The impact of non-tariff barriers on maize and beef trade in East Africa*

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Abstract

On March 2, 2004, the East African Community (EAC) member states signed the protocol for the establishment of the East African Community Customs Union, which commits them, among others, to eliminate non-tariff barriers (NTBs) to increase intraregional trade. However, several NTBs are still applied by member states, raising concerns among policy makers and the business community. There is, however, no information about the magnitude of the impact of these NTBs. This study identifies the existing NTBs on maize and beef trade in East Africa and quantifies their impact on trade and the welfare of EAC citizens using a Spatial Equilibrium Model (SEM). Data on NTBs were collected from traders and transporters of maize and beef cattle in East Africa. In addition, the study found that the main types of NTBs within the three founding members of the EAC (Kenya, Tanzania and Uganda) are similar. They include administrative requirements (mainly licenses, municipal and council permits), taxes/duties (mainly excise and cess duty), roadblocks, customs barriers, weighbridges, licensing, corruption (e.g., through bribes) and transiting.

The results of the welfare analysis vary across the three countries, but the net monetary gains are positive in all cases. A complete abolishment or a reduction of the existing NTBs in maize and beef trade increases intra-EAC maize and beef trade flows, with Kenya importing more maize from both Uganda and Tanzania, while Uganda's beef exports to Kenya and Tanzania increase. As a result, positive net welfare gains are attained for the entire EAC maize and beef sub-sectors. In all cases, those who gain from the proposed reductions in NTBs can potentially compensate the losers, leading to potential improvements in welfare. These findings give compelling evidence in support of the elimination of NTBs within the EAC customs union.

The study recommends taking a regional approach to eliminating the existing NTBs since they are similar across the member countries and across commodities so as to exploit economies of scale. Other policy recommendations include streamlining of administrative procedures at border points to improve efficiency, and speeding up the implementation of procedures at point of origin and at the border points. Finally, the study recommends the need to design and implement monitoring systems to provide feedback to the relevant authorities on the implementation of measures to remove unnecessary barriers to trade within the EAC region.

Introduction

The East African Community (EAC)[7], which is one of the four major regional trading blocks within eastern and southern Africa, aims at widening and deepening cooperation among its partner states in, among others, political, economic and social fields for their mutual benefit. To this extent the EAC countries established a Customs Union (East African Community Secretariat, 2004) and started applying a common external tariff (CET) in January 2005 to all non-EAC imports. Under the customs union, intra-EAC tariffs were abolished. However, Kenya – the region's largest exporter – will continue to pay duties on its goods entering the other four countries until 2010.

The creation of the EAC customs union is expected to facilitate increased trade and investment flows between member states, and at the same time create a large market for the East African people. The EAC customs union commits member states to removing barriers and obstacles to trade within East Africa. These obstacles include both tariff and non-tariff barriers (NTBs) to trade, whose removal reduces the cost of doing business within a region and ultimately improves welfare. In the EAC protocol, NTBs means "laws, regulations, administrative and technical requirements other than tariffs imposed by a partner state whose effect is to impede trade" (EAC Secretariat, 2004). As a customs union, the EAC has succeeded in abolishing intra-EAC tariffs and adopting a CET towards imports from non-EAC

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[7]The East African Community (EAC) is a regional intergovernmental organization headquartered in Arusha, Tanzania whose membership comprises Kenya, Uganda, Tanzania, Rwanda and Burundi.

sources. However, trade between the EAC partner states is still being hampered by the existence of NTBs. Governments have continued to selectively apply various types of NTBs to protect some strategic sectors. While the EAC protocol calls for the elimination of NTBs, in practice several NTBs are still applied variously by the member states.

Trade between the three countries is carried out both through formal (regulated and recorded) and informal sectors accounting for over 95% of trade in livestock and up to 60% of trade in staple grains (Ackello-Ogutu and Echessah, 1997; Little, 2007). Policy makers and the business community have raised serious concerns about these NTBs. It is generally accepted that NTBs lead to trade distortion with concomitant losses in welfare. However, in the EAC case, the cost of these NTBs, their impacts on regional trade and their welfare impacts are not well understood.

