0.0	1.1	1.1	1.1	1.1	1.1	0.3
Food Products	0.0	0.0	0.0	0.0	19.0	19.0	19.0	19.0	19.0	0.3
Petroleum and Coal Products	0.0	0.0	0.0	0.0	9.3	9.3	9.3	9.3	9.3	0.3
Other Manufacturing	0.0	0.0	0.0	0.0	16.1	16.1	16.1	16.1	16.1	0.3
Textile and Apparel	0.0	0.0	0.0	0.0	13.0	13.0	13.0	13.0	13.0	0.3
Wood and Paper Products	0.0	0.0	0.0	0.0	8.4	8.4	8.4	8.4	8.4	0.3
Agriculture and Forestry	0.0	0.0	0.0	0.0	17.5	17.5	17.5	17.5	17.5	14.6
	Barriers to Efficient Trade Facilitation on Exports									
Chemicals Mineral and Metal Products	21.4	22.3	21.5	21.7	27.0	16.9	20.1	18.3	21.2	
Energy and Minerals	12.6	12.6	12.6	12.6	12.5	12.3	12.6	12.6	12.2	
Food Products	22.3	13.5	21.2	11.8	16.3	15.1	16.3	12.8	20.3	
Petroleum and Coal Products	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	
Other Manufacturing	16.2	15.7	14.5	15.8	14.2	11.1	11.5	15.9	8.7	
Textile and Apparel	7.1	8.1	8.0	8.6	8.2	10.0	7.8	7.9	7.8	
Wood and Paper Products	15.9	23.1	18.0	13.7	19.1	11.5	13.3	14.8	15.2	
Agriculture and Forestry	21.3	26.6	21.0	15.9	25.3	22.7	25.9	23.5	19.1	
	Barriers to Efficient Trade Facilitation on Imports									
Chemicals Mineral and Metal Products	25.6	45.9	42.9	9.5	30.7	4.3	6.8	13.4	14.1	
Energy and Minerals	14.3	18.9	19.8	4.6	16.0	2.8	4.4	8.1	9.9	
Food Products	20.1	27.2	22.9	14.7	19.4	4.6	7.6	13.2	10.5	
Petroleum and Coal Products	31.9	41.9	43.9	36.8	35.5	6.0	12.3	18.0	21.4	
Other Manufacturing	12.6	22.7	24.6	7.2	15.5	1.7	4.3	8.6	9.5	
Textile and Apparel	9.4	12.2	14.9	4.6	20.6	1.8	7.4	5.9	7.0	
Wood and Paper Products	12.9	10.0	17.3	10.7	30.4	3.8	8.5	12.0	14.4	
Agriculture and Forestry	23.1	41.4	24.8	18.3	35.0	8.0	8.3	20.8	21.2	

Table 4b: Benchmark Distortions in Tanzania; Ad valorem values in percentage.

	Barriers Against Service Providers									
	Discriminatory									Non-Discriminatory
	Kenya	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW	
Business Services										
Air Transport	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	0.0
Communication	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	3.1
Insurance	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0	17.9
Business Services nec	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Financial Services nec	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	14.7
Transport nec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Transport	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0	0.0
	Tariff Rates on Goods									Non-Tariff Measures
	Kenya	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW	
Goods										
Chemicals Mineral and Metal Products	0.0	0.0	0.0	4.4	0.0	4.4	4.4	4.4	4.4	47.4
Energy and Minerals	0.0	0.0	0.0	3.2	0.0	3.2	3.2	3.2	3.2	47.4
Food Products	0.0	0.0	0.0	13.4	0.0	13.4	13.4	13.4	13.4	47.4
Petroleum and Coal Products	0.0	0.0	0.0	3.2	0.0	3.2	3.2	3.2	3.2	47.4
Other Manufacturing	0.0	0.0	0.0	6.3	0.0	6.3	6.3	6.3	6.3	47.4
Textile and Apparel	0.0	0.0	0.0	29.7	0.0	29.7	29.7	29.7	29.7	47.4
Wood and Paper Products	0.0	0.0	0.0	11.6	0.0	11.6	11.6	11.6	11.6	47.4
Agriculture and Forestry	0.0	0.0	0.0	11.9	0.0	11.9	11.9	11.9	11.9	22.2
	Barriers to Efficient Trade Facilitation on Exports									
Chemicals Mineral and Metal Products	16.2	16.1	14.2	14.0	16.1	12.9	13.7	15.9	16.2	
Energy and Minerals	9.0	7.6	9.0	9.0	5.4	5.4	8.6	9.0	8.4	
Food Products	12.6	15.3	16.4	12.1	13.8	7.6	14.7	9.8	13.9	
Petroleum and Coal Products	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	19.9	
Other Manufacturing	7.8	6.4	13.1	10.2	10.2	9.4	9.3	9.8	9.6	
Textile and Apparel	5.9	5.7	5.8	5.6	6.3	6.8	7.2	6.6	7.5	
Wood and Paper Products	8.3	15.1	11.2	10.8	9.5	5.8	6.3	4.3	15.2	
Agriculture and Forestry	14.3	18.2	28.7	12.5	17.6	17.9	15.2	13.1	18.0	
	Barriers to Efficient Trade Facilitation on Imports									
Chemicals Mineral and Metal Products	19.9	38.6	58.8	9.2	29.3	4.8	5.9	14.8	13.5	
Energy and Minerals	11.7	18.9	19.8	4.5	17.3	2.6	3.9	8.2	9.2	
Food Products	20.7	30.7	27.9	41.9	19.7	4.8	4.8	11.3	10.8	
Petroleum and Coal Products	25.9	41.9	43.9	38.1	36.0	6.0	14.1	18.0	17.8	
Other Manufacturing	15.1	26.9	42.6	3.4	16.3	2.0	4.1	8.6	8.2	
Textile and Apparel	6.5	12.8	13.8	5.3	15.0	2.1	3.9	5.9	7.2	
Wood and Paper Products	14.7	17.6	49.9	10.8	33.9	2.6	7.9	9.6	9.7	
Agriculture and Forestry	19.8	34.7	54.2	20.4	30.3	8.7	9.0	17.9	15.6	

Table 4c: Benchmark Distortions in Uganda; Ad valorem values in percentage.

	Barriers Against Service Providers									
	Discriminatory									Non-
	Kenya	Tanzania	Rwanda	COMESA	SADC	USA	EUR	China	ROW	Discriminatory
Business Services										
Air Transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Communication	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	0.0
Insurance	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	0.0
Business Services nec	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	0.0
Financial Services nec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.0
Transport nec	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	0.0
Water Transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tariff Rates on Goods									Non-Tariff
	Kenya	Tanzania	Rwanda	COMESA	SADC	USA	EUR	China	ROW	Measures
Goods										
Chemicals Mineral and Metal Products	0.0	0.0	0.0	0.0	6.2	6.6	5.2	10.7	9.6	0.0
Energy and Minerals	0.0	0.0	0.0	0.0	3.3	1.8	1.3	0.1	2.8	0.0
Food Products	0.0	0.0	0.0	0.0	66.4	19.4	19.6	21.5	20.9	0.0
Petroleum and Coal Products	0.0	0.0	0.0	0.0	10.0	6.5	4.1	0.0	7.1	0.0
Other Manufacturing	0.0	0.0	0.0	0.0	7.3	5.6	4.1	7.0	11.2	0.0
Textile and Apparel	0.0	0.0	0.0	0.0	21.7	20.8	20.8	24.6	20.6	0.0
Wood and Paper Products	0.0	0.0	0.0	0.0	15.8	13.6	10.5	21.1	20.0	0.0
Agriculture and Forestry	0.0	0.0	0.0	0.0	15.8	14.8	17.5	14.4	3.1	3.9
	Barriers to Efficient Trade Facilitation on Exports									
Chemicals Mineral and Metal Products	52.4	44.9	48.4	44.5	51.7	28.7	32.6	29.1	36.8	
Energy and Minerals	21.6	21.6	21.6	21.6	22.1	21.6	21.7	21.6	21.6	
Food Products	31.1	35.1	38.0	24.6	24.3	31.9	38.2	23.1	30.5	
Petroleum and Coal Products	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	47.9	
Other Manufacturing	25.9	30.7	23.8	34.2	21.4	18.4	24.1	30.9	26.6	
Textile and Apparel	14.1	14.6	13.5	14.2	14.3	14.7	15.9	12.8	15.4	
Wood and Paper Products	11.4	20.1	21.3	32.8	14.1	22.6	23.6	19.8	17.1	
Agriculture and Forestry	46.6	39.8	35.1	36.1	36.5	36.8	35.9	38.7	34.7	
	Barriers to Efficient Trade Facilitation on Imports									
Chemicals Mineral and Metal Products	20.8	25.7	35.7	15.1	24.7	4.3	5.3	13.6	12.9	
Energy and Minerals	11.7	12.1	19.8	5.1	16.3	2.7	4.2	8.1	7.8	
Food Products	12.4	24.4	17.2	7.7	18.5	4.4	6.1	14.2	11.7	
Petroleum and Coal Products	25.9	31.9	43.9	11.3	35.8	6.0	10.8	18.0	14.4	
Other Manufacturing	14.6	10.2	31.4	5.0	16.6	2.0	3.8	6.8	9.7	
Textile and Apparel	7.5	9.2	9.1	5.1	17.7	2.2	4.0	4.9	5.0	
Wood and Paper Products	21.4	23.8	8.7	11.3	29.4	3.0	6.7	6.5	12.6	
Agriculture and Forestry	25.8	29.4	35.8	27.9	40.9	8.2	6.0	19.8	24.1	

Table 4d: Benchmark Distortions in Rwanda; Ad valorem values in percentage.

	Barriers Against Service Providers									
	Discriminatory									Non-Discriminatory
	Kenya	Tanzania	Uganda	COMESA	SADC	USA	EUR	China	ROW	
Business Services										
Air Transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Communication	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	0.0
Insurance	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	0.0
Business Services nec	62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0	62.0	0.0
Financial Services nec	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	0.0
Transport nec	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	0.0
Water Transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Tariff Rates on Goods									Non-Tariff Measures
	Kenya	Tanzania	Uganda	COMESA	SADC	USA	EUR	China	ROW	
Goods										
Chemicals Mineral and Metal Products	0.0	0.0	0.0	0.0	16.3	14.8	14.9	20.7	10.6	4.8
Energy and Minerals	0.0	0.0	0.0	0.0	2.8	0.0	3.0	0.2	4.6	4.8
Food Products	0.0	0.0	0.0	0.0	16.4	22.7	20.2	19.9	20.7	4.8
Petroleum and Coal Products	0.0	0.0	0.0	0.0	15.2	0.0	9.6	0.0	15.1	4.8
Other Manufacturing	0.0	0.0	0.0	0.0	17.8	18.8	19.3	16.8	18.8	4.8
Textile and Apparel	0.0	0.0	0.0	0.0	6.6	25.4	23.4	26.5	22.6	4.8
Wood and Paper Products	0.0	0.0	0.0	0.0	11.3	22.3	19.7	21.1	18.5	4.8
Agriculture and Forestry	0.0	0.0	0.0	0.0	4.6	4.9	5.4	0.7	5.1	0.0
	Barriers to Efficient Trade Facilitation on Exports									
Chemicals Mineral and Metal Products	39.0	53.4	32.5	29.7	27.3	27.7	27.3	35.6	30.2	
Energy and Minerals	18.0	18.0	18.0	18.4	18.0	18.0	18.0	18.0	18.0	
Food Products	20.8	23.3	15.8	29.3	16.1	9.0	16.4	16.2	19.2	
Petroleum and Coal Products	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	
Other Manufacturing	22.3	38.2	28.5	14.5	18.4	16.3	17.9	24.2	16.7	
Textile and Apparel	13.5	12.5	8.3	8.0	10.9	19.5	10.6	8.6	12.2	
Wood and Paper Products	16.0	45.1	7.9	28.5	19.4	9.6	15.3	32.3	17.9	
Agriculture and Forestry	22.6	47.1	31.5	57.0	29.5	31.6	30.3	44.4	25.3	
	Barriers to Efficient Trade Facilitation on Imports									
Chemicals Mineral and Metal Products	20.0	22.7	42.1	11.8	24.3	3.7	5.5	14.1	10.7	
Energy and Minerals	11.7	14.4	18.9	18.0	16.3	2.7	4.3	8.3	19.9	
Food Products	19.8	26.3	33.3	15.2	27.9	4.9	4.3	9.1	8.7	
Petroleum and Coal Products	25.9	31.9	41.9	11.0	36.8	6.0	9.4	18.0	14.1	
Other Manufacturing	13.6	21.0	21.0	16.7	23.6	2.4	3.8	8.3	8.1	
Textile and Apparel	7.4	9.3	11.7	9.9	5.2	1.9	3.2	5.3	3.8	
Wood and Paper Products	16.7	17.4	18.6	9.1	20.3	2.5	6.6	9.3	10.0	
Agriculture and Forestry	19.4	46.1	32.9	39.8	9.6	8.7	5.0	14.9	26.4	

Table 4e: Benchmark Distortions in COMESA; Ad valorem values in percentage.

	Barriers Against Service Providers										
	Discriminatory										Non-Discriminatory
	Kenya	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW	
Business Services											
Air Transport	45.0	45.0	45.0	45.0	0.0	45.0	45.0	45.0	45.0	45.0	0.0
Communication	40.0	40.0	40.0	40.0	0.0	40.0	40.0	40.0	40.0	40.0	0.0
Insurance	102.0	102.0	102.0	102.0	0.0	102.0	102.0	102.0	102.0	102.0	0.0
Business Services nec	36.0	36.0	36.0	36.0	0.0	36.0	36.0	36.0	36.0	36.0	0.0
Financial Services nec	101.0	101.0	101.0	101.0	0.0	101.0	101.0	101.0	101.0	101.0	0.0
Transport nec	25.0	25.0	25.0	25.0	0.0	25.0	25.0	25.0	25.0	25.0	0.0
Water Transport	56.0	56.0	56.0	56.0	0.0	56.0	56.0	56.0	56.0	56.0	0.0
	Tariff Rates on Goods										Non-Tariff Measures
	Kenya	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW	
Goods											
Chemicals Mineral and Metal Products	0.0	14.3	0.0	0.0	0.0	10.5	7.7	8.9	13.3	7.8	20.1
Energy and Minerals	0.0	8.8	0.0	0.0	0.0	4.4	1.4	0.7	2.3	0.3	20.1
Food Products	0.0	26.7	0.0	0.0	0.0	35.7	11.5	84.2	25.6	9.0	20.1
Petroleum and Coal Products	0.0	0.0	0.0	0.0	0.0	11.4	6.2	6.7	9.2	4.4	20.1
Other Manufacturing	0.0	12.6	0.0	0.0	0.0	13.4	6.3	7.4	10.5	13.0	20.1
Textile and Apparel	0.0	22.2	0.0	0.0	0.0	18.0	15.3	20.6	30.2	13.5	20.1
Wood and Paper Products	0.0	20.1	0.0	0.0	0.0	7.6	8.2	9.4	22.6	8.3	20.1
Agriculture and Forestry	0.0	12.0	0.0	0.0	0.0	2.4	2.3	5.3	14.6	3.9	27.5
	Barriers to Efficient Trade Facilitation on Exports										
Chemicals Mineral and Metal Products	9.4	9.0	12.7	10.0	10.5	10.8	8.4	9.3	14.2	11.3	
Energy and Minerals	4.5	4.5	4.9	12.4	4.6	4.6	6.2	5.0	5.5	4.7	
Food Products	12.5	30.3	7.7	11.3	13.9	20.7	8.7	10.2	13.1	9.2	
Petroleum and Coal Products	25.8	26.5	10.7	10.5	25.2	17.4	10.8	10.2	14.3	10.8	
Other Manufacturing	6.0	3.3	4.6	13.3	5.5	6.3	7.2	4.6	8.6	5.4	
Textile and Apparel	4.6	5.3	5.0	7.2	10.1	4.9	3.6	3.7	4.3	4.7	
Wood and Paper Products	10.7	10.9	11.3	8.9	7.3	7.8	4.6	5.9	5.7	6.7	
Agriculture and Forestry	16.9	15.9	19.7	26.5	21.5	26.6	19.9	17.8	14.8	15.6	
	Barriers to Efficient Trade Facilitation on Imports										
Chemicals Mineral and Metal Products	20.2	22.5	39.0	32.8	10.9	37.0	5.1	8.2	14.3	14.3	
Energy and Minerals	11.7	14.4	18.9	20.2	4.6	9.8	2.7	4.2	8.1	8.3	
Food Products	10.9	19.3	21.2	32.2	13.8	15.9	5.0	6.6	12.8	13.1	
Petroleum and Coal Products	25.9	31.9	41.9	43.9	35.8	27.9	6.0	12.0	18.0	22.1	
Other Manufacturing	14.8	16.4	30.2	16.0	6.2	17.0	2.1	4.4	7.9	8.0	
Textile and Apparel	8.0	9.0	12.5	8.2	11.4	9.5	2.1	5.1	7.0	7.4	
Wood and Paper Products	12.4	17.3	28.7	31.5	7.3	21.5	5.1	7.2	6.8	11.0	
Agriculture and Forestry	14.7	19.9	31.7	63.1	20.3	37.5	7.1	10.7	16.9	17.8	

Table 4f: Benchmark Distortions in SADC; Ad valorem values in percentage.