This study examines the trade and welfare impacts of NTBs on maize and beef cattle trade within the founding EAC member states of Kenya, Uganda and Tanzania, with a view to suggesting interventions that can enhance regional trade and improve the welfare of the EAC citizens. The objectives of the study were: i) to identify the various types of NTBs applied by countries within the EAC; ii) to evaluate the cost of various types of NTBs within the EAC partner states; and iii) to quantify the trade and welfare impacts of the identified NTBs. The knowledge generated will be of interest to EAC maize and beef cattle traders, policy makers and development agencies.

Non-tariff barriers to trade in East Africa

Economists generally agree that NTBs are detrimental to regional trade. NTBs diminish the potential benefits that could be derived from the trade preferences offered through regional trading arrangements. These trade preference benefits include better access to partner country markets, increased export volumes and prices, improved economic welfare, more jobs, and more rapid economic growth. Moreover, NTBs are a serious impediment to the growth of intra-regional trade and the associated benefits.

In a recent study, the East African Business Council (EABC) sought to identify the nature and extent of NTBs applied within the EAC. The study found out that NTBs indeed existed in the general areas of business registration and licensing, customs procedures, police road checks, road axle regulations and control, and standards and certification requirements. In decreasing order of severity, respondents from both the private and public sector ranked the major NTBs as: i) administration of duties/taxes, ii) corruption, iii) customs administration, iv) transiting checks, v) police checks, vi) immigration procedures, and vii) licensing procedures (EABC, 2005). While the EABC study highlighted the main NTBs to EAC trade, it did not quantify the trade and welfare impacts of the NTBs. This study extends the EABC study by quantifying the effects of the NTBs on regional trade for beef cattle and maize. Maize is the main staple food in Kenya and Tanzania and second to bananas in Uganda. It constitutes 14% of the agricultural exports from East Africa to the rest of the continent. Beef cattle are the main livestock tradable commodity across the EAC region.

Other studies analyzed EAC (particularly Kenya, Uganda and Tanzania) trade with other COMESA countries over the period 2001 to 2005 (Ihiga, 2007; Tumuhimbise and Ihiga, 2007; Mmasi and Ihiga, 2007). This included a detailed analysis of exports and imports, including EAC/COMESA destination countries, exports and trends, and major products traded between 2001 and 2005. Consultations were held with relevant representatives of the private and public sector. These consultations validated NTBs earlier identified and identified new ones. The analysis found that a number of NTBs affect the ability of Kenyan, Ugandan and Tanzanian businesses to export and import. The major related NTBs were reported to fall under government participation in trade and restrictive practices tolerated by governments; customs and administrative entry procedures; sanitary and phytosanitary measures (SPS); technical barriers to trade; and the time and costs involved in accessing trade-related services. The studies thus recommended the need for partner states within EAC and COMESA to consolidate and demonstrate their political and technical goodwill to implement the aspirations of the EAC and COMESA treaties. Emphasis was also placed on the need to build capacity at the coordinating ministries and business associations to enable the NTBs monitoring committee to play its role of facilitating, reporting, monitoring and eliminating NTBs. The studies also recommended the need for harmonization of regional transit traffic schemes aimed at reducing transport and trade facilitation costs in the different countries. This will ensure that transportation within the region becomes more efficient and cost-effective through harmonized transit procedures. This study extended the work by specifically addressing the barriers in the agricultural sector, mainly to beef cattle and maize trade. The current study further quantified the impact of the NTBs on welfare.

Methodology

Economic approaches for measuring impacts of NTBs

There are three main approaches used to analyze the effects of trade policies on regional trade: Computable general equilibrium (CGE) models; partial equilibrium models; and multi-market models. CGE models are multi-sector, economy-wide models that can be used to study effects of policies on income, employment and welfare. The models can be built to study dynamic economy-wide interactions and to assess the strength of linkages or impact of policies over time. CGE models provide considerable scope for understanding how changes in policy on NTBs might affect trade and investment in various market settings. However, their measures of specific NTBs are heavily aggregated and cannot capture the complexities of regulations at the sectoral level.

Partial equilibrium models provide a framework for analyzing tariff-rate equivalents of policy change on NTBs, such as standards and technical regulations and associated welfare changes. Welfare change is estimated by investigating impacts on domestic consumer and producer surplus caused by an increase in costs to comply with standards. Demand and supply elasticities are often calibrated from existing studies. At the sacrifice of generality, the partial equilibrium approach has the advantage of transparency and comprehensiveness in analyzing changes in various welfare components and in incorporating standards and regulations.

A multi-market model is a partial equilibrium model that does not explicitly model the macro side of the economy, such as the relationship between savings and investments or foreign exchange markets (Sadoulet and de Janvry, 1995). Multi-market models are policy tools that can be used to analyze a wide range of sectoral issues. To build a multi-market model, sectoral data must be compiled. This includes obtaining figures for prices (inputs, outputs), production (area, yield), production technology (conversion rates, losses, seed rates), trade volumes, taxes, transportation costs and market margins. Supply and demand parameters are then obtained through econometric estimations or from "guesstimates" based on data in literature.

Supply and demand equations in the input and output markets are set up as well as the specification of income and foreign trade. These equations can be set up to examine the spatial multi-market relationships as well. Unlike partial equilibrium models, which typically focus on the dynamics in a single sector, multi-market models measure the interactions between different markets in an economy as specified by the analyst (Goletti and Rich, 1998). Multi-market models are useful in analyzing the impact of changes in public policy at the sectoral level. These policy changes can be traced to examine their effects on production, demand, household incomes, government revenues, international trade and welfare (Rich and Lundeberg, 2002; Devadoss et al., 2005).

The Spatial Equilibrium Model (SEM) – which is a type of a multi-market model – was popularized by Takayama and Judge (1971) following the seminal work of Samuelson (1952). The SEM consists of n regions (or countries), and these regions are separated by distance, thus the name spatial equilibrium model. Trade policies and transportation costs are treated as exogenous in the model (Devadoss et al., 2005). The SEM is frequently used to determine the effects of trade policy changes on quantities, prices and welfare, and was found suitable for the current study, which analyzes the impact of NTBs on regional trade for two tradable commodities, maize and beef cattle.

The Spatial Equilibrium Model (SEM)

This study adopts the SEM used in Devadoss et al. (2005) and adjusts it to estimate the impacts of NTBs on maize and beef cross-border trade within the EAC since intra-EAC import tariffs have been abolished. The SEM provides quantitative measures of the welfare impacts of reducing NTBs, which helps to weight the benefits and costs of preferential trade liberalization. It is calibrated to the price and quantity values for the 2006 data based on elasticity estimates adopted from earlier studies undertaken in the region. Following Devadoss et al. (2005), the inverted supply and demand functions for maize and beef in Kenya, Uganda and Tanzania can be represented as follows:

$$p_i^d = a_i - b_i y_i \qquad \text{i=1,...,n} \qquad (1)$$

$$p_i^s = c_i - d_i x_i \qquad \text{i=1,...,n} \qquad (2)$$

where a, b, c and d are coefficients, and p_i^d, p_i^s, y_i and x_i are regional demand and supply prices and regional quantities demanded and supplied in ith region. The supply and demand functions are used in the calibration of SEM, which provides the welfare objective function and the market clearing conditions mathematically as follows:

$$W = \sum_{i=1}^{n}(a_i - b_i y_i)y_i - \sum_{i=1}^{n}(c_i + d_i x_i)x_i - \sum_{i,j} x_{ij}t_{ij} - \sum_{i,j} x_{ij}(\rho_j^d - \rho_i^s) + \sum_{i,j} x_{ij}\left(\rho_j^d \frac{1}{1+\delta_{ij}} - \rho_i^s\right) \qquad (3)$$

Subject to:

$$\sum_{j-1}^{n} x_{ij} \le x_i \qquad \text{for all } i \qquad (4)$$

$$\sum_{i-1}^{n} x_{ij} \ge y_j \qquad \text{for all j} \qquad (5)$$

$$c_i + d_i \ge \rho_i^s \qquad \text{for all } i \qquad (6)$$

$$a_i - b_i y_i \le \rho_i^d \qquad \text{for all } i \qquad (7)$$

$$(1+\delta_{ij})(\rho_i^s + t_{ij}) \ge \rho_j^d \qquad \text{for all } i \text{ and } j \qquad (8)$$

$$y_i, x_i, x_{ij} \ge 0 \qquad \text{for all i and j} \qquad (9)$$

where x_{ij} is the quantity of beef cattle or maize transported from region *i* to *j*, t_{ij} is the unitary transportation cost from *i* to *j*, y_i is quantity demanded in country i, δ_{ij} is cost of NTBs imposed by region *j* on imports from region *i*, ρ_i^d is country demand price, and ρ_i^s is country supply price.