	Barriers Against Service Providers										
	Discriminatory										Non-Discriminatory
	Kenya	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW	
Business Services											
Air Transport	30.0	30.0	30.0	30.0	30.0	0.0	30.0	30.0	30.0	30.0	0.0
Communication	53.0	53.0	53.0	53.0	53.0	0.0	53.0	53.0	53.0	53.0	0.0
Insurance	22.0	22.0	22.0	22.0	22.0	0.0	22.0	22.0	22.0	22.0	0.0
Business Services nec	38.0	38.0	38.0	38.0	38.0	0.0	38.0	38.0	38.0	38.0	0.0
Financial Services nec	15.0	15.0	15.0	15.0	15.0	0.0	15.0	15.0	15.0	15.0	0.0
Transport nec	27.0	27.0	27.0	27.0	27.0	0.0	27.0	27.0	27.0	27.0	0.0
Water Transport	7.0	7.0	7.0	7.0	7.0	0.0	7.0	7.0	7.0	7.0	0.0
	Tariff Rates on Goods										Non-Tariff Measures
	Kenya	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW	
Goods											
Chemicals Mineral and Metal Products	1.5	0.0	13.8	0.6	2.5	0.0	4.7	4.2	8.5	3.7	0.4
Energy and Minerals	4.2	0.0	0.0	0.0	6.9	0.0	2.5	0.2	3.4	0.2	0.4
Food Products	1.1	0.0	17.3	0.0	2.5	0.0	13.9	11.6	10.1	10.1	0.4
Petroleum and Coal Products	1.9	0.0	9.7	0.0	1.2	0.0	2.3	6.1	1.4	5.6	0.4
Other Manufacturing	1.5	0.0	5.1	1.9	3.8	0.0	4.9	5.5	6.0	10.0	0.4
Textile and Apparel	6.5	0.0	10.0	0.0	19.7	0.0	21.0	11.1	26.1	18.7	0.4
Wood and Paper Products	3.9	0.0	15.9	15.6	8.4	0.0	4.8	6.1	15.7	8.7	0.4
Agriculture and Forestry	12.8	0.0	32.0	0.1	4.6	0.0	3.2	3.0	6.6	5.1	4.5
	Barriers to Efficient Trade Facilitation on Exports										
Chemicals Mineral and Metal Products	17.4	16.5	14.2	14.2	21.8	21.3	16.0	17.6	20.0	18.5	
Energy and Minerals	8.9	9.7	9.1	9.1	7.7	14.0	11.1	12.5	10.0	11.8	
Food Products	11.0	11.5	10.5	18.3	9.9	16.1	9.0	9.6	13.4	12.7	
Petroleum and Coal Products	19.9	20.1	19.9	22.6	18.1	20.2	35.3	21.9	20.0	23.7	
Other Manufacturing	8.7	9.2	9.2	13.3	9.6	11.2	11.8	8.3	8.6	13.8	
Textile and Apparel	12.8	8.6	10.0	3.5	6.1	7.8	7.5	5.4	8.8	7.9	
Wood and Paper Products	16.9	18.9	16.4	11.4	12.7	13.4	11.6	11.5	20.2	13.8	
Agriculture and Forestry	20.0	16.9	21.9	5.5	23.7	20.0	20.0	23.6	18.5	23.3	
	Barriers to Efficient Trade Facilitation on Imports										
Chemicals Mineral and Metal Products	24.9	25.9	45.6	30.1	11.7	34.8	4.4	6.9	12.6	13.9	
Energy and Minerals	11.6	8.7	19.3	19.8	4.7	21.6	2.7	3.7	8.1	12.1	
Food Products	15.3	22.2	21.1	17.7	28.9	26.0	4.5	7.0	14.5	11.9	
Petroleum and Coal Products	25.9	31.9	41.9	43.9	22.5	36.1	6.0	9.5	18.0	18.6	
Other Manufacturing	13.4	16.7	19.5	20.2	7.8	19.3	2.8	5.0	8.8	8.5	
Textile and Apparel	7.5	10.1	12.2	11.9	4.9	12.8	1.8	4.0	5.7	5.7	
Wood and Paper Products	17.4	15.3	12.3	19.8	7.9	22.4	4.2	6.9	5.8	9.9	
Agriculture and Forestry	24.0	28.1	31.8	32.5	26.3	33.1	6.6	7.5	20.0	15.9	

Table 5a—Trade Flows by Trading Partner of Kenya (in percentage)

	Imports									Exports								
	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW
Business Services																		
Air Transport	0.0	0.0	0.0	0.3	0.4	1.0	58.2	0.3	40.2	0.0	0.1	0.0	0.4	1.3	20.7	39.1	2.1	36.4
Communication	0.1	0.0	0.0	1.3	0.2	13.7	53.6	1.9	29.3	0.0	0.0	0.0	0.7	0.0	11.6	60.7	1.6	25.4
Insurance	0.0	0.0	0.0	0.2	0.0	18.6	49.5	1.4	30.3	0.0	0.0	0.0	0.0	0.0	20.6	36.8	4.5	38.1
Business Services nec	0.0	0.0	0.0	0.2	0.3	8.6	53.8	1.6	35.5	0.0	0.0	0.0	0.6	1.1	12.3	33.7	2.0	50.3
Financial Services nec	0.0	0.0	0.0	0.3	0.6	25.2	38.6	1.2	34.0	0.1	0.0	0.0	0.5	0.8	12.5	41.6	3.2	41.3
Transport nec	0.0	0.0	0.0	0.0	1.2	6.0	39.5	4.4	48.9	0.0	0.0	0.0	0.5	0.7	12.4	45.2	3.7	37.5
Water Transport	0.0	0.0	0.0	0.0	0.5	1.8	47.4	0.6	49.7	0.0	0.0	0.0	0.2	0.2	0.8	45.9	0.2	52.7
Dixit-Stigliz Goods																		
Chemicals Mineral and Metal Products	0.3	0.2	0.0	1.2	21.7	2.2	21.2	10.6	42.5	12.8	24.0	4.2	13.1	7.6	0.8	2.8	0.8	33.9
Energy and Minerals	0.1	0.1	0.0	0.1	1.4	0.1	0.1	0.0	98.1	11.4	25.9	8.6	1.8	0.6	0.3	9.6	9.3	32.5
Food Products	4.7	5.5	3.0	14.1	13.2	8.2	11.1	0.9	39.4	6.4	11.7	2.1	13.2	13.0	3.3	31.6	0.7	18.0
Petroleum and Coal Products	0.0	0.0	0.0	1.7	1.3	0.2	2.8	0.1	94.0	7.1	42.0	11.8	8.1	2.1	3.0	12.3	0.8	12.9
Other Manufacturing	0.3	0.1	0.0	0.4	3.2	14.5	35.2	12.2	34.2	12.3	17.5	4.2	25.6	4.0	4.6	13.6	0.3	18.0
Textile and Apparel	2.9	0.7	0.0	1.1	3.2	0.9	4.9	51.2	35.2	3.9	6.4	1.0	3.4	2.1	50.6	13.9	1.6	17.1
Wood and Paper Products	8.0	0.3	0.0	8.1	12.3	1.7	29.5	9.7	30.4	14.3	28.8	6.4	13.3	6.1	2.4	6.4	0.4	22.0
CRTS																		
Agriculture and Forestry	11.3	18.7	0.3	2.4	4.7	14.1	6.7	0.5	41.3	0.6	0.6	0.1	13.4	0.9	2.8	48.1	0.5	32.9
Other Services	0.0	0.1	0.0	0.8	0.9	38.8	30.1	2.0	27.3	0.1	0.0	0.0	0.9	0.9	33.7	26.0	1.7	36.6
Trade	0.1	0.0	0.0	0.5	0.3	11.0	37.9	3.0	47.2	0.0	0.0	0.0	0.6	1.2	12.9	29.7	1.8	53.8
Utilities	0.2	19.1	0.0	0.2	1.8	7.0	41.4	3.2	27.2	0.0	0.1	0.0	0.4	1.9	9.4	47.9	3.4	36.9

Source: GTAP 8.1 dataset.

Table 5b—Trade Flows by Trading Partner of Tanzania (in percentage)

	Imports									Exports								
	Kenya	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW	Kenya	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW
Business Services																		
Air Transport	0.0	0.0	0.0	1.7	1.4	11.5	42.4	1.7	41.9	0.0	0.0	0.0	0.5	1.0	16.3	40.1	3.1	38.9
Communication	0.3	0.0	0.0	2.1	0.0	16.6	46.4	3.9	30.7	0.2	0.0	0.0	0.7	0.6	11.4	58.6	1.7	26.8
Insurance	0.0	0.0	0.0	0.3	0.9	19.8	48.7	1.5	28.8	0.0	0.0	0.0	0.8	0.8	33.2	24.9	6.3	33.9
Business Services nec	0.0	0.0	0.0	0.0	0.0	9.1	60.0	2.5	28.3	0.0	0.0	0.0	0.4	1.2	10.7	51.6	2.4	33.7
Financial Services nec	0.1	0.0	0.0	0.5	0.6	24.9	41.2	2.5	30.3	0.0	0.0	0.0	0.5	0.8	13.0	41.9	2.3	41.5
Transport nec	0.0	0.0	0.0	1.8	0.9	7.2	40.0	4.4	45.7	0.0	0.0	0.0	0.5	0.6	16.3	44.7	3.7	34.2
Water Transport	0.0	0.0	0.0	1.7	0.5	10.2	19.9	10.7	56.9	0.0	0.0	0.0	0.6	0.8	12.0	42.0	3.9	40.6
Dixit-Stigliz Goods																		
Chemicals Mineral and Metal Products	8.0	0.6	0.0	1.1	15.6	0.9	21.9	11.8	40.2	0.9	0.4	0.7	0.7	22.0	0.9	3.8	4.2	66.5
Energy and Minerals	46.7	0.4	0.0	3.9	13.3	0.4	1.4	2.0	31.9	0.2	0.0	0.0	0.2	7.9	1.5	10.0	47.0	33.1
Food Products	11.1	3.1	0.0	0.2	8.5	1.4	11.7	0.8	63.2	5.6	3.5	1.5	0.9	2.2	4.4	52.0	1.7	28.3
Petroleum and Coal Products	1.2	0.0	0.0	1.9	2.7	0.4	1.3	1.1	91.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Manufacturing	2.0	0.1	0.0	1.1	8.7	7.2	41.8	13.9	25.3	12.0	1.7	1.1	2.2	22.7	6.9	24.3	1.5	27.7
Textile and Apparel	6.1	0.5	0.0	0.3	2.5	1.0	3.6	48.7	37.4	10.5	2.1	0.3	2.0	12.4	7.1	28.5	3.9	33.2
Wood and Paper Products	11.4	0.2	0.0	1.6	19.6	1.2	23.6	9.9	32.4	55.0	1.0	0.5	1.6	3.5	1.5	7.5	6.5	22.8
CRTS																		
Agriculture and Forestry	6.9	0.2	0.0	0.3	5.5	11.3	2.7	0.6	72.5	4.9	0.2	0.1	0.6	1.7	6.9	41.0	3.5	41.0
Other Services	0.2	0.0	0.0	0.8	1.0	27.5	35.9	4.4	30.1	0.1	0.0	0.0	0.7	0.8	20.3	38.0	3.1	37.1
Trade	0.0	0.0	0.0	0.6	0.3	13.0	44.3	3.5	38.4	0.0	0.0	0.0	0.5	0.7	12.2	45.6	3.9	37.1
Utilities	0.2	0.4	0.0	0.3	3.1	16.5	35.8	3.5	40.1	0.0	0.0	0.0	0.5	0.7	12.2	45.9	3.9	36.7

Source: GTAP 8.1 dataset.

Table 5c—Trade Flows by Trading Partner of Uganda (in percentage)

	Imports									Exports								
	Kenya	Tanzania	Rwanda	COMESA	SADC	USA	EUR	China	ROW	Kenya	Tanzania	Rwanda	COMESA	SADC	USA	EUR	China	ROW
Business Services																		
Air Transport	0.4	0.0	0.0	2.2	1.1	18.0	44.5	2.2	32.7	0.0	0.0	0.0	0.5	1.1	9.0	22.9	1.9	64.5
Communication	0.5	0.1	0.0	1.6	0.0	15.7	59.2	2.5	20.5	0.2	0.0	0.0	0.6	0.6	11.5	57.1	1.9	28.0
Insurance	0.0	0.0	0.0	0.2	0.2	18.9	50.5	1.2	29.1	0.0	0.0	0.0	0.8	0.8	33.7	24.1	6.2	34.3
Business Services nec	0.0	0.0	0.0	0.2	0.4	9.8	54.5	2.3	32.8	0.0	0.0	0.0	0.4	0.8	12.5	37.7	2.5	46.2
Financial Services nec	0.1	0.0	0.0	0.4	0.7	0.0	55.5	2.0	41.4	0.0	0.0	0.0	0.2	0.5	16.0	51.8	0.7	30.8
Transport nec	0.1	0.1	0.0	1.6	1.4	0.0	41.2	4.7	50.9	0.0	0.0	0.0	0.5	0.7	13.8	45.0	3.7	36.2
Water Transport	0.1	0.1	0.0	1.2	1.0	4.8	26.1	7.8	58.8	0.0	0.0	0.0	0.6	1.1	9.1	21.9	2.0	65.4
Dixit-Stigliz Goods																		
Chemicals Mineral and Metal Products	29.5	0.5	0.2	1.0	12.0	0.9	20.7	4.5	30.7	1.8	2.9	19.1	21.0	1.7	3.1	2.8	1.1	46.5
Energy and Minerals	68.9	0.3	3.7	0.1	1.5	0.7	2.6	2.2	19.9	0.1	0.0	0.0	0.0	0.5	25.8	27.2	5.2	41.2
Food Products	44.7	8.7	0.0	2.0	19.7	6.6	11.7	0.4	6.2	9.1	3.8	10.9	11.8	6.8	1.3	37.0	0.6	18.5
Petroleum and Coal Products	15.2	0.0	0.0	1.2	0.6	0.6	0.9	0.1	81.4	0.1	1.0	10.2	1.2	23.5	7.5	30.8	2.0	23.7
Other Manufacturing	5.5	0.2	0.0	0.7	7.7	4.5	37.9	11.0	32.5	4.7	2.5	6.5	10.6	25.7	2.1	14.9	0.7	32.3
Textile and Apparel	22.9	2.3	0.0	0.2	2.2	0.5	3.2	46.1	22.6	11.9	4.5	7.0	12.6	2.5	5.0	8.8	24.4	23.3
Wood and Paper Products	32.8	0.5	0.1	4.4	9.0	0.7	21.4	5.9	25.3	6.5	1.7	25.0	13.9	2.7	4.1	11.3	1.6	33.1
CRTS																		
Agriculture and Forestry	16.1	2.8	0.5	0.9	1.9	26.4	9.8	0.2	41.4	11.5	0.1	1.6	9.6	1.6	2.5	45.4	0.8	27.0
Other Services	0.3	0.1	0.0	0.7	1.2	33.8	31.4	3.3	29.2	0.1	0.1	0.0	0.8	0.9	26.7	32.2	2.4	36.9
Trade	0.0	0.1	0.0	0.2	0.5	5.3	47.5	9.3	37.1	0.0	0.0	0.0	0.4	1.0	8.2	47.3	7.5	35.6
Utilities	0.0	0.0	0.0	0.2	1.8	3.7	59.8	3.8	30.6	1.4	0.0	0.2	0.1	0.3	7.6	55.2	1.2	34.0

Source: GTAP 8.1 dataset.

Table 5d—Trade Flows by Trading Partner of Rwanda (in percentage)

	Imports									Exports								
	Kenya	Tanzania	Uganda	COMESA	SADC	USA	EUR	China	ROW	Kenya	Tanzania	Uganda	COMESA	SADC	USA	EUR	China	ROW
Business Services																		
Air Transport	0.1	0.0	0.0	0.4	0.8	1.2	52.0	0.4	45.2	0.0	0.1	0.0	0.5	0.9	13.8	39.8	3.2	41.7
Communication	0.3	0.0	0.0	1.7	0.0	2.5	53.9	3.0	38.6	0.2	0.0	0.0	0.6	0.5	11.6	56.2	1.8	28.9
Insurance	0.0	0.0	0.0	0.4	0.0	14.8	50.7	2.0	32.1	0.0	0.0	0.0	0.7	0.7	27.4	24.9	5.0	41.3
Business Services nec	0.0	0.0	0.0	0.2	0.3	13.4	53.5	2.3	30.3	0.0	0.0	0.0	0.6	1.1	11.7	31.7	2.1	52.7
Financial Services nec	0.2	0.0	0.0	1.7	1.9	0.0	0.0	8.5	87.7	0.0	0.0	0.0	0.6	1.0	12.8	24.9	2.0	58.6
Transport nec	0.1	0.1	0.1	2.8	1.2	9.9	34.5	5.0	46.4	0.0	0.0	0.0	0.4	0.5	25.0	42.1	3.2	28.8
Water Transport	0.1	0.1	0.0	1.2	1.0	2.1	44.4	8.2	42.9	0.0	0.1	0.0	0.5	0.7	12.4	40.4	3.4	42.5
Dixit-Stigliz Goods																		
Chemicals Mineral and Metal Products	19.1	3.4	28.6	1.8	3.1	1.1	24.1	3.1	15.6	4.4	0.1	13.7	10.1	0.2	3.1	15.0	3.5	50.0
Energy and Minerals	41.0	0.2	1.5	4.3	0.3	0.2	1.0	1.7	49.8	0.1	0.0	0.2	0.0	0.4	21.8	31.2	9.6	36.7
Food Products	14.3	6.4	34.6	9.5	7.4	7.6	8.6	0.1	11.5	66.9	0.0	0.3	0.8	0.1	8.7	6.6	0.5	16.2
Petroleum and Coal Products	15.1	0.0	0.8	0.2	0.1	1.3	2.1	0.2	80.1	0.0	0.0	0.0	93.3	0.0	0.8	4.2	0.2	1.5
Other Manufacturing	5.6	0.5	1.4	2.3	5.1	2.6	43.9	12.9	25.7	0.6	0.5	4.4	9.5	1.8	13.3	23.4	1.4	45.1
Textile and Apparel	20.3	1.8	9.8	2.0	2.7	1.2	9.1	9.0	44.2	0.0	0.0	1.1	6.3	0.2	5.1	40.5	8.5	38.3
Wood and Paper Products	27.2	0.8	12.8	5.8	6.2	1.0	28.6	4.8	12.9	0.3	0.2	12.5	4.3	0.2	51.2	16.7	0.6	14.0
CRTS																		
Agriculture and Forestry	7.2	5.9	62.9	2.8	4.3	2.0	2.6	0.5	11.8	1.5	0.0	0.6	2.7	8.5	10.1	52.2	0.6	23.9
Other Services	0.3	0.0	0.1	0.8	1.0	33.1	32.8	3.4	28.5	0.1	0.0	0.0	1.0	1.0	39.7	20.3	1.2	36.6
Trade	0.0	0.1	0.0	0.3	0.5	5.4	48.9	9.7	35.1	0.0	0.0	0.0	0.2	1.5	2.6	49.8	12.8	33.1
Utilities	0.0	0.0	1.5	0.2	1.7	4.2	60.5	4.1	27.6	0.0	0.0	0.0	0.0	0.2	5.2	63.3	1.3	29.9

Source: GTAP 8.1 dataset.

Table 5e—Trade Flows by Trading Partner of COMESA (in percentage)

	Imports									Exports								
	Kenya	Tanzania	Uganda	Rwanda	SADC	USA	EUR	China	ROW	Kenya	Tanzania	Uganda	Rwanda	SADC	USA	EUR	China	ROW
Business Services																		
Air Transport	0.2	0.0	0.0	0.0	0.8	8.3	50.4	1.2	39.0	0.0	0.0	0.0	0.0	1.2	20.2	39.3	2.6	36.7
Communication	0.5	0.1	0.0	0.0	0.0	18.3	57.2	3.1	20.8	0.1	0.0	0.0	0.0	0.6	11.9	55.4	2.4	29.5
Insurance	0.0	0.0	0.0	0.0	0.0	18.9	50.6	1.3	29.2	0.0	0.1	0.0	0.0	0.0	22.7	35.3	5.0	36.9
Business Services nec	0.0	0.0	0.0	0.0	0.4	12.3	53.0	2.5	31.9	0.0	0.0	0.0	0.0	1.1	12.1	49.2	2.6	35.0
Financial Services nec	0.1	0.0	0.0	0.0	1.1	0.2	37.7	4.4	56.4	0.0	0.0	0.0	0.0	0.6	14.9	46.9	2.7	34.8
Transport nec	0.1	0.1	0.1	0.0	1.2	11.7	34.7	5.3	47.0	0.0	0.0	0.0	0.0	0.4	26.0	42.4	3.2	27.9
Water Transport	0.2	0.0	0.0	0.0	0.7	0.0	64.5	4.0	30.6	0.0	0.1	0.0	0.0	0.9	10.4	44.7	3.1	40.8
Dixit-Stigliz Goods																		
Chemicals Mineral and Metal Products	0.8	0.0	0.4	0.0	1.8	6.1	34.7	12.7	43.4	0.4	0.2	0.1	0.0	0.7	4.8	40.3	0.8	52.6
Energy and Minerals	0.1	0.0	0.0	0.0	0.2	4.8	10.2	0.9	83.6	0.0	0.0	0.0	0.0	0.0	4.2	11.9	34.5	49.4
Food Products	2.2	0.1	0.9	0.0	1.2	7.3	19.9	1.5	66.9	3.9	0.0	0.2	0.5	2.6	3.9	30.3	0.9	57.7
Petroleum and Coal Products	0.3	0.0	0.0	0.1	0.3	1.9	7.2	5.9	84.4	0.4	0.4	0.1	0.0	0.5	4.8	49.6	0.2	43.9
Other Manufacturing	0.3	0.0	0.0	0.0	1.0	11.4	41.2	14.4	31.7	0.6	1.1	0.4	0.3	1.1	7.0	36.2	1.1	52.3
Textile and Apparel	0.5	0.1	0.1	0.0	0.3	1.2	11.0	44.5	42.3	0.2	0.0	0.0	0.0	0.3	31.5	46.7	2.0	19.2
Wood and Paper Products	0.6	0.0	0.1	0.0	1.0	6.4	38.4	9.3	44.2	4.6	0.4	0.8	0.3	0.8	7.8	28.7	1.5	55.1
CRTS																		
Agriculture and Forestry	4.8	0.1	1.1	0.0	1.1	34.3	8.2	1.0	49.3	0.3	0.0	0.0	0.0	0.4	4.5	38.6	4.1	52.0
Other Services	0.3	0.0	0.1	0.0	0.9	30.8	34.7	3.4	29.7	0.1	0.1	0.0	0.0	1.6	16.4	38.5	3.1	40.2
Trade	0.0	0.1	0.0	0.0	0.3	10.8	43.7	5.2	39.8	0.0	0.1	0.0	0.0	0.8	11.9	45.2	4.6	37.4
Utilities	0.1	0.1	0.1	0.0	2.0	8.2	52.7	3.9	32.9	0.0	0.0	0.0	0.0	1.6	5.5	49.8	2.1	41.0

Source: GTAP 8.1 dataset.

Table 5f—Trade Flows by Trading Partner of SADC (in percentage)

	Imports									Exports								
	Kenya	Tanzania	Uganda	Rwanda	COMESA	USA	EUR	China	ROW	Kenya	Tanzania	Uganda	Rwanda	COMESA	USA	EUR	China	ROW
Business Services																		
Air Transport	0.3	0.0	0.0	0.0	2.3	11.7	48.4	2.3	36.3	0.0	0.0	0.0	0.0	0.4	18.3	40.9	2.7	37.6
Communication	0.0	0.2	0.2	0.0	7.5	17.5	0.0	15.1	59.4	0.0	0.0	0.0	0.0	0.0	12.4	52.9	2.6	32.0
Insurance	0.0	0.0	0.0	0.0	0.0	13.4	50.9	2.0	33.6	0.0	0.1	0.0	0.0	0.0	21.6	36.5	5.0	36.8
Business Services nec	0.0	0.0	0.0	0.0	0.2	12.5	56.6	2.6	28.1	0.0	0.0	0.0	0.0	0.4	13.0	45.6	3.2	37.8
Financial Services nec	0.0	0.0	0.0	0.0	0.3	17.1	44.9	1.9	35.8	0.0	0.0	0.0	0.0	0.2	16.6	51.3	1.7	30.3
Transport nec	0.0	0.1	0.1	0.0	2.0	7.7	47.1	5.3	37.7	0.0	0.1	0.0	0.0	0.5	12.7	45.1	3.7	37.9
Water Transport	0.1	0.0	0.0	0.0	0.5	0.0	53.9	2.7	42.8	0.0	0.0	0.0	0.0	0.3	4.8	46.5	1.4	47.0
Dixit-Stigliz Goods																		
Chemicals Mineral and Metal Products	0.3	0.9	0.0	0.0	0.2	6.3	40.3	10.3	41.7	1.3	0.5	0.2	0.0	0.7	13.9	28.3	7.0	48.1
Energy and Minerals	0.0	0.2	0.1	0.0	0.0	0.5	8.6	0.2	90.4	0.0	0.0	0.0	0.0	0.0	31.1	23.2	24.4	21.3
Food Products	1.4	0.2	0.4	0.0	0.8	4.7	32.8	2.7	57.1	1.6	0.8	0.8	0.2	1.2	5.4	54.4	1.1	34.6
Petroleum and Coal Products	0.1	0.0	0.0	0.0	0.4	11.9	13.1	3.8	70.7	0.8	1.3	0.1	0.0	0.7	20.7	27.4	3.5	45.5
Other Manufacturing	0.0	0.0	0.0	0.0	0.0	10.4	49.4	11.1	29.0	0.7	1.1	0.5	0.1	1.5	15.5	40.9	3.3	36.5
Textile and Apparel	0.2	0.4	0.0	0.0	0.2	1.3	15.0	50.9	32.0	0.5	0.2	0.1	0.0	0.3	31.5	51.8	1.5	14.2
Wood and Paper Products	0.2	0.1	0.0	0.0	0.2	5.5	50.8	12.8	30.4	1.7	1.2	0.4	0.1	1.1	4.0	40.6	2.9	48.1
CRTS																		
Agriculture and Forestry	1.0	0.8	0.6	0.4	0.7	18.2	14.7	7.0	56.6	0.3	0.2	0.0	0.0	1.2	4.3	51.3	10.1	32.5
Other Services	0.1	0.0	0.0	0.0	0.9	20.0	40.5	4.6	33.8	0.0	0.1	0.0	0.0	0.6	16.3	41.3	3.4	38.3
Trade	0.0	0.0	0.0	0.0	0.2	4.0	47.0	10.6	38.2	0.0	0.0	0.0	0.0	0.2	4.2	49.3	11.9	34.2
Utilities	0.0	0.0	0.0	0.0	0.2	3.5	54.9	3.4	37.9	0.0	0.0	0.1	0.0	0.2	7.2	48.1	2.5	41.9

Source: GTAP 8.1 dataset.

Table 6a—Market Shares of Output Produced in Kenya in Sectors with FDI (in percentage).

	Kenya	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW
Business Services										
Air Transport	31	5	0	0	5	1	0	30	0	28
Communication	33	0	0	0	0	1	0	36	0	31
Insurance	85	0	0	0	0	4	5	4	0	3
Business Services nec	98	0	0	0	0	0	0	2	0	0
Financial Services nec	65	0	0	0	0	0	5	27	0	4
Transport nec	74	4	6	1	12	0	0	2	0	2
Water Transport	45	9	0	2	5	0	2	25	5	8

Source: Authors' calculations based on data in Fukui and Lakatos (2012) and appendices D and E.

Table 6b—Market Shares of Output Produced in Tanzania in Sectors with FDI (in percentage).

	Kenya	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW
Business Services										
Air Transport	5	31	0	0	0	5	0	30	3	26
Communication	0	29	0	0	0	24	0	25	0	22
Insurance	48	43	0	0	0	8	0	1	0	0
Business Services nec	0	65	0	0	4	3	7	13	0	9
Financial Services nec	2	62	0	0	0	10	10	15	0	2
Transport nec	5	86	1	0	0	3	0	2	0	3
Water Transport	9	46	0	0	0	5	0	25	6	10

Source: Authors' calculations based on data in Fukui and Lakatos (2012) and appendices D and E.

Table 6c—Market Shares of Output Produced in Uganda in Sectors with FDI (in percentage).

	Kenya	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW
Business Services										
Air Transport	0	0	5	0	0	0	72	19	0	4
Communication	0	0	1	0	0	55	0	14	0	31
Insurance	60	0	12	0	0	4	15	5	0	5
Business Services nec	0	0	78	0	0	0	9	9	0	4
Financial Services nec	0	0	50	0	0	0	50	0	0	0
Transport nec	0	0	67	0	0	0	18	8	0	7
Water Transport	0	0	39	0	0	0	61	0	0	0

Source: Authors' calculations based on data in Fukui and Lakatos (2012) and appendices D and E.

Table 6d—Market Shares of Output Produced in Rwanda in Sectors with FDI (in percentage).

	Kenya	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW
Business Services										
Air Transport	0	0	0	5	0	0	2	92	0	1
Communication	0	0	0	54	0	36	11	0	0	0
Insurance	60	0	0	12	0	4	15	5	0	5
Business Services nec	0	0	0	78	0	0	6	15	0	0
Financial Services nec	0	0	0	50	0	0	26	24	0	0
Transport nec	0	0	0	66	0	0	6	20	0	7
Water Transport	0	0	0	40	0	0	13	0	0	47

Source: Authors' calculations based on data in Fukui and Lakatos (2012) and appendices D and E.

Table 6e—Market Shares of Output Produced in COMESA in Sectors with FDI (in percentage).

	Kenya	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW
Business Services										
Air Transport	0	0	0	0	5	0	2	92	0	1
Communication	0	0	0	0	15	40	0	19	0	26
Insurance	32	0	0	0	32	17	12	3	0	4
Business Services nec	0	0	0	0	78	0	6	15	0	0
Financial Services nec	0	0	0	0	50	0	26	24	0	0
Transport nec	0	0	0	0	66	0	6	20	0	7
Water Transport	0	0	0	0	40	0	13	0	0	47

Source: Authors' calculations based on data in Fukui and Lakatos (2012) and appendices D and E.

Table 6f—Market Shares of Output Produced in SADC in Sectors with FDI (in percentage).

	Kenya	Tanzania	Uganda	Rwanda	COMESA	SADC	USA	EUR	China	ROW
Business Services										
Air Transport	0	0	0	0	0	32	68	0	0	0
Communication	2	0	0	0	0	53	5	28	0	13
Insurance	3	0	0	0	1	81	6	6	0	3
Business Services nec	0	0	0	0	0	80	6	2	0	13
Financial Services nec	0	0	0	0	0	70	12	18	0	0
Transport nec	0	0	0	0	0	74	3	0	0	23
Water Transport	0	0	0	0	0	21	62	0	0	18

Source: Authors' calculations based on data in Fukui and Lakatos (2012) and appendices D and E.

Table 7—Model Elasticities

	Armington elasticities			Supply elasticities				
	Domestic vs Foreign	Foreign vs Foreign	Dixit-Stiglitz	Africa	SADC	China	EUR and ROW	USA
Business Services								
Air Transport			3.0	1.9	3.9	6.0	10.0	15.0
Communication			3.0	2.5	5.2	8.0	13.4	20.0
Insurance			3.0	3.3	3.3	3.3	3.3	10.0
Business Services nec			3.0	2.5	5.2	8.0	13.4	20.0
Financial Services nec			3.0	3.3	3.3	3.3	3.3	10.0
Transport nec			3.0	1.9	2.3	2.6	3.3	10.0
Water Transport			3.0	1.9	3.9	6.0	10.0	15.0
Dixit-Stigliz Goods								
Chemicals Mineral and Metal Products			6.8	1.9	3.9	6.0	10.0	15.0
Energy and Minerals			11.6	3.3	3.3	3.3	3.3	10.0
Food Products			5.1	3.3	3.3	3.3	3.3	10.0
Petroleum and Coal Products			4.2	3.3	3.3	3.3	3.3	10.0
Other Manufacturing			7.7	1.9	3.9	6.0	10.0	15.0
Textile and Apparel			7.6	3.3	3.3	3.3	3.3	10.0
Wood and Paper Products			6.3	3.3	3.3	3.3	3.3	10.0
CRTS								
Agriculture and Forestry	2.5	30.0						
Other Services	1.5	30.0						
Trade	1.5	30.0						
Utilities	2.8	30.0						

Source: Dixit-Stiglitz elasticities in services are based on estimates from Broda and Weinstein (2006). Dixit-Stiglitz elasticities in goods are the estimates of the elasticity of substitution for imports from different regions in the GTAP dataset. Armington elasticities of substitution of domestic for foreign are from the GTAP dataset. Armington elasticities of substitution of foreign for foreign are based on the estimates of Reidel (1988). Supply elasticities are based on the estimates of Schiff, Wang and Olarreaga (2002) and Schiff and Wang (2006).

Table 8: East Africa Customs Union (EACU) Policies: Deep Integration and Multilateral Liberalization (Results are percentage change from initial equilibrium)

Scenario definition	Benchmark	EACU Central: (Trade Facilitation plus services and NTB liberalization)	EACU (only Trade Facilitation) *	EACU (only services liberalization)	EACU (only NTB liberalization)	EACU Liberal: (Multilateral services, NTM refrom plus Trade Facilitation within EACU)	EACU Liberal: (only services liberalization)	EACU Liberal: (only NTB liberalization)
Trade faclitation: 20% reduction of trade costs within EACU countries only	No	Yes	Yes	No	No	Yes	No	No
Trade faclitation: 5% reduction in trade costs with non-EACU countries	No	Yes	Yes	No	No	Yes	No	No
Services Liberalization: 50% reduction of discriminatory FDI barriers within EACU countries	No	Yes	No	Yes	No	Yes	Yes	No
Services Liberalization: 50% multilateral reduction of discriminatory FDI barriers by EACU co	No	No	No	No	No	Yes	Yes	No
Non-Tariff Barriers: 20% reduction of NTB costs within EACU countries	No	Yes	No	No	Yes	Yes	No	Yes
Non-Tariff Barriers: 20% multiltateral reduction of NTB costs by EACU countries	No	No	No	No	No	Yes	No	Yes
Aggregate welfare								
Welfare (EV as % of consumption)								
Kenya		0.96	0.66	0.04	0.10	1.81	0.98	0.14
Tanzania		0.95	0.63	0.03	0.17	7.11	1.24	5.06
Uganda		1.24	1.13	0.04	0.04	2.79	1.54	0.03
Rwanda		1.40	1.21	0.13	0.03	4.95	3.35	0.27
Aggregate trade								
Aggregate exports								
Kenya		6.08	4.46	0.02	1.04	7.74	2.55	0.46
Tanzania		5.57	2.70	-0.03	1.83	16.65	2.51	10.49
Uganda		5.17	4.88	0.02	0.06	7.97	2.96	0.05
Rwanda		9.60	8.83	0.17	0.40	20.12	9.92	1.04
Factor earnings								
Kenya								
Capital		1.38	0.86	0.03	0.31	1.17	0.17	0.09
Unskilled labor		1.56	1.40	0.01	0.08	1.67	0.24	0.02
Skilled labor		0.24	0.13	0.01	0.04	0.11	-0.01	0.05
Resource		2.84	2.78	0.01	0.04	3.49	0.63	0.04
Tanzania								
Capital		0.05	0.35	0.04	-0.21	-0.40	0.33	-1.04
Unskilled labor		0.61	0.62	0.00	0.07	1.29	0.32	0.35
Skilled labor		0.26	0.18	0.01	0.03	1.64	0.13	1.13
Resource		-0.32	0.58	0.00	-0.62	-0.03	0.31	-0.62
Uganda								
Capital		1.60	1.32	0.04	0.10	2.01	0.67	0.05
Unskilled labor		4.65	4.23	0.01	0.29	4.73	0.22	0.02
Skilled labor		1.18	1.04	0.02	0.03	1.17	0.27	0.02
Resource		1.58	1.70	0.02	-0.05	2.52	0.70	0.00
Rwanda								
Capital		-0.47	-0.56	0.16	-0.07	3.04	3.69	-0.20
Unskilled labor		1.11	0.95	0.06	0.00	2.24	1.40	0.00
Skilled labor		0.48	0.43	0.07	0.02	1.46	0.76	0.09
Resource		2.90	2.74	0.12	0.06	7.40	4.76	0.18

* Trade facilitation within EACU is part of the "EACU liberal" scenario also.