The SEM employs a non-linear optimization technique to maximize the net social monetary gains function (equation 3), subject to a set of linear constraints (equations 4 to 9). The net social monetary gain function is used as the objective function instead of net social welfare function since NTBs are modeled. The net social monetary gain is the sum of all the countries' total revenues, minus total production costs, minus transportation costs, minus net societal loss arising from NTBs. Equation (4) states that the total quantity of maize/beef transported from country 'i' must be lower or equal to national production in that country. Equation (5) states that the total quantity transported into a country must be greater than or equal to quantity demanded in the destination country. Equation (6) shows that the regional EAC supply price must be greater than or equal to the specific country supply price. Equation (7) is similar to equation (6) but relates to demand; it implies that regional and national demand prices must be equal if national demand is positive. If the regional demand price is lower than the national demand price, then national demand ought to be zero. Equation (8) is a market clearing condition showing that market supply price in i plus transportation cost adjusted for NTBs must be greater than or equal to market demand price in j. The last constraint shows that demand, supply and transported quantities are non-negative.

The underlying assumption related to equations (6), (7) and (8) is that the price difference between any two countries is explained by transportation costs, comparative advantage, and NTBs. In this analysis, tariff barriers are not considered since intra-EAC tariffs were zero-rated in 2005 with the formation of the EAC customs union. However, various other forces affect market prices in the EAC, but might not be captured in the SEM presented above. For example, due to poor communication networks, traders in Tanzania or Uganda might generally be uncertain of what the price of maize/beef might be in Kenya such that the prices at which they are expecting to sell their products in Kenya might differ from that defined in the model. Similarly, some traders in Uganda, Kenya or Tanzania might sell

their maize/beef cattle at prices below or above that defined in the model because they have a lower/higher negotiating power compared to their buyers. In addition, it might be true that roads work better between Kenya and Tanzania compared to between Kenya and Uganda such that the true transportation cost per kilometer between Kenya and Tanzania might be lower than that between Kenya and Uganda.

Data collection

This study evaluates the impact of NTBs on maize and beef trade in Kenya, Uganda and Tanzania and the implications for welfare. As noted earlier, these are important agricultural commodities in East Africa and form an important source of livelihood in terms of food security, employment and government revenue.

Although there are several methods in the trade literature that can be used to quantify the cost of NTBs, each has its own suitability and limitation. Thus, a single analytical method may not be adequate to quantify the cost of the entire spectrum of NTBs (Deardorff and Stern, 1997). One approach, the price differential approach (price-wedge method), computes the cost of NTBs as the differential between the import price and the domestic price of each commodity, less the tariff rate on the commodity. This approach provides a direct measure of the price impact of NTBs. It allows for an easy computation of the implicit tariffs or implicit rates of protection. The result is treated as a non-tariff barrier. The main advantages of this method are that it is easy to estimate and it enables a quick understanding of the situation. However, the price-wedge method has several limitations. First, although the method enables the analyst to quantify the effect of a set of NTBs present in the market, it seldom makes it possible to identify what those NTBs are precisely. Second, formulas that measure the NTBs in an implicit way, as a percentage price wedge between imports and domestic prices, are valid only under the assumption that imported goods are perfect substitutes. For large-scale studies, available data are often too aggregated to reflect differences in the quality of imported goods (Beghin and Bureau, 2001).

Inventory-based approaches can be used from both a quantitative and a qualitative perspective to assess the importance of domestic regulations as trade barriers. This approach can be useful for directing attention to the frequency of occurrence and the trade or production coverage of various types of NTBs. The major limitations of this method are: i) it does not provide a quantification of the effect of regulations on trade per se; ii) data availability is a major problem; and iii) standards vary in importance across sectors and products.