Source: Authors' estimates

Table 9: Rents Captured from Deep Integration of the East African Customs Union and the Tripartite FTA (values are percentage of initial consumption of the relevant country)

Scenario definition	Benchmark: Existing rent	EACU Central: (Trade Facilitation plus services and NTB liberalization)	EACU (only Trade Facilitation)	EACU (only services liberalization)	EACU (only NTB liberalization)	EACU Liberal: (Multilateral services and NTB refrom plus Trade Facilitation within EACU)	EACU Liberal: (only services liberalization)	EACU Liberal: (only NTB liberalization)	Tripartite regional integration, central: Trade Facilitation plus services and NTB liberalization	Tripartite regional integration (only Trade Facilitation)	Tripartite regional integration (only services liberalization)	Tripartite regional integration (only NTB liberalization)
Rent affected by the policy												
Foreign Direct Investment												
Kenya	3.210	0.026	0.000	0.026	0.000	0.486	0.486	0.000	0.060	0.000	0.060	0.000
Tanzania	5.012	0.006	0.000	0.006	0.000	0.680	0.680	0.000	0.124	0.000	0.124	0.000
Uganda	1.646	0.044	0.000	0.044	0.000	0.823	0.823	0.000	0.152	0.000	0.152	0.000
Rwanda	3.030	0.116	0.000	0.116	0.000	1.515	1.515	0.000	0.184	0.000	0.184	0.000
COMESA	6.802	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.758	0.000	0.758	0.000
SADC	5.891	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.094	0.000	0.094	0.000
Trade Faciliatation												
Kenya	9.338	0.369	0.369	0.000	0.000	0.369	0.000	0.000	0.675	0.675	0.000	0.000
Tanzania	8.721	0.407	0.407	0.000	0.000	0.407	0.000	0.000	0.680	0.680	0.000	0.000
Uganda	6.348	0.564	0.564	0.000	0.000	0.564	0.000	0.000	0.709	0.709	0.000	0.000
Rwanda	7.480	1.011	1.011	0.000	0.000	1.011	0.000	0.000	1.111	1.111	0.000	0.000
COMESA	6.966	0.005	0.005	0.000	0.000	0.005	0.000	0.000	0.245	0.245	0.000	0.000
SADC	6.222	0.002	0.002	0.000	0.000	0.002	0.000	0.000	0.184	0.184	0.000	0.000
Non-Tariff Barriers												
Kenya	0.375	0.016	0.000	0.000	0.016	0.075	0.000	0.075	0.022	0.000	0.000	0.022
Tanzania	18.910	0.218	0.000	0.000	0.218	3.782	0.000	3.782	0.625	0.000	0.000	0.625
Uganda	0.034	0.001	0.000	0.000	0.001	0.007	0.000	0.007	0.002	0.000	0.000	0.002
Rwanda	1.136	0.073	0.000	0.000	0.073	0.227	0.000	0.227	0.090	0.000	0.000	0.090
COMESA	7.616	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.040	0.000	0.000	0.040
SADC	0.182	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cross-Border Services												
Kenya	3.053	0.000	0.000	0.000	0.000	0.351	0.351	0.000	0.002	0.000	0.002	0.000
Tanzania	3.515	0.000	0.000	0.000	0.000	0.403	0.403	0.000	0.004	0.000	0.004	0.000
Uganda	0.766	0.000	0.000	0.000	0.000	0.383	0.383	0.000	0.004	0.000	0.004	0.000
Rwanda	2.140	0.001	0.000	0.001	0.000	1.070	1.070	0.000	0.009	0.000	0.009	0.000
COMESA	2.256	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.006	0.000
SADC	1.884	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.007	0.000
Total												
Kenya	15.976	0.411	0.369	0.026	0.016	1.281	0.836	0.075	0.759	0.675	0.062	0.022
Tanzania	36.158	0.631	0.407	0.006	0.218	5.272	1.083	3.782	1.433	0.680	0.129	0.625
Uganda	8.794	0.610	0.564	0.045	0.001	1.777	1.206	0.007	0.867	0.709	0.156	0.002
Rwanda	13.786	1.200	1.011	0.116	0.073	3.823	2.585	0.227	1.394	1.111	0.193	0.090
COMESA	23.639	0.005	0.005	0.000	0.000	0.005	0.000	0.000	1.049	0.245	0.764	0.040
SADC	14.179	0.002	0.002	0.000	0.000	0.002	0.000	0.000	0.285	0.184	0.101	0.000

Source: Authors' calculations.

Table 10: 50 Percent Reduction of Non-Discriminatory Services Barriers in Kenya and Tanzania
Results are percentage change from initial equilibrium

Scenario definition	Kenya	Tanzania
50% reduction in ad valorem equivalents of non-discriminatory services barriers in Kenya	Yes	No
50% reduction in ad valorem equivalents of non-discriminatory services barriers in Tanzania	No	Yes
Aggregate welfare		
Welfare (EV as % of consumption)		
Kenya	1.4	0.0
Tanzania	0.0	2.2
Aggregate trade		
Aggregate exports		
Kenya	1.3	0.0
Tanzania	0.0	3.8
Factor earnings		
Kenya		
Capital	0.9	0.0
Unskilled labor	0.3	0.0
Skilled labor	0.2	0.0
Resource	0.6	0.0
Tanzania		
Capital	0.0	1.7
Unskilled labor	0.0	0.5
Skilled labor	0.0	0.3
Resource	0.0	0.3

Source: Authors' estimates

Table 11: Deep Integration in the Tripartite Agreement (Results are percentage change from initial equilibrium)

Scenario definition	Benchmark	Tripartite regional integration, central: (Trade Facilitation plus services and NTB liberalization and tariff reform)	Tripartite regional integration (only Trade Facilitation)	Tripartite regional integration (only services liberalization)	Tripartite regional integration (only NTB liberalization)
Trade faclitation: 20% reduction in trade costs with Tripartite countries*	No	Yes	Yes	No	No
Trade faclitation: 5% reduction in trade costs with non-Tripartite countries	No	Yes	Yes	No	No
Services Liberalization: 50% reduction of discriminatory FDI barriers for Tripartite countries*	No	Yes	No	Yes	No
Non-Tariff Barriers: 20% reduction of NTB costs with Tripartite countries*	No	Yes	No	No	Yes
Aggregate welfare					
Welfare (EV as % of consumption)					
Kenya		3.1	1.3	1.4	0.2
Tanzania		2.2	1.1	0.1	0.6
Uganda		2.4	1.9	0.2	0.1
Rwanda		2.3	1.7	0.2	0.1
COMESA		1.5	0.3	1.0	0.0
SADC		0.8	0.6	0.2	0.0
Aggregate trade					
Aggregate exports					
Kenya		5.9	6.3	-2.3	1.5
Tanzania		10.1	4.9	0.2	3.4
Uganda		7.7	6.9	0.1	0.1
Rwanda		12.9	10.9	0.4	0.4
COMESA		3.4	1.8	0.8	0.3
SADC		2.7	2.3	0.1	0.1
Factor earnings					
Kenya					
Capital		4.5	1.4	2.2	0.7
Unskilled labor		4.1	2.6	0.3	1.3
Skilled labor		0.9	0.4	0.2	-0.1
Resource		7.3	5.0	0.2	2.7
Tanzania					
Capital		0.6	0.9	0.1	-0.3
Unskilled labor		1.4	1.1	0.0	0.2
Skilled labor		0.8	0.4	0.0	0.2
Resource		0.1	0.9	0.0	-0.6
Uganda					
Capital		3.5	2.4	0.1	0.3
Unskilled labor		10.7	7.8	0.0	1.2
Skilled labor		3.1	2.1	0.1	0.1
Resource		0.7	1.3	0.0	-0.2
Rwanda					
Capital		1.8	0.8	0.2	0.0
Unskilled labor		11.1	7.8	0.1	0.2
Skilled labor		0.0	-0.3	0.1	0.0
Resource		-0.3	0.7	0.2	0.0
COMESA					
Capital		0.3	0.1	0.2	0.0
Unskilled labor		0.6	0.4	0.2	0.0
Skilled labor		0.7	0.2	0.4	0.0
Resource		0.4	0.4	0.0	0.0
SADC					
Capital		0.9	0.6	0.2	0.1
Unskilled labor		1.1	0.7	0.1	0.1
Skilled labor		0.5	0.4	0.1	0.0
Resource		0.6	0.6	0.0	0.0

*Tripartite countries are EAC, COMESA and SADC

Source: Authors' estimates

Table 12a. Output Impacts in Kenya from EACU Regional Deep Integration and Multilateral Liberalization (results are percentage change from initial equilibrium)

Scenario definitions (see tables 8 and 10).	EACU Central: (Trade Facilitation plus services and NTB liberalization)	EACU (only Trade Facilitation)	EACU (only services liberalization)	EACU (only NTB liberalization)	EACU (only unilateral tariff liberalization)	EACU Liberal: (Multilateral services, NTM and tariff refrom plus Trade Facilitation within EACU)	EACU Liberal: (only services liberalization)	EACU Liberal: (only NTB liberalization)	Tripartite regional integration, central: (Trade Facilitation plus services and NTB liberalization and tariff reform)	Tripartite regional integration (only Trade Facilitation)	Tripartite regional integration (only services liberalizatio n)	Tripartite regional integration (only NTB liberalization)	Tripartite regional integration (only tariff reform)
Business Services													
Air Transport	-0.5	-0.3	-0.2	-0.1	0.2	-1.7	-1.4	0.1	-1.5	-0.6	-0.3	-0.6	0.3
Communication	-0.5	-0.4	0.0	-0.1	0.2	0.2	0.6	0.1	-1.3	-0.8	0.2	-0.8	0.2
Insurance	0.4	0.3	0.0	0.1	0.1	-2.8	-3.1	0.1	1.4	0.5	0.9	-0.1	-0.1
Business Services nec	0.5	0.3	0.0	0.1	0.2	-2.9	-3.3	0.1	0.5	0.4	0.1	-0.1	0.2
Financial Services nec	0.7	0.5	0.0	0.1	0.1	0.3	-0.3	0.1	1.4	0.8	0.6	0.0	0.1
Transport nec	0.1	0.1	0.0	0.0	0.2	0.5	0.4	0.1	-0.1	0.1	0.1	-0.3	0.3
Water Transport	0.4	-0.2	0.7	-0.1	0.2	-0.4	-0.3	0.1	-0.7	-0.4	0.2	-0.6	0.3
Dixit-Stigliz Goods													
Chemicals Mineral and Metal Products	4.1	2.1	0.0	1.4	0.3	3.5	1.1	0.2	2.3	1.3	-0.3	0.6	-1.6
Energy and Minerals	9.3	5.0	0.0	3.9	0.4	10.4	1.6	3.5	7.2	4.6	-0.6	2.1	0.9
Food Products	0.4	0.0	0.0	0.2	0.1	1.2	0.9	0.2	0.6	0.0	0.4	-0.2	-0.7
Petroleum and Coal Products	1.3	0.9	0.0	0.3	0.2	1.6	0.8	0.0	0.4	0.4	0.1	-0.2	-0.2
Other Manufacturing	0.8	-0.1	0.0	0.6	0.3	0.7	0.9	-0.1	0.0	-0.1	-0.3	-0.1	-0.9
Textile and Apparel	0.2	-0.3	0.0	0.4	0.2	1.9	2.1	0.1	-1.2	-0.8	-0.1	-0.4	0.2
Wood and Paper Products	0.4	-0.4	0.0	0.7	0.3	0.8	1.4	-0.2	-3.7	-3.0	-0.3	-0.6	-1.1
CRTS													
Agriculture and Forestry	1.7	1.9	0.0	-0.2	-0.1	2.7	0.8	-0.1	4.4	3.3	0.0	1.8	1.3
Other Services	-1.2	-1.0	0.0	-0.2	0.3	0.2	1.2	0.0	-2.6	-1.7	-0.2	-1.3	0.2
Trade	0.9	0.7	0.0	0.1	0.1	1.2	0.4	0.1	1.7	1.3	0.1	0.4	0.5
Utilities	0.8	0.3	0.0	0.3	0.2	1.4	0.9	0.1	0.6	0.2	0.3	-0.2	-0.3

*Tripartite partners are EAC, COMESA and SADC.

Source: Authors' estimates

Table 12b. Output Impacts in Tanzania from EACU Regional Deep Integration and Multilateral Liberalization (results are percentage change from initial equilibrium)

Scenario definitions (see tables 8 and 10).	EACU Central: (Trade Facilitation plus services and NTB liberalization)	EACU (only Trade Facilitation)	EACU (only services liberalization)	EACU (only NTB liberalization)	EACU (only unilateral tariff liberalization)	EACU Liberal: (Multilateral services, NTM and tariff refrom plus Trade Facilitation within EACU)	EACU Liberal: (only services liberalization)	EACU Liberal: (only NTB liberalization)	Tripartite regional integration, central: (Trade Facilitation plus services and NTB liberalization and tariff reform)	Tripartite regional integration (only Trade Facilitation)	Tripartite regional integration (only services liberalizatio n)	Tripartite regional integration (only NTB liberalization)	Tripartite regional integration (only tariff reform)
Business Services													
Air Transport	0.8	0.2	0.1	0.3	0.2	1.3	-3.8	4.6	1.4	0.3	0.2	0.6	-0.1
Communication	0.6	0.1	0.0	0.2	0.2	6.6	2.2	4.0	1.6	0.2	0.5	0.6	-0.2
Insurance	1.2	-0.2	0.9	0.2	0.2	8.5	5.4	3.0	2.4	-0.4	2.0	0.5	-0.2
Business Services nec	0.7	0.1	0.0	0.3	0.2	7.0	2.4	4.1	1.6	0.2	0.3	0.7	-0.2
Financial Services nec	0.5	-0.1	0.2	0.2	0.2	6.0	2.7	3.2	2.0	-0.2	1.4	0.5	-0.2
Transport nec	0.6	0.1	0.0	0.2	0.2	4.6	0.5	3.8	1.1	0.2	0.1	0.6	-0.1
Water Transport	0.5	0.0	0.0	0.2	0.2	3.3	0.2	3.0	0.7	0.0	0.0	0.5	-0.1
Dixit-Stigliz Goods													
Chemicals Mineral and Metal Products	-0.5	-0.1	0.0	-0.4	0.3	-0.5	0.8	-1.7	0.9	1.9	0.0	-1.1	-0.3
Energy and Minerals	-2.0	-0.5	0.0	-1.4	0.5	0.8	0.7	0.9	-2.7	-0.9	0.0	-1.4	-0.7
Food Products	-0.9	0.0	0.0	-0.6	0.2	-1.6	0.9	-2.0	-0.8	0.0	0.1	-0.7	0.1
Petroleum and Coal Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Manufacturing	-0.3	-0.5	0.0	0.0	0.3	-11.0	0.6	-11.8	-2.3	-0.6	0.0	-1.6	-0.4
Textile and Apparel	-0.6	-0.3	0.0	-0.7	0.5	-8.9	0.6	-9.5	-0.7	-0.3	0.1	-0.6	0.7
Wood and Paper Products	-1.8	0.3	0.0	-2.0	0.6	-11.8	0.9	-13.8	-11.6	-4.5	0.2	-5.6	-0.9
CRTS													
Agriculture and Forestry	1.8	1.4	0.0	0.5	-0.3	4.5	0.2	2.9	3.3	2.0	0.0	0.9	0.6
Other Services	0.5	0.0	0.0	0.2	0.2	4.9	0.9	3.5	0.9	0.0	0.0	0.6	-0.2
Trade	0.2	-0.2	0.0	0.1	0.3	3.8	1.2	2.8	0.3	-0.3	0.1	0.3	-0.3
Utilities	0.3	0.1	0.0	0.0	0.2	3.6	1.2	2.1	0.7	0.3	0.1	0.0	-0.2

*Tripartite partners are EAC, COMESA and SADC

Source: Authors' estimates

Table 12c. Output Impacts in Uganda from EACU Regional Deep Integration and Multilateral Liberalization (results are percentage change from initial equilibrium)

Scenario definitions (see tables 8 and 10).	EACU Central: (Trade Facilitation plus services and NTB liberalization)	EACU (only Trade Facilitation)	EACU (only services liberalization)	EACU (only NTB liberalization)	EACU (only unilateral tariff liberalization)	EACU Liberal: (Multilateral services, NTM and tariff refrom plus Trade Facilitation within EACU)	EACU Liberal: (only services liberalization)	EACU Liberal: (only NTB liberalization)	Tripartite regional integration, central: (Trade Facilitation plus services and NTB liberalization and tariff reform)	Tripartite regional integration (only Trade Facilitation)	Tripartite regional integration (only services liberalizatio n)	Tripartite regional integration (only NTB liberalization)	Tripartite regional integration (only tariff reform)
Business Services													
Air Transport	-1.3	-0.9	0.1	-0.3	0.3	1.0	2.0	0.0	-5.7	-3.5	0.2	-0.9	-8.2
Communication	0.0	0.0	0.1	-0.1	0.1	2.8	2.9	0.0	0.3	-0.2	0.9	-0.2	-2.9
Insurance	3.2	-1.0	4.3	-0.1	0.2	2.5	3.5	0.0	1.5	-2.2	4.9	-0.5	-5.5
Business Services nec	-0.5	-0.4	0.0	-0.1	0.2	-0.3	0.5	0.0	-1.6	-1.1	0.1	-0.3	-5.0
Financial Services nec	-0.1	-0.1	0.1	-0.1	0.2	1.1	1.2	0.0	-1.1	-0.8	0.3	-0.3	-4.9
Transport nec	-0.5	-0.4	0.0	-0.1	0.1	-0.6	-0.2	0.0	-1.7	-1.1	0.1	-0.3	-3.0
Water Transport	-1.7	-1.3	0.0	-0.2	0.3	-0.3	1.1	0.0	-5.9	-3.8	0.1	-0.8	-6.8
Dixit-Stigliz Goods													
Chemicals Mineral and Metal Products	0.1	-0.8	0.0	0.3	0.3	1.5	2.1	0.0	1.0	0.4	0.2	0.4	-9.4
Energy and Minerals	-2.3	-1.8	0.0	-0.3	0.5	0.1	2.0	0.0	-8.9	-5.7	0.1	-1.3	-11.8
Food Products	0.6	0.1	0.0	0.2	0.3	2.6	1.9	0.3	-1.4	-1.1	0.2	0.2	-23.9
Petroleum and Coal Products	-13.1	-11.2	0.0	-0.3	0.3	-9.1	1.4	-0.2	-19.1	-14.4	0.1	-0.9	-10.8
Other Manufacturing	-3.6	-3.5	0.0	-0.2	0.4	-1.5	2.1	0.0	-8.2	-6.1	0.1	-0.8	-10.4
Textile and Apparel	-3.6	-3.8	0.0	0.1	0.4	-1.7	2.0	0.0	-9.0	-7.1	0.2	-0.3	-13.1
Wood and Paper Products	-7.4	-7.3	0.1	-0.1	0.3	-4.6	2.4	0.0	-13.4	-11.6	0.3	-0.5	-13.9
CRTS													
Agriculture and Forestry	6.5	6.1	0.0	0.4	-0.7	7.6	0.8	0.0	14.2	10.8	0.0	1.8	24.9
Other Services	-1.2	-1.1	0.0	-0.1	0.2	0.0	1.3	0.0	-2.2	-1.8	0.1	-0.5	-3.1
Trade	-1.3	-1.3	0.1	-0.1	0.3	0.9	2.8	0.0	-2.2	-1.9	0.2	-0.6	-5.8
Utilities	-1.8	-1.5	0.0	-0.2	0.3	0.2	1.6	0.0	-4.4	-3.2	0.1	-0.7	-6.7

*Tripartite partners are EAC, COMESA and SADC

Source: Authors' estimates

Table 12d. Output Impacts in Rwanda from EACU Regional Deep Integration and Multilateral Liberalization (results are percentage change from initial equilibrium)

Scenario definitions (see tables 8 and 10).	EACU Central: (Trade Facilitation plus services and NTB liberalization)	EACU (only Trade Facilitation)	EACU (only services liberalization)	EACU (only NTB liberalization)	EACU (only unilateral tariff liberalization)	EACU Liberal: (Multilateral services, NTM and tariff refrom plus Trade Facilitation within EACU)	EACU Liberal: (only services liberalization)	EACU Liberal: (only NTB liberalization)	Tripartite regional integration, central: (Trade Facilitation plus services and NTB liberalization and tariff reform)	Tripartite regional integration (only Trade Facilitation)	Tripartite regional integration (only services liberalizatio n)	Tripartite regional integration (only NTB liberalization)	Tripartite regional integration (only tariff reform)
Business Services													
Air Transport	1.6	1.5	0.1	0.1	0.0	4.4	2.5	0.3	-4.4	-2.8	0.2	-0.1	0.2
Communication	1.4	1.3	0.1	0.1	0.0	5.9	3.9	0.4	-2.9	-2.5	1.0	-0.1	0.2
Insurance	3.7	1.6	1.9	0.1	0.0	2.5	0.4	0.3	-0.3	-1.3	2.2	0.0	0.2
Business Services nec	1.3	1.3	0.1	0.1	0.1	-4.5	-6.1	0.3	-6.6	-4.2	0.0	-0.1	0.3
Financial Services nec	1.3	1.3	0.0	0.1	0.0	0.9	-0.8	0.3	-2.8	-1.7	0.0	0.0	0.2
Transport nec	0.8	0.7	0.0	0.0	0.0	1.6	0.5	0.2	-3.4	-2.2	0.1	0.0	0.1
Water Transport	0.8	0.7	0.1	0.0	0.0	3.6	2.3	0.2	-4.1	-2.7	0.2	-0.1	0.1
Dixit-Stigliz Goods													
Chemicals Mineral and Metal Products	-19.9	-18.9	0.1	-0.6	0.1	-15.5	3.9	-1.7	-32.2	-27.3	0.2	-0.6	-1.1
Energy and Minerals	3.9	3.6	0.3	0.1	0.1	18.8	14.5	0.4	-8.3	-4.8	0.4	-0.1	0.5
Food Products	-3.9	-3.5	0.1	-0.3	-0.1	-0.2	3.8	-0.5	-10.8	-8.7	0.3	-0.2	0.5
Petroleum and Coal Products	-8.9	-7.8	0.2	-0.2	0.1	1.0	2.7	-2.6	-2.0	-1.6	0.3	1.0	0.1
Other Manufacturing	0.1	0.2	0.0	0.0	0.1	-0.3	1.0	-1.6	-13.0	-8.7	0.0	-0.3	-2.7
Textile and Apparel	-0.3	0.0	0.2	-0.3	0.0	7.1	7.9	-1.4	-11.1	-7.5	0.4	-0.3	0.3
Wood and Paper Products	-8.7	-7.8	0.2	-0.7	0.1	-1.5	8.2	-2.2	-26.4	-20.8	0.5	-1.0	-1.1
CRTS													
Agriculture and Forestry	2.8	2.5	0.1	0.1	-0.1	4.4	2.0	0.2	15.4	11.5	0.1	0.3	-0.1
Other Services	1.2	1.1	0.1	0.1	0.1	4.9	3.2	0.4	-4.5	-3.4	0.2	-0.1	0.3
Trade	-1.9	-1.8	0.1	-0.1	0.0	2.1	3.7	-0.2	-6.8	-5.5	0.1	-0.2	-0.1
Utilities	0.6	0.6	0.1	0.1	0.1	13.7	8.0	1.2	-13.5	-9.8	0.3	-0.2	0.4

*Tripartite partners are EAC, COMESA and SADC

Source: Authors' estimates

Table 12e. Output Impacts in COMESA from the Deep Integration in the Tripartite Free Trade Agreement (results are percentage change from initial equilibrium)

Scenario definitions (see tables 8 and 10).	EACU Central: (Trade Facilitation plus services and NTB liberalization)	EACU (only Trade Facilitation)	EACU (only services liberalization)	EACU (only NTB liberalization)	EACU (only unilateral tariff liberalization)	EACU Liberal: (Multilateral services, NTM and tariff refrom plus Trade Facilitation within EACU)	EACU Liberal: (only services liberalization)	EACU Liberal: (only NTB liberalization)	Tripartite regional integration, central: (Trade Facilitation plus services and NTB liberalization and tariff reform)	Tripartite regional integration (only Trade Facilitation)	Tripartite regional integration (only services liberalizatio n)	Tripartite regional integration (only NTB liberalization)	Tripartite regional integration (only tariff reform)
Business Services													
Air Transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.1	0.8	0.1	0.1
Communication	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.2	1.9	0.0	0.0
Insurance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6	0.2	13.3	0.0	0.0
Business Services nec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.2	0.9	0.0	0.0
Financial Services nec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.2	0.9	0.0	0.0
Transport nec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.1	0.8	0.0	0.1
Water Transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.1	0.7	0.0	0.1
Dixit-Stigliz Goods													
Chemicals Mineral and Metal Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.8	0.8	-0.1	-0.1
Energy and Minerals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.1	0.6	0.1	0.1
Food Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.9	0.0	-0.4
Petroleum and Coal Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	-0.3	0.9	0.1	0.0
Other Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	-0.6	0.8	0.0	-0.2
Textile and Apparel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	-0.2	0.9	0.1	0.1
Wood and Paper Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	-0.6	1.2	0.0	0.0
CRTS													
Agriculture and Forestry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.0	0.8	-0.1	0.0
Other Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.1	0.7	0.1	0.1
Trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.9	0.0	0.0
Utilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.9	0.0	0.0

*Tripartite partners are EAC, COMESA and SADC.

Source: Authors' estimates

Table 12f. Output Impacts in SADC from Regional Deep Integration through the Tripartite Free Trade Agreement (results are percentage change from initial equilibrium)

Scenario definitions (see tables 8 and 10).	EACU Central: (Trade Facilitation plus services and NTB liberalization)	EACU (only Trade Facilitation)	EACU (only services liberalization)	EACU (only NTB liberalization)	EACU (only unilateral tariff liberalization)	EACU Liberal: (Multilateral services, NTM and tariff refrom plus Trade Facilitation within EACU)	EACU Liberal: (only services liberalization)	EACU Liberal: (only NTB liberalization)	Tripartite regional integration, central: (Trade Facilitation plus services and NTB liberalization and tariff reform)	Tripartite regional integration (only Trade Facilitation)	Tripartite regional integration (only services liberalizatio n)	Tripartite regional integration (only NTB liberalization)	Tripartite regional integration (only tariff reform)
Business Services													
Air Transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1	0.0	0.0
Communication	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.4	0.0	0.1
Insurance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	0.1	0.0	0.1
Business Services nec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.1
Financial Services nec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.3	0.1	0.0	0.0
Transport nec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.0	0.1
Water Transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.0	0.0
Dixit-Stigliz Goods													
Chemicals Mineral and Metal Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.1	0.0	0.2
Energy and Minerals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.7	-0.1	0.0	-0.1	-0.2
Food Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.2	0.0	1.1
Petroleum and Coal Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	0.1	0.0	0.0
Other Manufacturing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.2	-1.0	0.1	0.0	0.3
Textile and Apparel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.8	-0.7	0.2	0.0	0.0
Wood and Paper Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4	-0.3	0.1	0.0	0.2
CRTS													
Agriculture and Forestry	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	3.9	0.1	0.3	-0.6
Other Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1	0.0	0.0
Trade	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.1	0.0	0.2
Utilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.6	-0.4	0.1	-0.1	0.0

*Tripartite partners are EAC, COMESA and SADC.

Source: Authors' estimates

Table 13a: Piecemeal Sensitivity Analysis: Impact on Kenya of EACU Deep Integration and Multilateral Liberalization

				Equivalent Variation as a % of Consumption					
	Parameter Value			EACU Deep Integration			EACU Liberalization		
Parameter	Lower	Central	Upper	Lower	Central	Upper	Lower	Central	Upper
$\sigma(q_i, q_j)$ – services sectors	2	3	4	0.96	0.96	0.96	1.81	1.81	1.83
$\sigma(q_i, q_j)$ – goods sectors		see below		0.78	0.96	1.16	1.90	1.81	1.87
σ(va, bs)	0.625	1.25	1.875	0.96	0.96	0.96	1.79	1.81	1.83
σ(D, M)		see below		0.95	0.96	0.97	1.80	1.81	1.83
σ(M, M)	GTAP values	30		1.06	0.96	NA	1.86	1.81	NA
σ(L, K)	0.5	1	1.5	0.96	0.96	0.96	1.82	1.81	1.81
$\sigma(A_1,\ldots A_n)$	0	0	0.25	NA	0.96	0.96	NA	1.81	1.81
$\varepsilon_{EACU}, \varepsilon_{COMESA}, \varepsilon_{SADC}$ $\varepsilon_{EU}, \varepsilon_{ROW}, \varepsilon_{USA}, \varepsilon_{CHINA}$	Lower (upper) values are 0.5 (1.5) central values. See table 7 for central values.			0.94	0.96	0.99	1.67	1.81	1.90
θ_r	0	0	1	NA	0.96	0.91	NA	1.81	0.77
θ_m	0.025	0.05	0.075	0.96	0.96	0.96	1.81	1.81	1.81

$\sigma(q_i, q_j)$ – IRTS goods	**Parameter Value**		
chemicals and metals	3.4	6.8	10.2
energy and minerals	5.8	11.6	17.4
food products	2.6	5.1	7.7
petroleum and coal prod.	2.1	4.2	6.3
other manufacturing	3.9	7.7	11.6
textiles, apparel and leather	3.8	7.6	11.4
wood and paper products	3.2	6.3	9.5

σ(D, M)--CRTS sectors	**Parameter Value**		
	Lower	Central	Upper
agriculture and forestry	1.3	2.5	3.8
other services	0.8	1.5	2.3
trade	0.8	1.5	2.3
utilities	1.4	2.8	4.2

Key:

$\sigma(q_i, q_j)$: Elasticity of substitution between firm varieties in imperfectly competitive sectors

σ(va, bs): Elasticity of substitution between value-added and business services

σ(D, M): Elasticity of substitution between domestic goods and imports in CRTS sectors

σ(M, M): Elasticity of substitution between imports from different regions in CRTS sectors

σ(L, K): Elasticity of substitution between primary factors of production in value added

$\sigma(A_1,\ldots A_n)$: Elasticity of substitution in intermediate production between composite Armington aggregate goods

$\varepsilon_{ROW}, \varepsilon_{EU}, \varepsilon_{CHINA}, \varepsilon_{USA}$ $\varepsilon_{EACU}, \varepsilon_{COMESA}, \varepsilon_{SADC}$: Vectors of elasticities of imperfectly competitive firms' supply in the Rest World, EU, China. USA, EACU, COMESA and SADC with respect to the price of their outputs.

θ_r: Share of rents in services sectors captured by domestic agents

θ_m: Shares of value added in multinational firms due to specialized primary factor imports

Source: Authors' estimates.

Table 13b: Piecemeal Sensitivity Analysis: Impact on Tanzania of EACU Deep Integration and Multilateral Liberalization

in Equivalent Variation (EV) as a percentage of consumption

	Parameter Value			Equivalent Variation: EACU Deep Integration			EACU Liberalization		
Parameter	Lower	Central	Upper	Lower	Central	Upper	Lower	Central	Upper
$\sigma(q_i, q_j)$ – services sectors	2	3	4	0.95	0.95	0.95	7.13	7.11	7.11
$\sigma(q_i, q_j)$ – goods sectors		see below		0.85	0.95	1.06	6.76	7.11	7.64
σ(va, bs)	0.625	1.25	1.875	0.95	0.95	0.95	7.08	7.11	7.14
σ(D, M)		see below		0.94	0.95	0.95	7.10	7.11	7.13
σ(M, M)	GTAP values	30		0.98	0.95	NA	7.04	7.11	NA
σ(L, K)	0.5	1	1.5	0.95	0.95	0.95	7.12	7.11	7.11
$\sigma(A_1,\ldots A_n)$	0	0	0.25	NA	0.95	0.95	NA	7.11	7.11
$\varepsilon_{EACU}, \varepsilon_{COMESA}, \varepsilon_{SADC}$ $\varepsilon_{EU}, \varepsilon_{ROW}, \varepsilon_{USA}, \varepsilon_{CHINA}$	Lower (upper) values are 0.5 (1.5) central values. See table 7 for central values.			0.97	0.95	0.93	7.10	7.11	7.09
θ_r	0	0	1	NA	0.95	0.68	NA	7.11	1.05
θ_m	0.025	0.05	0.075	0.95	0.95	0.95	7.11	7.11	7.11

$\sigma(q_i, q_j)$ – IRTS goods	**Parameter Value**		
chemicals and metals	3.4	6.8	10.2
energy and minerals	5.8	11.6	17.4
food products	2.6	5.1	7.7
petroleum and coal prod.	2.1	4.2	6.3
other manufacturing	3.9	7.7	11.6
textiles, apparel and leather	3.8	7.6	11.4
wood and paper products	3.2	6.3	9.5

σ(D, M)--CRTS sectors	**Parameter Value**		
	Lower	Central	Upper
agriculture and forestry	1.3	2.5	3.8
other services	0.8	1.5	2.3
trade	0.8	1.5	2.3
utilities	1.4	2.8	4.2

Key:

$\sigma(q_i, q_j)$: Elasticity of substitution between firm varieties in imperfectly competitive sectors

σ(va, bs): Elasticity of substitution between value-added and business services

σ(D, M): Elasticity of substitution between domestic goods and imports in CRTS sectors

σ(M, M): Elasticity of substitution between imports from different regions in CRTS sectors

σ(L, K): Elasticity of substitution between primary factors of production in value added

$\sigma(A_1,\ldots A_n)$: Elasticity of substitution in intermediate production between composite Armington aggregate goods

$\varepsilon_{ROW}, \varepsilon_{EU}, \varepsilon_{CHINA}, \varepsilon_{USA}$ $\varepsilon_{EACU}, \varepsilon_{COMESA}, \varepsilon_{SADC}$: Vectors of elasticities of imperfectly competitive firms' supply in the Rest World, EU, China. USA, EACU, COMESA and SADC with respect to the price of their outputs.

θ_r: Share of rents in services sectors captured by domestic agents

θ_m: Shares of value added in multinational firms due to specialized primary factor imports

Source: Authors' estimates.

Table 13c: Piecemeal Sensitivity Analysis: Impact on Uganda of EACU Deep Integration and Multilateral Liberalization

in Equivalent Variation (EV) as a percentage of consumption

	Parameter Value			Equivalent Variation: EACU Deep Integration			EACU Liberalization		
Parameter	Lower	Central	Upper	Lower	Central	Upper	Lower	Central	Upper
$\sigma(q_i, q_j)$ – services sectors	2	3	4	1.25	1.24	1.24	2.75	2.79	2.82
$\sigma(q_i, q_j)$ – goods sectors		see below		1.09	1.24	1.35	2.90	2.79	2.79
σ(va, bs)	0.625	1.25	1.875	1.24	1.24	1.24	2.74	2.79	2.83
σ(D, M)		see below		1.22	1.24	1.27	2.77	2.79	2.81
σ(M, M)	GTAP values	30		1.24	1.24	NA	2.76	2.79	NA
σ(L, K)	0.5	1	1.5	1.27	1.24	1.23	2.81	2.79	2.78
$\sigma(A_1,\ldots A_n)$	0	0	0.25	NA	1.24	1.24	NA	2.79	2.79
$\varepsilon_{EACU}, \varepsilon_{COMESA}, \varepsilon_{SADC}$ $\varepsilon_{EU}, \varepsilon_{ROW}, \varepsilon_{USA}, \varepsilon_{CHINA}$	Lower (upper) values are 0.5 (1.5) central values. See table 7 for central values.			1.25	1.24	1.24	2.58	2.79	2.91
θ_r	0	0	1	NA	1.24	1.19	NA	2.79	1.38
θ_m	0.025	0.05	0.075	1.24	1.24	1.24	2.79	2.79	2.79

$\sigma(q_i, q_j)$ – IRTS goods	**Parameter Value**		
chemicals and metals	3.4	6.8	10.2
energy and minerals	5.8	11.6	17.4
food products	2.6	5.1	7.7
petroleum and coal prod.	2.1	4.2	6.3
other manufacturing	3.9	7.7	11.6
textiles, apparel and leather	3.8	7.6	11.4
wood and paper products	3.2	6.3	9.5

σ(D, M)--CRTS sectors	**Parameter Value**		
	Lower	Central	Upper
agriculture and forestry	1.3	2.5	3.8
other services	0.8	1.5	2.3
trade	0.8	1.5	2.3
utilities	1.4	2.8	4.2

Key:

$\sigma(q_i, q_j)$: Elasticity of substitution between firm varieties in imperfectly competitive sectors

σ(va, bs): Elasticity of substitution between value-added and business services

σ(D, M): Elasticity of substitution between domestic goods and imports in CRTS sectors

σ(M, M): Elasticity of substitution between imports from different regions in CRTS sectors

σ(L, K): Elasticity of substitution between primary factors of production in value added

$\sigma(A_1,\ldots A_n)$: Elasticity of substitution in intermediate production between composite Armington aggregate goods

$\varepsilon_{ROW}, \varepsilon_{EU}, \varepsilon_{CHINA}, \varepsilon_{USA}$ $\varepsilon_{EACU}, \varepsilon_{COMESA}, \varepsilon_{SADC}$: Vectors of elasticities of imperfectly competitive firms' supply in the Rest World, EU, China. USA, EACU, COMESA and SADC with respect to the price of their outputs.