A gravity model explains bilateral trade flows by trading partners' Gross National Product and geographical distance between countries. The gravity model has been extended to include additional variables for examining the effect of trade promoting and limiting factors. That is, the gravity-based approach includes estimating a gravity equation with residual errors then considered as the effect of NTBs. It quantifies the effect of NTBs on trade flows. However, there may be factors other than NTBs responsible for residual errors.

Risk assessment approaches appear to be far removed from the measurement of NTBs. However, these methods have been coupled with cost-benefit calculations and indirectly contribute to the measurement of the effect of regulations and, therefore, of NTBs. Rather than quantifying the actual impact of this measure on trade, they provide some indication of what should be included as trade barriers based on the effect on welfare. The main advantage of this method is in its combined use of scientific and cost-benefit assessment for identifying and assessing the effects of NTBs. The main limitation of this approach is the uncertainty that surrounds the level of risks and the economic consequences.

Using stylized macroeconomic approaches, the effects of NTBs are estimated by observing the displacement of the market equilibrium induced by a regulation. It helps in assessing how much trade is forgone because of regulations, how extensively consumer preferences are affected and what the effect of harmonization of regulations versus mutual recognition agreements might be for particular nations. The major disadvantage lies in the fact that the analytical framework becomes rapidly intractable unless drastic simplifying assumptions are made.

Survey-based approaches have been used to obtain data on costs of NTBs when information from other sources is not available. This method uses surveys conducted among practitioners (e.g., exporters) to find the various types of NTBs faced during their activities. In the absence of information from other sources, survey-based methods are useful. With this method, it is possible to identify and gain perspectives about trade impediments that may be difficult for economists to measure (for example,

administrative procedures) (Beghin and Bureau, 2001). However, this approach is costly and resource-intensive. Some of the data from surveys can also be used in quantitative methods.

Given the non-availability of data on NTBs in the EAC, the survey approach was employed in this study. Primary data were obtained through a detailed field survey of maize and beef cattle traders and transporters along the trade routes across the three countries. Beef cattle and maize traders and transporters were interviewed to obtain data on the transfer costs and the various NTBs that they face while trading in maize and beef cattle in EAC countries. A cluster sampling method was used to identify 357 and 450 beef cattle and maize traders and transporters, respectively, who were interviewed using a semi-structured questionnaire. In the first stage of the cluster sampling, the major markets located along the main trade routes and the major border points in Kenya, Uganda and Tanzania were selected. The second stage of the cluster sampling selected a total of 807 beef cattle and maize traders and transporters in the selected markets along the major trade routes. In addition, secondary data sources were used to provide data used for the other variables required by the SEM analysis outlined above. Although primary data were collected on beef cattle, these were converted to beef in kilograms for the purpose of the SEM analysis.

Results

Characteristics of trade

Within the maize sector, traders and transporters in the three EAC countries mainly engage in local purchase and sale and this constitutes more than 80% of their trade volumes. In contrast, maize imports and exports in EAC account for less than 10% of total volumes handled by traders and transporters. Regional trade is therefore much lower relative to domestic trade in maize. A similar trade pattern is observed in the beef cattle subsector where local trade accounts for over 80% of all trade while regional trade accounts for less than 5% of total beef cattle trade. The low trade volumes in these key food commodities, coupled with simultaneous existence of food deficits and surpluses in the region, undermine food security in EAC (Karugia et al., 2008). Domestic food prices are to a large extent determined by local and regional demand and supply conditions. Maize is a strategic food crop in the EA region and there is need to promote intra-regional trade for increased food security. Similar results have been reported for the COMESA region where total trade in maize was worth US$ 1.35 billion in 2002 and US$ 0.8 billion in 2003. However, less than 10% of this trade has been intra-regional. These findings should be interpreted with caution since the region also experiences high informal trade in both maize and beef cattle (RATES, 2003). Typically, maize crosses the EAC borders informally in small quantities that are transported by bicycles and by trekking. On the other hand, informal beef cattle trade is made possible by the possibility of moving cattle on foot across EAC border points.