θ_r: Share of rents in services sectors captured by domestic agents

θ_m: Shares of value added in multinational firms due to specialized primary factor imports

Source: Authors' estimates.

Table 13d: Piecemeal Sensitivity Analysis: Impact on Rwanda of EACU Deep Integration and Multilateral Liberalization

in Equivalent Variation (EV) as a percentage of consumption

	Parameter Value			Equivalent Variation: EACU Deep Integration			EACU Liberalization		
Parameter	Lower	Central	Upper	Lower	Central	Upper	Lower	Central	Upper
$\sigma(q_i, q_j)$ – services sectors	2	3	4	1.40	1.40	1.40	4.91	4.95	4.99
$\sigma(q_i, q_j)$ – goods sectors		see below		1.32	1.40	1.44	5.32	4.95	4.90
σ(va, bs)	0.625	1.25	1.875	1.42	1.40	1.39	4.88	4.95	5.03
σ(D, M)		see below		1.41	1.40	1.40	4.95	4.95	4.95
σ(M, M)	GTAP values	30		1.32	1.40	NA	4.87	4.95	NA
σ(L, K)	0.5	1	1.5	1.41	1.40	1.40	4.94	4.95	4.95
$\sigma(A_1,\ldots A_n)$	0	0	0.25	NA	1.40	1.40	NA	4.95	4.95
$\varepsilon_{EACU}, \varepsilon_{COMESA}, \varepsilon_{SADC}$ $\varepsilon_{EU}, \varepsilon_{ROW}, \varepsilon_{USA}, \varepsilon_{CHINA}$	Lower (upper) values are 0.5 (1.5) central values. See table 7 for central values.			1.46	1.40	1.36	4.45	4.95	5.27
θ_r	0	0	1	NA	1.40	1.18	NA	4.95	1.66
θ_m	0.025	0.05	0.075	1.40	1.40	1.40	4.95	4.95	4.95

$\sigma(q_i, q_j)$ – IRTS goods	**Parameter Value**		
chemicals and metals	3.4	6.8	10.2
energy and minerals	5.8	11.6	17.4
food products	2.6	5.1	7.7
petroleum and coal prod.	2.1	4.2	6.3
other manufacturing	3.9	7.7	11.6
textiles, apparel and leather	3.8	7.6	11.4
wood and paper products	3.2	6.3	9.5

σ(D, M)--CRTS sectors	**Parameter Value**		
	Lower	Central	Upper
agriculture and forestry	1.3	2.5	3.8
other services	0.8	1.5	2.3
trade	0.8	1.5	2.3
utilities	1.4	2.8	4.2

Key:

$\sigma(q_i, q_j)$: Elasticity of substitution between firm varieties in imperfectly competitive sectors

σ(va, bs): Elasticity of substitution between value-added and business services

σ(D, M): Elasticity of substitution between domestic goods and imports in CRTS sectors

σ(M, M): Elasticity of substitution between imports from different regions in CRTS sectors

σ(L, K): Elasticity of substitution between primary factors of production in value added

$\sigma(A_1,\ldots A_n)$: Elasticity of substitution in intermediate production between composite Armington aggregate goods

$\varepsilon_{ROW}, \varepsilon_{EU}, \varepsilon_{CHINA}, \varepsilon_{USA}$ $\varepsilon_{EACU}, \varepsilon_{COMESA}, \varepsilon_{SADC}$: Vectors of elasticities of imperfectly competitive firms' supply in the Rest World, EU, China. USA, EACU, COMESA and SADC with respect to the price of their outputs.

θ_r: Share of rents in services sectors captured by domestic agents

θ_m: Shares of value added in multinational firms due to specialized primary factor imports

Source: Authors' estimates.

Appendices

Appendix A: Mapping from the GTAP Sectors and Regions to the Sectors and Regions of our East Africa-Global Model

We employ the GTAP 8.1 dataset as the basis of the dataset for our multi-region trade model. This was the most recent release of the GTAP dataset at the time we built the model. It is documented in Badri Narayanan et al. (2012).[26] GTAP 8 contains 57 sectors and 129 regions. We aggregate both the sectors and the regions of the GTAP 8 dataset to an 18 sector and 8 region model that is most relevant for analyzing the impact on trade costs of Kenya and Tanzania.

Sector Aggregation

Given that access to business services constitutes an important aspect of the analysis of trade costs, we retain all the business services sectors of the GTAP dataset such as communications, financial services and various transportation services. We aggregate the goods sectors into their important and common aggregates. The mapping may be found in table A1.

[26]See Badri Narayanan, G., Angel Aguiar and Robert McDougall, Eds. (2012), *Global Trade, Assistance, and Production: The GTAP 8 Data Base*, Center for Global Trade Analysis: Purdue University. Available at: https://www.gtap.agecon.purdue.edu/databases/v8/default.asp.

Table A1: Mapping from the GTAP Sectors to the Sectors of our Model, and IRTS/CRTS classification

GTAP Codes and Sector Descriptions			SECTOR IN OUR MODEL				
Number	Code	Description					
1	PDR	Paddy rice	1	AGRICULTURE AND FORESTRY			CRTS
2	WHT	Wheat	1	AGRICULTURE AND FORESTRY			
3	GRO	Cereal grains nec	1	AGRICULTURE AND FORESTRY			
4	V_F	Vegetables, fruit, nuts	1	AGRICULTURE AND FORESTRY			
5	OSD	Oil seeds	1	AGRICULTURE AND FORESTRY			
6	C_B	Sugar cane, sugar beet	1	AGRICULTURE AND FORESTRY			
7	PFB	Plant-based fibers	1	AGRICULTURE AND FORESTRY			
8	OCR	Crops nec	1	AGRICULTURE AND FORESTRY			
9	CTL	Bovine cattle, sheep and goats, horses	1	AGRICULTURE AND FORESTRY			
10	OAP	Animal products nec	1	AGRICULTURE AND FORESTRY			
11	RMK	Raw milk	1	AGRICULTURE AND FORESTRY			
12	WOL	Wool, silk-worm cocoons	1	AGRICULTURE AND FORESTRY			
13	FRS	Forestry	1	AGRICULTURE AND FORESTRY			
14	FSH	Fishing	1	AGRICULTURE AND FORESTRY			
15	COA	Coal	2	ENERGY AND MINERALS			IRTS
16	OIL	Oil	2	ENERGY AND MINERALS			
17	GAS	Gas	2	ENERGY AND MINERALS			
18	OMN	Minerals nec	2	ENERGY AND MINERALS			
19	CMT	Bovine meat products	3	FOOD PRODUCTS			IRTS
20	OMT	Meat products nec	3	FOOD PRODUCTS			
21	VOL	Vegetable oils and fats	3	FOOD PRODUCTS			
22	MIL	Dairy products	3	FOOD PRODUCTS			
23	PCR	Processed rice	3	FOOD PRODUCTS			
24	SGR	Sugar	3	FOOD PRODUCTS			
25	OFD	Food products nec	3	FOOD PRODUCTS			
26	B_T	Beverages and tobacco products	3	FOOD PRODUCTS			
27	TEX	Textiles	4	TEXTILES, APPAREL and Leather			IRTS
28	WAP	Wearing apparel	4	TEXTILES, APPAREL and Leather			
29	LEA	Leather products	4	TEXTILES, APPAREL and Leather			
30	LUM	Wood products	5	WOOD AND PAPER PRODUCTS			IRTS
31	PPP	Paper products, publishing	5	WOOD AND PAPER PRODUCTS			
32	P_C	Petroleum, coal products	6	PETROLEUM AND COAL PRODUCTS			IRTS
33	CRP	Chemical, rubber, plastic products	7	CHEMICALS, MINERAL AND METAL PRODUCTS			IRTS
34	NMM	Mineral products nec	7	CHEMICALS, MINERAL AND METAL PRODUCTS			
35	I_S	Ferrous metals	7	CHEMICALS, MINERAL AND METAL PRODUCTS			
36	NFM	Metals nec	7	CHEMICALS, MINERAL AND METAL PRODUCTS			
37	FMP	Metal products	7	CHEMICALS, MINERAL AND METAL PRODUCTS			
38	MVH	Motor vehicles and parts	8	OTHER MANUFACTURES			IRTS
39	OTN	Transport equipment nec	8	OTHER MANUFACTURES			
40	ELE	Electronic equipment	8	OTHER MANUFACTURES			
41	OME	Machinery and equipment nec	8	OTHER MANUFACTURES			
42	OMF	Manufactures nec	8	OTHER MANUFACTURES			
43	ELY	Electricity	9	UTILITIES			CRTS
44	GDT	Gas manufacture, distribution	9	UTILITIES			
45	WTR	Water	9	UTILITIES			
46	CNS	Construction	10	OTHER SERVICES			CRTS
47	TRD	Trade	11	TRADE			CRTS
48	OTP	Transport nec	12	TRANSPORT NEC			IRTS
49	WTP	Water transport	13	WATER TRANS;PORT			IRTS
50	ATP	Air transport	14	AIR TRANSPORT			IRTS
51	CMN	Communication	15	COMMUNICATION			IRTS
52	OFI	Financial services nec	16	FINANCIAL SERVICES NEC			IRTS
53	ISR	Insurance	17	INSURANCE			IRTS
54	OBS	Business services nec	18	BUSINESS SERVICES NEC			IRTS
55	ROS	Recreational and other services	10	OTHER SERVICES			
56	OSG	Public Administration, Defense, Education,	10	OTHER SERVICES			
57	DWE	Dwellings	10	OTHER SERVICES			

Aggregation of Regions

Kenya, Tanzania and Uganda. Given our interest in Kenya and Tanzania, we, of course, retain Kenya and Tanzania as two separate regions of the model. The East African Customs Union (EACU) is comprised of Kenya, Tanzania, Uganda, Burundi and Rwanda. Uganda and Rwanda are also regions in the model, but Burundi is not a region of GTAP 8.1 Consequently, we retain Uganda and Rwanda as a separate regions of our model, but not Burundi.

South African Development Community (SADC). Given the potential merger of the Common Market for East and Southern Africa (COMESA), SADC and the EACU, we include COMESA and SADC in our model and define regions as close as possible to these regions. Some countries are members of both SADC and COMESA. In these cases, we included them in the SADC region of our model. This included Madagascar, Mauritius, Malawi, the Democratic Republic of the Congo, Zambia and Zimbabwe.

COMESA. Since we have to choose where to place countries that are in both SADC and COMESA, our COMESA region is comprised of only eleven countries. Egypt and Ethiopia are individual countries in the GTAP 8.1 dataset that are not in SADC or EAC, so we include them in COMESA. The remaining nine countries in our COMESA region are in the GTAP 8.1 region called "Rest of East Africa." With the exception of Somalia and the territory of Mayotte, all of these nine countries or territories are members of COMESA. Although Burundi is also a member of both the EAC and COMESA, and Seychelles is a member of SADC, this region is dominated by COMESA members, so we "Rest of East Africa" into the COMESA region of our model.

United States, European Union, China and Rest of the World. Given potential alliances with the European Union or the United States and the growing importance of China in Africa, we retain the USA, China and the 27 country European Union as separate regions of the model. All other countries of the world are aggregated into an aggregate Rest of the World region in our model.

Table A2. In table A2 we show the details of our mapping from the regions of the GTAP 8.1 database to the regions of our model for the five regions in Eastern and Southern Africa. The mapping for the other three regions of our model should be clear from the previous paragraphs.

Table A2: Mapping from the GTAP Regions to the Regions of our Model

GTAP code	GTAP 8 Region	Region in our Model
102	Egypt	COMESA
113	South Central Africa	all SADC
	- Angola	
	- Congo the Democratic Republic of the	
114	Ethiopia	COMESA
115	Kenya	Kenya
116	Madagascar	SADC
117	Malawi	SADC
118	Mauritius	SADC
119	Mozambique	SADC
120	Tanzania United Republic of	Tanzania
121	Uganda	Uganda
122	Zambia	SADC
123	Zimbabwe	SADC
124	Rest of Eastern Africa	
	- Burundi	COMESA
	- Comoros	COMESA
	- Djibouti	COMESA
	- Eritrea	COMESA
	- Mayotte	COMESA
	- Rwanda	Rwanda
	- Seychelles	COMESA
	- Somalia	COMESA
	- Sudan	COMESA
125	Botswana	SADC
126	Namibia	SADC
127	South Africa	SADC
128	Rest of South African Customs Union	all SADC
	- Lesotho	
	- Swaziland	

Appendix B: Estimates of the Ad Valorem Equivalents (AVEs) for Non-Tariff Measures (NTMs) for the Regions of our Model

Our estimates of the AVEs of NTMs are based on the estimates of Kee *et al*., (2008; 2009). Kee et al. estimate the AVEs of NTMs for 105 countries at the 6 digit level. These estimates, as well as aggregated estimates for manufacturing and agriculture for the 93 countries, are available on the World Bank website.[27] At the six digit level, the estimates are sometimes subject to a substantial margin of error that may lead to misleading results in a CGE model policy analysis. Consequently, we have chosen to use the aggregated estimates of Kee et al. at the sector level, i.e., for each country, we have one AVE of the NTMs in manufacturing and one AVE of the NTMs in agriculture. For seven of the ten regions of our model (Kenya, Tanzania, Uganda, Rwanda, the United States, China and the European Union) estimates are available in the dataset of Kee et al. For COMESA, SADC and our Rest of the World, we further aggregate these values for 105 countries to the regions of our model.

Specifically, we use the values for the Overall Trade Restrictiveness Index (OTRI) and for the Tariff-only OTRI (OTRI_T) at the aggregated sector level. The OTRI measures the uniform tariff equivalent of the country's tariff and NTMs that would generate the same level of import value for the country in a given year. The OTRI_T focuses only on tariffs of each country. We use the values based on applied tariffs which take into account the bilateral trade preferences. Both indices are available for 105 countries[28] and for two different types of aggregated products: agricultural goods and manufacturing goods. Calculating the difference between OTRI and OTRI_T gives us an AVE for NTMs only for each product and county.

Aggregation of resulting AVEs to the regions of our model includes two steps:

1. Aggregation of 105 countries to the GTAP 8.1 countries and regions.
2. Aggregation of GTAP countries to the specific regions of our model.

[27] The dataset is available at http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:22574446~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html

[28] There are more countries available in the dataset, but the values are missing for some countries due to non-availability of a tariff schedule for the reported year in the source database (TRAINS).

There are 129 countries and regions in the GTAP database, but we have data for only 105 countries. The GTAP dataset, however, includes the EU countries as independent countries in the model. We assume, as Kee does, that there is a unique ad valorem equivalent of the non-tariff measure for all EU countries. For the single countries of the GTAP dataset, which are also available in the Kee et al. (2009) data, we simply assign the calculated AVEs for the EU**.** Several GTAP regions are aggregates of smaller countries. These GTAP regions, the countries that comprise the regions and data availability for the countries within the region from Kee et al. are listed in table B1. We obtain estimates for these regions as follows. For Rest of Oceania, Rest of East Asia, Rest of South Asia, Rest of Central America, Caribbean, Rest of Europe and Rest of South African Customs Union, the AVEs are zero for all countries within these regions for which estimates from Kee et al. (2009) are available. Consequently, we report zero AVEs for these countries. For Rest of EFTA, Rest of North Africa and Central Africa we have estimates for only one country in the region from Kee et al. (2009); for these regions, we assume the values of the one country apply to the region. We compute simple averages for Rest of Western Asia, Rest of Western Africa and Rest of Eastern Africa[29] using AVEs for the available countries. There are no data available for several of the smaller regions and countries in the GTAP aggregation. After this aggregation step, we receive positive AVEs for 90[30] GTAP countries, zero AVEs for 27 countries and 18 missing values. A detailed description of our results is given in Table B2.

In the final step we aggregate the GTAP countries to the model specific regions using the mapping described in Appendix A. For the single countries we simply assign the calculated values. For SADC, COMESA, EU and ROW we compute weighted averages using GTAP countries' total imports at market prices as weights. The AVEs for SADC are calculated without taking Madagascar, Zimbabwe and rest of South Central Africa into account as these values are missing. Table B3 presents the resulting AVEs applied in our model.

Table B1: Data availability for the GTAP regions

No.	Code	Description	Countries available	No.	Code	Description	Countries available

[29] Kenya, Tanzania, Rwanda and Uganda are all regions of our model. The aggregation for Rest of Eastern Africa is based on the available data for Burundi, Djibouti and Sudan.

[30] As the EU is a single region in the dataset of Kee et al. (2009), we assume the same value for all EU member countries which apply a common trade policy.

			from Kee et al.
3	XOC	Rest of Oceania	-
		- American Samoa	-
		- Cook Islands	-
		- Fiji	FJI
		- French Polynesia	-
		- Guam	-
		- Kiribati	-
		- Marshall Islands	-
		- Micronesia Federated States of	-
		- Nauru	-
		- New Caledonia	-
		- Niue	-
		- Northern Mariana Islands	-
		- Palau	-
		- Papua New Guinea	-
		- Pitcairn	-
		- Samoa	-
		- Solomon Islands	-
		- Tokelau	-
		- Tonga	TON
		- Tuvalu	-
		- United States Minor Outlying Islands	-
		- Vanuatu	VUT
		- Wallis and Futuna	-
10	XEA	Rest of East Asia	-
		- Korea Democratic Peoples Republic of	-
		- Macao	MAC
19	XSE	Rest of Southeast Asia	-
		- Brunei Darussalam	-
		- Myanmar	-
		- Timor Leste	-
25	XSA	Rest of South Asia	-
		- Afghanistan	-
		- Bhutan	-
		- Maldives	MDV
29	XNA	Rest of North America	-
		- Bermuda	-
		- Greenland	-
		- Saint Pierre and Miquelon	-
40	XSM	Rest of South America	-
		- Falkland Islands (Malvinas)	-
		- French Guiana	-
		- Guyana	-
		- South Georgia and the South Sandwich Islands	-
		- Suriname	-
47	XCA	Rest of Central America	BLZ
		- Belize	-
48	XCB	Caribbean	-
		- Anguilla	-
		- Antigua & Barbuda	ATG
		- Aruba	-
		- Bahamas	-
		- Barbados	-
		- Cayman Islands	-
		- Cuba	CUB
		- Dominica	-
84	XEE	Rest of Eastern Europe	-
		- Moldova Republic of	-
85	XER	Rest of Europe	-
		- Andorra	-
		- Bosnia and Herzegovina	BIH
		- Faroe Islands	-
		- Gibraltar	-
		- Guernsey	-
		- Holy See (Vatican City State)	-
		- Isle of Man	-
		- Jersey	-
		- Macedonia the former Yugoslav Republic of	MKD
		- Monaco	-
		- Montenegro	MNE
		- San Marino	-
		- Serbia	-
86	KAZ	Kazakhstan	-
87	KGZ	Kyrgyzstan	KGZ
88	XSU	Rest of Former Soviet Union	-
		- Tajikistan	-
		- Turkmenistan	-
		- Uzbekistan	-
101	XWS	Rest of Western Asia	-
		- Iraq	-
		- Jordan	JOR
		- Lebanon	-
		- Palestinian Territory Occupied	-
		- Syrian Arab Republic	SYR
		- Yemen	YEM
105	XNF	Rest of North Africa	-
		- Algeria	DZA
		- Libyan Arab Jamahiriya	-
		- Western Sahara	-
111	XWF	Rest of Western Africa	-
		- Cape Verde	CPV
		- Gambia	GMB
		- Guinea-Bissau	GNB
		- Liberia	-
		- Mali	MLI
		- Mauritania	-
		- Niger	NER
		- Saint Helena, Ascension and Tristan Da Cunha	-
		- Sierra Leone	-
112	XCF	Central Africa	-
		- Central African Republic	-
		- Chad	-
		- Congo	-
		- Equatorial Guinea	-
		- Gabon	GAB
		- Sao Tome and Principe	-
113	XAC	South Central Africa	-
		- Angola	-
		- Congo the Democratic Republic of the	-
124	XEC	Rest of Eastern Africa	-
		- Burundi	BDI
		- Comoros	-

		- Dominican Republic	-			- Djibouti	DJI
		- Grenada	-			- Eritrea	-
		- Haiti	-			- Mayotte	-
		- Jamaica	-			- Seychelles	-
		- Montserrat	-			- Somalia	-
		- Netherlands Antilles	-			- Sudan	SDN
		- Puerto Rico	-	128	XSC	Rest of South African Customs Union	-
		- Saint Kitts and Nevis	KNA			- Lesotho	LSO
		- Saint Lucia	-			- Swaziland	SWZ
		- Saint Vincent and the Grenadines	-	129	XTW	Rest of the World	-
		- Trinidad and Tobago	-			- Antarctica	-
		- Turks and Caicos Islands	-			- Bouvet Island	-
		- Virgin Islands British	-			- British Indian Ocean Territory	-
		- Virgin Islands U.S.	-			- French Southern Territories	-
76	XEF	Rest of EFTA	-				
		- Iceland	ISL				
		- Liechtenstein	-				

Table B2: Ad Valorem Equivalents for Non-Tariff Measures for Agricultural Goods and Manufacturing Goods **for the GTAP countries**[31]

	Country	Agricultural goods	Manufacturing goods
ALB	Albania	7,0%	0,6%
ARG	Argentina	7,1%	3,9%
AUS	Australia	28,8%	4,2%
BFA	Burkina Faso	19,2%	0,5%
BLR	Belarus	17,7%	4,6%
BOL	Bolivia, Plurinational Republic of	19,6%	5,1%
BRA	Brazil	20,8%	11,6%
CAN	Canada	11,4%	2,4%
CHE	Switzerland	14,9%	0,7%
CHL	Chile	17,2%	1,3%
CHN	China	6,1%	5,1%
CIV	Cote d'Ivoire	27,8%	18,8%
CMR	Cameroon	5,8%	1,1%
COL	Colombia	30,5%	6,4%
CRI	Costa Rica	0,7%	0,1%
EGY	Egypt	29,9%	23,7%
ETH	Ethiopia	0,0%	1,1%
GHA	Ghana	10,9%	1,1%
GTM	Guatemala	36,1%	5,5%

[31] Table B3 includes only values different from zero.

HKG	Hong Kong	20,3%	0,8%
HND	Honduras	7,2%	0,0%
IDN	Indonesia	11,5%	0,5%
IND	India	26,2%	4,8%
JPN	Japan	23,6%	3,8%
KEN	Kenya	14,6%	0,3%
KOR	Korea, Republic of	0,6%	0,1%
LKA	Sri Lanka	0,0%	0,3%
MAR	Morocco	39,3%	3,8%
MEX	Mexico	26,1%	12,3%
MUS	Mauritius	26,6%	3,3%
MWI	Malawi	21,5%	1,4%
MYS	Malaysia	44,8%	22,1%
NGA	Nigeria	42,5%	22,2%
NIC	Nicaragua	29,6%	3,1%
NOR	Norway	18,4%	0,8%
NZL	New Zealand	23,0%	7,3%
OMN	Oman	36,1%	0,6%
PER	Peru	22,5%	2,9%
PHL	Philippines	34,3%	15,4%
PRY	Paraguay	37,8%	3,7%
RUS	Russian Federation	16,9%	9,2%
RWA	Rwanda	0,0%	4,8%
SAU	Saudi Arabia	1,1%	0,5%
SEN	Senegal	33,9%	33,4%
SGP	Singapore	52,3%	12,7%
SLV	El Salvador	1,3%	4,8%
THA	Thailand	24,9%	0,6%
TUR	Turkey	6,0%	5,2%
TZA	Tanzania United Republic of	22,2%	47,4%
UGA	Uganda	3,9%	0,0%
UKR	Ukraine	3,3%	19,4%
URY	Uruguay	25,8%	5,8%
USA	United States of America	14,8%	3,3%
VEN	Venezuela	35,1%	3,7%

ZAF	South Africa	4,8%	0,3%
ZMB	Zambia	5,1%	0,0%
XEF	Rest of EFTA	15,5%	0,8%
XWS	Rest of Western Asia	4,6%	5,9%
XNF	Rest of North Africa	36,4%	20,7%
XWF	Rest of Western Africa	2,8%	0,4%
XCF	Central Africa	0,0%	0,1%
XEC	Rest of Eastern Africa	9,7%	8,8%

Table B3: Applied AVEs for Agricultural Goods and Manufacturing Goods for the regions of our model

	Agricultural goods	Manufacturing goods
China	6,1%	5,1%
Kenya	14,6%	0,3%
Rwanda	0,0%	4,8%
Tanzania	22,2%	47,4%
Uganda	3,9%	0,0%
USA	14,8%	3,3%
SADC	4,5%	0,4%
COMESA	27,5%	20,1%
EU	27,0%	2,3%
ROW	17,4%	5,0%

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Appendix C: Estimates of the Ad Valorem Equivalents of Poor Trade Facilitation

Our estimates of the ad valorem equivalents (AVEs) of poor trade facilitation are based on the path-breaking work of David Hummels and his co-authors (Hummels, 2007; Hummels and Schaur, 2013; Hummels *et al*., 2007). Using the estimates of Hummels and his co-authors, Peter Minor (2013) provided estimates for the regions and products in the GTAP database. We use estimates from Peter Minor, which we aggregate to the sectors and regions of our model.[32] Documentation of the steps we have taken and a brief explanation of the methodology are explained below. (See Minor (2013) for a fuller explanation of the methodology.)

Although a central finding of the above studies is that the AVE of time in trade varies across products, most computable general equilibrium modeling of trade facilitation issues have used a single AVE across all products. By basing our estimates on the work of Hummels and Minor, we improve on the sector accuracy of the benefits of trade facilitation, and show that the results are dependent on these sector estimates. We summarize the steps in the estimation of Minor and our aggregation below.

1. **Estimation of the value of one day saved in transit for over 600 HS4 *products*** ("the per-day value of time savings" by product)

The crucial first step is the estimation of the value of one day saved in transit for each *product* ("the per-day value of time savings" by product). The key to the estimation is the premium in shipping costs that firms are willing to pay for air shipping to avoid an additional day of ocean shipping. The premium that firms are willing to pay for air shipping varies considerably across products. At one extreme, we have products like crude oil, coal and fertilizers with an AVE of zero for one day saved in transit. Evidently no significant amounts of these products are shipped by air, which reflects no willingness to pay to save time. On the other hand, a significant share of fruits and vegetables are shipped by air, reflecting a willingness to pay to save time in shipping. Hummels *et al.*, (2007, p. 8) estimate that for an aggregate of all fruits and vegetables the AVE of one day saved in 0.9 percent; that is, one additional day in

[32] We thank Peter Minor for his cooperation with us in this process.

transit cost almost one percent of the value of the fruits and vegetables. Hummels has statistically significant estimates of the AVE of one day saved in transit for slightly more than 600 HS4 products. The AVE of one day of time saved in shipping is independent of the country.

The data for Hummels estimates come from the U.S. Merchandise Imports database 1991-2005, and a database on shipping times between ports. Hummels calculates average shipping times between ports around the world and U.S. ports. As such, the AVE estimates of one day saved in shipping are based solely on U.S. data and assumed to apply to all countries.

2. **Estimation of the value of one day saved in transit for the GTAP database** ("the per day value of time savings" by GTAP product category)

To obtain estimates of the AVE of one day saved in transit for the GTAP product categories, Peter Minor (2013) aggregated from the HS4 categories for which Hummels has provided estimates, to the 57 product categories of the GTAP database. The 600 plus HS4 product categories for which Hummels has statistically significant estimates, however, is less than the number of HS4 categories underlying the GTAP database. The missing HS4 categories account for about 38 percent of the value of trade, based on the MacMap 2007 database.[33] Minor proposes three methodologies to address the lack of estimates for the missing HS4 categories and provides estimates using all three methodologies. We believe the first two methodologies are biased down and Minor shows evidence of this. We believe the third of his three methodologies is theoretically unbiased (although Minor shows it may be empirically biased up), and we chose the third -- he calls it "tau-3." In tau-3, where there is a missing estimate at the HS4 level, Minor replaces the missing value with the average for the same GTAP product category based on values that exist from Hummels. Minor then aggregates from HS4 to the GTAP product categories using trade weights from the MacMap 2007 dataset for GTAP. The trade weights in the MacMap dataset vary by country; so, despite the fact that there is a unique AVE for the value of one day saved in trade at the HS4 level for each of the 600 plus product categories from Hummels, due to differing trade weights across countries, the value of one day saved in transit varies across countries at the GTAP 57 product level. Minor's full dataset of results is available at: http://mygtap.org/resources/.

[33] See Minor (2013, table 1).

3. Calculating the AVE of Time in Importing and Exporting for the GTAP sectors and countries.

Following Hummels et al. (2007), Minor combines the above data set with the World Bank's *Doing Business* data set for 2012. The *Doing Business* dataset shows the number of days in transit in each country for importing and for exporting goods. The *Doing Business* dataset is not distinguished by product, so it is assumed the same number of days applies to all products. Combining the Doing Business dataset with the Minor dataset mentioned in step 2 above, yields the AVE equivalents of the cost of time to export or import by product and country in the GTAP dataset for imports and exports, where the AVEs are bilateral depending on the partner country.

4. Aggregating the AVE of the time in trade to the products and regions of our model.

We start with the estimates of Minor (2013) described in step 3 of the bilateral ad valorem equivalents (AVEs) of the time in trade for exports and imports. We then aggregate these estimates to the products and regions of our model. The mapping of the GTAP sectors and regions to the sectors and regions of our model is described in Appendix A. The weights we use for the aggregation are bilateral trade weights, taken from the GTAP 8.1 dataset, which is based on 2007 trade weights. There are four steps in the aggregation, which we describe in both words and mathematics. We specify the mathematics for exporting; the importing aggregation is fully symmetric and is omitted.

(i) **Total time costs of exporting product k from region r to region s**. We calculate the value of the total time costs of exporting product k from region r to region s by multiplying the AVEs of time costs of exporting product k from region r to region s by the bilateral exports if product k from region r to region s. The trade flow data are taken from GTAP 8.1 with the base year 2007.

Let X_{rs}^{k} = the value of exports of product k from region r to region s from the GTAP dataset.

Let $etau_{rs}^{k}$ = the bilateral trade weighted ad valorem equivalent of the time in trade in exporting product k from region r to region s (from step 3 above).

Define $CTIT_{rs}^{k} = X_{rs}^{k} * etau_{rs}^{k}$ = the total costs of time in exporting product k exported from GTAP region r to GTAP region s.

(ii) **Total time cost of exporting products within one of the model's sectors and regions.** Then for any sector and region of our model, we aggregate these total costs for all subsectors and subregions –simply summing up the values for GTAP sectors which belong to the one sector of our model and the same for the regions) – according to the mapping given in Appendix A.

Let R be the set of all 129 regions in the GTAP dataset. Our model contains ten regions, R_v, v= 1,…10. The GTAP regions that belong to R_v are defined in appendix A. The regions are non-overlapping subsets of R, the union of which is all the GTAP regions. That is, we have R = $(R_1 \cup R_2 \cup, \ldots, \cup R_{10})$, with $R_v \cap R_{v\prime} = \emptyset \ \forall \ v, v'$, where v' is an alternate index for the elements of R_v. Let the elements of R be indexed by both R_v and S_v.

Similarly, let K be the set of all 57 GTAP goods and services. Our model contains 18 sectors, K_w, w= 1,…18. The GTAP sectors that belong to K_w are defined in appendix A. Our sectors are non-overlapping subsets of K, the union of which is all the GTAP products. That is, we have K = $(K_1 \cup K_2 \cup, \ldots, \cup K_{18})$,

with $K_w \cap K_{w\prime} = \emptyset \quad \forall \ w, w'$, where $w \neq w'$ and $w'$is an alternate index for the elements of K_w.

For any product group K_w and any pair of regions R_v , $R_{v\prime}$ of our model, we aggregate the total cost of exporting across the sub-products of K_w from the sub-regions of R_v to the sub-regions of $R_{v\prime}$. That is, the aggregate or total time cost of exporting products within product group K_w from region R_v to region S_v is:

$$ACTIT_{R_v S_{v\prime}}^{K_w} = \sum_{k \in K_w} \sum_{s \in S_{v\prime}} \sum_{r \in R_v} CTIT_{rs}^{k} \quad \forall w, v, v' \quad v \neq v'.$$

(iii) **Total value of exports within one of the model's sectors from one of the model's regions to another.** In the same way we aggregate the value of all exports X_{rs}^{k}. The

total value of all exports within product group K_w from one sub-region of R_v to another sub-region of region R_v is:

$$AX_{R_vS_{v\prime}}^{K_w} = \sum_{k\in K_w}\sum_{s\in S_{v\prime}}\sum_{r\in R_v} X_{rs}^{k} \quad \forall w, v, v' \quad v \neq v'.$$

(iv) **Model specific AVEs of the cost of time in exporting one of the model's sectors from one of the model's regions to another.** At the end we calculate the new AVEs for our model. In particular, we divide the value of total costs of time to export (import) by the value of exports (imports) for each sector and country pair of our model (we use here already aggregated values from (ii) and (iii).

In the last step we calculate the model-specific AVEs of time in trade $etf_{R_vS_{v\prime}}^{K_w}$ to export the commodities within product group K_w from one region to another region of our model:

$$etf_{R_vS_{v\prime}}^{K_w} = {ACTIT_{R_vS_{v\prime}}^{K_w}}\Big/{AX_{R_vS_{v\prime}}^{K_w}} \quad \forall w, v, v' \quad v \neq v'.$$

5. Interpretation and Caveats

If using these estimates in a simulation exercise of policy changes to facilitate trade, we believe that it is prudent to simulate modest percentage cuts, rather than cuts of 50 to 100 percent. In our policy scenarios, the maximum cuts in the time in trade costs that we implement are 20 percent. The reasons are as follows.

(i) The time in trade can't be cut to zero. The world average for shipping a container for exporting or importing is about 23 days, down about two days compared with 2009.[34] However, the most efficient country in the world in the Doing Business data is Singapore. Based in the 2014 *Doing Business* data, it takes six days to export a shipment on average and four days to import a shipment in Singapore. This is likely a lower bound for most countries to achieve.

(ii) Policies can't change infrastructure. Many of the changes responsible for the global decline in the time in trade to ship a container in the past few years are policies such as: improved customs administration; introduction or improvement in electronic submission and processing; introduction of the electronic single window; introduction or improvement in risk management procedures. But poor roads, ports, rail facilities, airports and pipelines also significantly contribute to delays. If polices are being simulated, they can't be expected to improve infrastructure.

(iii)Potential double counting. In a Small Open Economy model, we clearly need to impose the distortion on both imports and exports. But there may be components of double counting if we follow the tradition in this field and impose trade facilitation distortions on both imports and exports for both countries in a bilateral relationship in a multi-country model. Take the example of exports of food products from Kenya to Tanzania. We have an export distortion that we impose in Kenya that reflects the AVE of the time of exporting from Kenya to Tanzania. In addition, we impose an import distortion in Tanzania on food products from Kenya. For there to be no double counting, the distortions should be independent. One could argue the distortions are independent. That is, the exporting time lost for Kenyan food to Tanzania comes from factors under the control of Kenya (like Kenyan roads, ports, customs procedures);

[34] In 2009 the world average to export a standard containerized cargo by sea transport was 23.5 days, and 25.9 days to import. Today it takes 21.8 days on average to export and 24.2 days to import (World Bank, 2014, p.107).

and the Tanzanian time lost on importing food from Kenya is due to Tanzanian roads, ports and customs procedures that are under the control of Tanzania. Then the distortions would be independent and should both be included. We have chosen to include the distortions on both imports and exports, but take modest cuts in both recognizing that there is a potential for double counting.

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Appendix D: Estimates of Insurance ownership shares in Kenya, Tanzania, Uganda, Rwanda, SADC and COMESA

All market share data come from Axco country reports.[35] Ownership data comes from Axco reports and company reports.