Over 70% of maize and beef cattle traders in the three EAC countries used vehicles to transport their merchandise. Use of lorries, trailers or trucks was the preferred mode of transportation for maize and beef cattle within the EAC. Among the motorized transportation methods, the lorry was the most preferred means of transport across the EAC countries. The other means of transport, such as bicycle, cart and ship, were used infrequently. However, another common mode of transport used by the beef cattle traders was trekking to the market place.

All traders and transporters of beef cattle and maize traveled on average over 150 km per trip within the EAC region from origin to destination. It is important to note that both origin and destination points were within the three EAC countries. On average, the amount of time taken per trip across the three countries was up to two days. The greatest distances per trip were reported in Tanzania, where maize and beef cattle traders and transporters covered an average of 278 and 341 kilometers, respectively. This is expected since Tanzania is a vast country relative to Kenya and Uganda. Tanzania's vastness offers a high potential trade base and the highly dispersed markets in the country are an avenue that traders should seek to exploit. In addition, traders and transporters of beef cattle and maize in Tanzania transported the highest quantities among all three countries in the EAC region in both inter- and intra-regional trade. Tanzania traders and transporters on average transported 34 beef cattle and 21 tons of maize per trip. In Kenya, the corresponding figures were 17 beef cattle and 13 tons of maize per trip, and Uganda traders and transporters transported on average 20 beef cattle and 16 tons of maize per trip.

Table 1: Main markets in EA and transfer cost with and without NTBs

Maize	With NTBs			Without NTB	
	Distance in km	Transfer cost per km/maize ton in US $	Total transfer cost US$	Transfer cost per km/maize ton in US $	Total transfer cost US$
Nairobi-Namanga	170	0.46	78	0.37	63
Nairobi-Busia	500	0.46	230	0.37	185
Busia – Kampala	250	0.44	110	0.29	73
Dar es Salaam – Namanga	772	0.35	270	0.24	185
Beef	**With NTBs**			**Without NTB**	
	Distance in km	Transfer cost per km/ beef ton in US $	Total cost US$	Transfer cost per km/beef ton in US$	Total transfer cost US$
Nairobi-Namanga	170	0.34	57.8	0.17	28.9
Nairobi-Busia	500	0.34	170	0.17	85
Busia - Kampala	250	0.40	100	0.09	22.5
Dar es Salaam – Namanga	772	0.43	331.96	0.20	154.4

Source: Survey results, 2007-08

Transfer cost of maize and beef cattle per kilometer was estimated by the summation of all costs incurred as the traders and transporters moved from trade point of origin to destination. These costs were further split into two groups: non-NTB transfer costs (costs that are not considered NTBs, such as vehicle hire and maintenance, loading and off-loading and transporters' allowances) and NTB transfer costs (weighbridges, security, transiting, custom clearance, road toll stations, branding of cattle, standards and certification, and bribes). A variable was classified as an NTB cost if it acted as an impediment to trade in terms of increasing transfer costs and/or increased the time required for trade over the normal amount of time needed. This extra cost was reflected through bribes and extra time through queues experienced by traders as they acquired various trade services. Table 1 shows transfer costs and the various trade routes using main towns in the region.

Types of non-tariff barriers to maize and beef trade in EAC

The main NTBs are similar in the three EAC countries covered in the study. They include administrative requirements (mainly licenses, municipal and council permits), taxes/duties (mainly excise and cess duty), roadblocks, customs barriers, weighbridges, licensing, corruption (e.g., through bribes) and transiting. In addition, security constitutes a main administrative requirement in Tanzania. Various licenses are also required. These include a business license, road transport license and a livestock clearance certificate. Roughly a third of the respondents in the three countries indicated that business licenses were a mandatory administrative requirement for trade in both maize and beef cattle.

Roadblocks were identified as a barrier to trade in the region. Kenya has the highest total number of roadblocks impeding free trade in the EAC (Table 2). Kimenyi (2008) reported that, on average, there were 47 roadblocks on the road from Mombasa to Busia (a distance of 1,050 km). The Kenyan government has indicated that it intends to reduce the roadblocks from 47 to 15 (a reduction of 68%) to encourage inter-regional trade. Roadblocks were reported to be time wasting, too many in number, staffed by unfriendly police officers and were an avenue for corruption (bribery).