Given our focus on Kenya and Tanzania, we investigate these countries in detail and calculate market shares in insurance in Kenya and Tanzania for the regions in our model. This work is documented in Jafari (2014). Given that Uganda is a separate region in our model and we have the Axco country report, we also calculate the market share for Uganda in detail as explained below.

Given the relative size of South Africa in SADC, we calculate the market share by region in South Africa and take that as representative of SADC. For COMESA, we take an average of Zambia and Uganda as representative of COMESA. Zambia had a state monopoly in insurance prior to opening the market in 1992. Partly as a result of the late opening of the market, Zambia has a rather large domestic share of the insurance market. Uganda, which has been very open to foreign direct investment, has a much smaller domestic share. It is likely that neither market is representative of COMESA, so an average of the two is more appropriate. Without data on Rwanda, we take Uganda as representative of Rwanda, where Rwanda's domestic share in Rwanda is assumed equal to Uganda's domestic share in Uganda.

Tanzania

In 2013 there were 23 non-life companies (including health insurers) registered and two composites, including one that is state-owned. There are also two registered life only companies. The market shares of these companies, based on written premiums, were obtained from the Axco company report for Tanzania. See Jafari (2014) for details.

Having been a monopolistic insurance system for more than 30 years, Tanzania has operated as a free market since 1998. There are two state-owned insurers: National Insurance Corporation of Tanzania (NIC) and Zanzibar Insurance Corporation (ZIC).

[35] Axco country reports are available at: https://www.axco.co.uk/. Accessed on January 9, 2014.

At the end of December 2011, 19 non-life and composite insurers had foreign shareholders, most of which are regionally based, largely in Kenya. That said, South African interests are now having a greater impact. Recent market entrants have, however, largely been locally owned, but they are small, and there are no major local insurance groups operating in Tanzania.

With market shares from 25.4% to 10.7%, the six largest companies (listed according to market share) are Jubilee, Heritage, Alliance, AAR, Phoenix and Momentum.

Jafari (2014e) provides details of who owns the insurance companies of Tanzania, and calculates the market shares by region. The resulting market shares by regions of our model are as follows: **SADC, 7.6%; Kenya, 48. 2%; Rest of the World, 4.2%; European Union, 3.2%; others 0%.**

Kenya

There were more than 35 insurance companies operating in Kenya in 2013. The largest companies and their market shares are the following: Jubilee (11.3%); CIC General (9. 2%); UAP (8.3%); APA (7.8%); ICEA Lion (5.6%); Heritage (4.8%); Kenindia (4.7%); AIG Kenya (4.5%); Britam (4.4%); First Assurance (4.1%).

Who owns these companies and their market shares by region of their model is explained in Jafari (2014e). The resulting market shares by regions of our model are as follows: **SADC, 4. 2%; USA, 4.7 %; Kenya, 84.6%; Rest of the World, 2.8%; European Union, 3.7%; others 0%.**

Uganda

The largest insurance companies operating in Uganda, with their market shares and their primary country of ownership, are as follows: Jubilee (Kenya, 26.0%); AIG (USA, 14.5%); UAP (Kenya, 13.1%); Goldstar (Uganda, 6.3%); Lion (Kenya, 5.5%); Insurance Company of East Africa (Kenya, 5.4%); Phoenix of Uganda (Kenya, 4. 2%); East Africa Underwriters (South Africa and Kenya, 43.8%); APA (Kenya and South Africa, 3.5%); and Niko (Malawi, 2.3%). This identifies 86.7% of the market. Although we have not identified ownership from India, there are reportedly Indian ownership interests, so we allocate some ownership share of the unidentified portion to the rest of the world. Since it is likely that investors from Uganda, the

rest of the world and the EU have minority shares in many of the companies, we assume that the unidentified market shares are allocated as follows: European Union, 5%; Rest of the World 5%; Uganda, 4.3%; and COMESA, 1%.

This yields the following shares for the regions of our model: **Uganda, 10.6%; Kenya, 60.** 2**%; European Union, 5%; COMESA, 1%; SADC, 3.7%; USA, 14.5%; Rest of the World, 5%; others 0%.**

South Africa

There were 83 active short term insurance companies licensed and operating in South Africa in 2012. The ten largest are: Santam, Mutual and Federal, Hollard, OUTsurance, Guardrisk, Zurich, Absa, Auto and General, Centriq and AIG. Collectively, their market share is 63%. Lloyds of London is the only company permitted to write insurance directly without registering as a South African company.

There are several large South African financial conglomerates the control the insurance market, involving complex capital structures and multiple cross holdings. Santan is a subsidiary of the Sanlam Financial Group of South Africa. Absa is 62% owned by Barclays Bank of the UK, with the remainder sold on stock markets. Auto and General is owned by the financial group formed by the merger of Royal Group and South Africa Mutual and Fire—both South African companies. Hollard is owned by the Hollard Group of South Africa. Mutual and Federal is owned by the Mutual Group of South Africa. Outsurance is owned by the First Rand group of South Africa. Guardrisk was acquired in 2013 by MMI Holdings of South Africa. Zurich and Centriq are South African companies. AIG is a subsidiary of the large insurer from the United States.

For the remaining 37% market share, we increase the market shares of the US, European Union, Rest of the World and Kenya by two percent each and one percent for COMESA. We then scale the market shares of all regions proportionately so the sum of shares equals 100 percent. This yields the following shares by the regions of our model.

SADC, 80.6%; USA, 6. 2 **%; European Union, 6.3%; Kenya,** 2.8**%; COMESA, 1.4%; Rest of the World,** 2.8**%; others 0%.**

Zambia

Between 1970 and 1992, insurance in Zambia was controlled by a state-owned monopoly, Zambia State Insurance Corporation (ZSIC). ZSIC, which is still a state company, remains one of the three major companies in the market.

The leading insurance companies of Zambia (with their nationality and market shares) are as follows: Professional (24.2%, Zambia); Madison General (23%, Zambia with minority USA); ZSIC (21%, Zambia); Niko (11.9%, Malawi); Hollard (7.3%, South Africa); Goldman (5%, Zambia); Diamond (3.8%, Zambia); Phoenix (2%, Kenya); Mayfaiar (1%, Kenya).
Malawi is in both COMESA and SADC. We allocate Malawi to SADC, and the unidentified 0.8% to Rest of the World. This yields the following market shares for the regions of our model in Zambia.

SADC, 19.2%; USA, 2 **%; Kenya, 3%; COMESA, 75%; Rest of the World,** 0.8**%; others 0%.**

COMESA

For the share of COMESA, we take the average of Zambia's COMESA share. plus Uganda's COMESA share. We then scale all shares (except for Kenya, which is part of COMESA) so they sum to unity. This yields the following shares of the insurance market for COMESA countries.

SADC, 16.8%; USA, 12.1 %; Kenya, 31.6%; COMESA, 31.7%; Rest of the World, 4.2%; European Union, 3.2%; others 0%.

Appendix E: Telecommunications Ownership Shares in Kenya, Tanzania, Uganda, Rwanda, COMESA and SADC

Kenya

Based on data from the Kenyan Communications Commission, there are now more than 30 million telephone subscribers in Kenya, where all but about 200,000 are mobile telephone subscribers. The companies providing telephone services in Kenya and their market shares are: Safaricom, 65.5%; Airtel, 17.0%; Essar Telekom Kenya, 9.9%; and Telekom Kenya, 7.6% (combined mobile and fixed line subscribers) and TTCL, 1%.[36]

According to the Safaricom website,[37] the corporate structure in 2013 is 40% owned by Vodafone UK, 35% Government of Kenya and is 25% publicly traded open stock. We allocate one percent of this open stock to SADC and leave the remainder unidentified. Airtel is 95% owned by its Indian parent company. Kenyan businessman Naushad Merali owns five percent. [38] Essar Telekom Kenya is wholly owned by the Essar Group of India.[39] Telekom Kenya is 49% owned by the government of Kenya and the remainder is owned by France Telekom.[40] This identifies 84.6% of the ownership. Scaling all identified shares up proportionately so that the sum of the shares is 100%, yields the following **shares for the regions of our model: EU = 35.5%; Kenya = 32.5%; Rest of World = 30.7%; SADC = 1.2%; others = 0.**

Tanzania

The Tanzanian Communications Regulatory Authority indicates that the companies providing telephone services in Tanzania and their market shares are: Vodacom, 37%; Airtel,

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[36] Communications Commission of Kenya (2013), "Quarterly Sector Statistics Report, April-June 2013," Available at: http://www.cck.go.ke/resc/downloads/Q4_201213_STATISTICS_final_25th_oct_2013.pdf.

[37] http://www.safaricom.co.ke/about-us/investor-relations/investor-dashboard/corporate-fact-sheet.

[38] /Airtel-freed-from-20-per-cent-local-ownership-rule/-/539550/1632440/-/mkvcm0z/-/index.html A Kenyan court ruling has freed Airtel from the 20% local ownership share requirement.

.http://www.businessdailyafrica.com/Corporate-News.

[39] http://www.businessdailyafrica.com/Corporate-News/Yu-confirms-search-for-new-investors/-/539550/1880876/-/h20lebz/-/index.html

[40] See "Tanzanian govt considers plan to take 100% ownership of TTCL," *TeleGeography*, February 13, 2013. Available at: http://www.telegeography.com/products/commsupdate/articles/2013/02/13/tanzanian-govt-considers-plan-to-take-100-ownership-of-ttcl/

32%; Millicom (marketed as Tigo), 23%; Zantel, 7%; and TTCL, 1%.[41] As documented in Worley, Vodacom Tanzania is a subsidiary of South Africa-based Vodacom (Pty) Ltd, which owns 65% of the company. The remainder is held by Tanzanian companies Planetel Communications (16%) and Caspian Construction (19%). Regarding MIC Tanzania (also known as TIGO), Luxemburg-based Millicom International Cellular (MIC) owned 84% of the company until it assumed 100% ownership in early 2006 when it bought out other minority shareholders. The Indian company Airtel bought the shares of the Zain group in Celtel Tanzania. Celtel Tanzania Ltd was 60% owned by Celtel International and 40% owned by the Tanzanian government. Regarding Zanzibar Telecommunications Corporaton (Zantel), Etisalat of the UAE acquired a 34%. stake, with the government retaining 18%. The other shareholders are Kintbury Investment of the Channel Islands (24%) and MEECO International of Tanzania (24%). Finally, TTCL is 65% owned by the government of Tanzania and 35% owned by Airtel.42

This implies the following shares for the sectors of our model: Tanzania, 29%; European Union 24.7%; SADC, 24.1%; and Rest of the World, 22.2%.

Rwanda

Rwandatel has an estimated 11 percent of the fixed plus mobile market and MTN Rwanda has 89 percent. Rwandatel is 99 percent owned by a consortium of US investors, with the remaining one percent Rwanda owned. MTN Rwanda is a South African company with headquarters in Johannesburg.

Based on these data, the ownership shares of communications sector in Rwanda are: **USA= 10.9%; SADC= 35.6%; Rwanda= 53.5%.**

Uganda

The Uganda Communications Commission (2012) reported the active mobile and fixed line service suppliers in 2011-2012, along with their assets. Based on their assets, the telecom companies and their market shares in 2011 were the following: Airtel, 15.4%; MTN Uganda,

[41] Tanzanian Communications Regulatory Authority, "Quarterly Telecom Statistics," September 2013. Available at: http://www.tcra.go.tz/images/documents/telecommunication/telecomStatsSept13.pdf. In addition, Benson had a miniscule share of 0.002%.

[42] See: http://www.telegeography.com/products/commsupdate/articles/2013/02/13/tanzanian-govt-considers-plan-to-take-100-ownership-of-ttcl/

54.9%; Warid, 14.7%; Orange, 14.0%; and Smile, 1%.[43] Airtel is an Indian based company and MTN is headquartered in South Africa (although MTN Uganda is a subsidiary of MTN International, which is headquartered in Mauritius. Warid was acquired in 2013 by Airtel.[44] Orange is owned by France Telecom. Finally, Smile is owned by companies from Saudi Arabia, Capital Works (a consortium of domestic and international institutional investors) and Venere, whose nationality is unknown.[45] Based on the owners of Smile, we assign 0.4% of the market to nationals of Saudi Arabia, 0.1% to nationals of the United States, 0.25% of the market to Ugandan nationals, 0.10% to nationals of COMESA, 0.10% to nationals of Kenya and 0.05% to nationals of Tanzania.

For the regions in our model, this means that we have the following ownership shares: **SADC= 54.9%; ROW= 30.5%;United States, 0.1%,; Uganda, 0.25%; COMESA, 0.1%; Kenya, 0.1%; and Tanzania, 0.05%.**

South Africa--SADC

We take South Africa as representative of SADC. Five companies provide mobile telephone services. The five cellular providers and the number of their subscribers in millions are Vodacom, 29.3; MTN, 25; Cell C, 11.7;, 0.5; and Telkom Mobile, 1.54.[46]

Regarding fixed line telephone services, in 1997, the South African telecommunications, was partly privatized. Telkom has a reported 3 million fixed line subscribers. A Second Network Operator was licensed to compete with Telkom across its spectrum of services and operates

[43] Data are from: Uganda Communications Commission (2012), "Annual Post, Broadcasting and Telecommunications Market Review 2011/2012." Available at : http://www.ucc.co.ug/files/downloads/2011%2012%20Annual%20post%20and%20Telecom%20market%20review%20report-Final.pdf

[44] Saturday Monitor , "Airtel Buys Warid Telecom," April 23, 2013. The article notes that MTN claims to have 7.7 million subscribers as of December 2012 and claims a 51 per cent market share while Airtel says it will have 7.4 million after adding Warid's 2.8 million customers. We base our market share calculations on the asset data, which is complete.

[45]Smile shareholders are listed on the company's website at: http://www.smilecoms.com/~smlcoms/pages/about-us/shareholders.php

[46] See http://en.wikipedia.org/wiki/Telecommunications_in_South_Africa; market share data are calculated from data on subsribers available in Qunton Bronkhorst, "Mobile subscribers in SA: who's eating whose lunch?" *Business Tech*, August 14, 2013. Available at: http://businesstech.co.za/news/mobile/44164/mobile-subscribers-in-sa-whos-eating-whose-lunch/

under the name, Neotel. It has a reported 132.4 thousand fixed line subscribers in late November 2012.[47]

Market shares of the combined fixed line and subscriber base are: Telekom ((combining Telkom and Telekom Mobile), 6.4%; Neotel, 0.2%; Vodacom, 41.2%; MTN, 35.1%; Cell C, 16.4%; and Virgin Mobile, 0.7%.

The ownership of these compnaies is as follows. The shareholders of Telekom are: the government of South Africa and an investment corporation of the South African government (50.3%), South African billionaire Allan Gray (5.4%), open stock purchases for 42.3% and 2% is TelekomTreasury stock.[48] The US company SBC sold its shares in 2007. Vodaphone UK owns 65% of the stock of Vodacom and the remainder is publicly traded due to the Telekom spin off.[49] MTN Group is reported to be South African.[50] Cell C is 75% controlled by the Saudi Arabian company (Saudi Oger) and 25% by a broad-based black economic empowerment entity of South Africa representing over 30 black empowerment companies and trusts.51 Virgin Mobile is 100% owned by Richard Branson's group of the UK. Neotel, is 68.%% owned by the Indian company Tata, 19% owned by a Nexus Connexion, a South African black economic empowerment partner and 12.5% owned by Communitel, a consortium of South African and Namibian companies.[52]

Taking weighted average of the identified owners, the ownership shares for the regions of our model are SADC, 49.35%; EU, 27.5%; Rest of World, 12.5%. The balance of 17.1% is publicly traded due to the Telekom and Vodacom public holdings. We allocate the ownership of the publicly traded shares as follows: United States, 5%; Kenya, 2%; COMESA, 1%, Tanzania, 1%;

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[47] Nicola Mawson, "Neotel Gains on Telekom," ITWeb, November 7, 2012. Available at http://www.itweb.co.za/?id=59858:Neotel-gains-on-Telkom

[48] http://www.telkom.co.za/about_us/company_information/shareholding.html

[49] http://en.wikipedia.org/wiki/Vodacom.

[50] http://en.wikipedia.org/wiki/MTN_Group.

[51] This combines the shares of Oger Telekom South Africa and Lanum Securities, both of which are wholly owned by Saudi Oger. See http://en.wikipedia.org/wiki/Cell_C

[52] See https://www.neotel.co.za/wps/portal/!ut/p/c5/04_SB8K8xLLM9MSSzPy8xBz9CP0os3gL52AnczcPIwMLMw9DA0_vAB9_M2NjY39Hc_1wkA6cKty9DdHk3d2NLYHygYGG7r7-BgbuxgTkTSDyBjiAo4G-n0d-bqp-QXZ2kEe5oyIAehRj4A!!/dl3/d3/L2dJQSEvUUt3QS9ZQnZ3LzZfOENTQjdGSDIwODZIMTBJS1BMTzYzMzNPUTE!/?WCM_GLOBAL_CONTEXT=

Rwanda, 0.25%; Uganda, 0.5%; China. 1%; and SADC, 6.35%. We take the weighted average of the identified owners and add the publicly traded shares allocation.

This gives us the following shares for the regions in our model: SADC, 49.35%; EU, 27.5%; Rest of World, 12.5%; United States, 5%; Kenya, 2%; COMESA, 1%, Tanzania, 1%; Rwanda, 0.25%; Uganda, 0.5%; China. 1%.

COMESA

Clearly SADC and the Rest of the World are represented well in the communications sector of COMESA countries. Airtel (of India) and MTN (of South Africa) are companies that are well represented in COMESA countries. Among COMESA countries, Airtel is located in the Democratic Republic of Congo, Madagascar, Malawi, Seychelles and Zambia[53], while MTN is located in Democratic Republic of Congo, Sudan, Swaziland and Zambia.[54] Vodacom (of South Africa) provides telephone service in the Democratic Republic of Congo as well as several SADC countries. We take an average of the Tanzanian and Ugandan market shares as representative of COMESA countries. This yields the following market shares:
COMESA, 14.65%; SADC, 39.5%; EU, 19.35%; USA, 0.1%; Rest of the World, 26.35%; Kenya, 0.05%.

[53] http://en.wikipedia.org/wiki/Airtel_Africa.
[54] http://en.wikipedia.org/wiki/MTN_Group.