Table 2: Average number of roadblocks and respective distances

	Number of road blocks			Average distance in kilometers		
Category	Kenya	Tanzania	Uganda	Kenya	Tanzania	Uganda
Beef cattle	12	7	5	198	341	236
Maize	10	5	14	190	278	190

Source: Survey results, 2008

Bribes are paid by traders at various levels of the trade transactions in the EA region. Table 3 shows that over half of traders and transporters gave bribes in order to overcome various trade barriers.

The number of weighbridges that traders and transporters were subjected to in Kenya, Uganda and Tanzania was low (5 in Uganda for both beef cattle and maize traders, 3 in Tanzania for both traders of beef cattle and maize while 2 for maize traders in Kenya and none for beef cattle traders in Kenya). Overall, the majority of traders in the three countries do not regard weighbridges as serious obstacles to trade.

Traders and transporters of both maize and beef cattle encountered long queues at customs offices. The longest time spent in queues per trip was approximately 7 hours in Uganda by maize traders. In Kenya beef cattle and maize traders spent on average 3 hours at customs offices, while in Tanzania traders

Table 3: Number of respondents who gave any form of bribe as they traded

	Kenya		Tanzania		Uganda	
Category	**No.**	**Percent**	**No.**	**Percent**	**No.**	**Percent**
Beef cattle traders	29	62	68	96	40	61
Beef cattle transporters	29	64	107	98	10	53
Maize traders	35	51	81	94	21	33
Maize transporters	44	83	145	99	25	76

Source: Survey results, 2008

Table 4: NTBs as a percentage of total transfer costs

	Maize			Beef cattle		
NTB description	**Kenya**	**Tanzania**	**Uganda**	**Kenya**	**Tanzania**	**Uganda**
Weighbridges	2.41	0.97	4.25	0	0.1	0
Security	0.45	0.73	0.26	0.26	6.69	1.48
Transiting	0.49	0	33.87	0.49	0	9.47
Municipal permits	3.61	2.39	2.21	4.2	3.69	3.18
Council permits	3.74	4.31	1.79	4.24	4.69	3.15
Licenses	2.75	0.37	4.46	1.74	0.17	5.93
Customs clearance	12.83	0.75	2.75	0.62	0.05	2.98
Immigration	0	0.13	0.31	0	0	2.35
Standards and certification	4.92	0.41	2.63	8.53	1.14	3.89
Road toll stations	1.42	0.35	0.63	0	0.34	2.89
Bribes	1.94	1.27	1.41	7.43	1.47	3.17
Branding of cattle	0	0	0	0.63	0.36	1.08
Transfer costs taken up by NTBs (%)	**34.56**	**11.68**	**54.57**	**28.14**	**18.7**	**39.57**

Source: Survey results, 2008

spent less than one hour at the customs offices per trip. These long queues were reported to be caused by inadequate staff at customs offices, discrimination by customs officials, and failure by customs officials to clarify the rules and regulations of trade. The inspection process at customs points required unnecessary unloading of commodities.

NTBs as a percentage of transfer costs

Nearly 35% of total maize transfer cost is contributed by various NTBs in Kenya from origin to destination (Table 4). In Uganda, the cost rises to over 50% and only 12% of total maize transfer cost in Tanzania was taken up by NTBs. In beef cattle trade, Kenya and Uganda reported that NTBs constitute over 25% of total transfer cost while Tanzania reported approximately 19% of total transfer cost. Reduction or elimination of NTBs will reduce the high transfer cost in the region. Table 4 illustrates the scenario.

Welfare impacts

The impacts of NTBs on cross-border trade and welfare were computed using a static SEM. The General Algebraic Modeling Systems (GAMS) package was used to solve the equations in the model. Estimates were compiled for the quantities of maize and beef supplied and consumed in the three EAC countries, their corresponding prices and their supply and demand elasticities. In addition, data were collected on the cost of NTBs and transport costs. The own-price elasticities of supply for maize in Kenya, Uganda and Tanzania were set at 2.17, 0.8 and 1.96, respectively. These supply responses were adopted from earlier studies[8]. On the other hand, supply response for beef in the three EAC countries was set at 0.35[9].

On the consumption side, aggregate demand for maize and beef depends on own prices and income. The own-price elasticity of demand for maize was set at - 0.80, - 0.77 and - 0.9 for Kenya, Uganda and Tanzania, respectively[10]. On the other hand, the own-price elasticities for beef in Kenya, Uganda and Tanzania were set at - 1.68, - 1.01 and - 1.18, respectively. These parameters were used to calibrate the SEM to reproduce the 2006 base scenario when NTBs were the major barriers to trade in the EAC.

Three policy scenarios are simulated to quantify the impacts of NTBs within the EAC. These comprise a 50% reduction in all NTBs, a complete abolishment of all NTBs, and the elimination of specific types of NTB, such as roadblocks. To solve the model, estimates were compiled for the quantities of maize and beef supplied and consumed in the three EAC countries, their corresponding prices and their price elasticities. In addition, the cost of NTBs and transport costs were used in the SEM. The variables of interest in the quantification of the impacts of NTBs on cross-border trade are maize and beef prices, demand, supply, trade flows and welfare changes (consumer and producer surplus). The base scenario replicates the existing trade patterns where the three EAC countries trade in both maize and beef. Since maize retail prices are higher in Kenya than in Uganda and Tanzania, Kenya formally imports maize from both Uganda and Tanzania to the tune of 134,000 and 86,000 tons, respectively. Uganda exports beef to both Kenya and Tanzania since beef retail prices are lower in Uganda than in both the other countries. The base scenario produces positive welfare impacts for the maize and beef subsectors in the three countries. Overall, the combined social surplus for the maize and beef subsectors in Kenya, Uganda and Tanzania amounted to US$ 2.3 billion, US$ 0.8 billion and US$ 1.8 billion, respectively.

Impact of a complete elimination of NTBs

When NTBs within the EAC are completely abolished, various changes relative to the base scenario are observed. Maize producer and consumer prices in Kenya fall by about 9% and 3%, respectively, but increase by 20% and 24%, respectively, in Uganda (Table 5). In Tanzania producer and consumer prices fall by 35% and 5%, respectively. The declining maize prices in Kenya result in a 4% rise in maize consumption, but cause a 6% decline in maize production. Maize consumption declines in Uganda by 2%, while production increases by 3%. In Tanzania, maize production declines by 5% while consumption increases by about 2%. The changes in prices and quantities occasion changes in intra-EAC maize trade. Consequently, Uganda's exports to Kenya rise by about 99% relative to the base scenario, while Tanzania's maize exports to Kenya increase by 33%. While percentage changes in intra-EAC maize exports appear substantial, the changes in export volumes are quite small since the model only takes note of the formal maize trade.

[8]In particular, the elasticity of supply for maize in Kenya is adopted from Nzuma (2007), while those for Uganda and Tanzania are derived from Delgado et al. (2003) and Wood and You (2001).
[9]The beef supply response used in this study was adopted from the IMPACT study by IFPRI.
[10]The demand elasticities for maize and beef in Kenya are adopted from Musyoka (2008), while those for Tanzania are derived from Weliwita et al. (2003) and the Ugandan estimates are derived from IFPRI. It should be noted that the estimation of all the demand elasticities satisfy the demand theory restrictions.

Table 5. Impacts of a complete elimination of NTBs

Variable Description	Complete elimination of NTBs		
	Kenya	Uganda	Tanzania
Maize			
Producer Price (US$/MT)	-14 (-8.86)	26 (19.55)	-55 (-34.59)
Consumer Price (US$/MT)	-6 (-2.96)	35 (24.31)	-8 (-4.79)
Quantity Demanded ('000 MT)	55 (3.61)	-14 (-2.34)	21 (1.56)
Quantity Supplied ('000 MT)	-145 (-6.49)	16 (3.25)	-179 (-4.69)
Quantity Traded ('000 MT)			
Kenya	-118 (-3.69)	0 (0)	0 (0)
Uganda	133 (99.25)	-59 (-5.4)	0 (0)
Tanzania	29 (33.72)	0 (0)	-10 (-0.27)
Consumer Surplus (US$ Million)	12 (7.43)	-14 (-4.69)	1 (0.6)
Producer Surplus (US$ Million)	-11 (-2.77)	16 (12.31)	- 2 (-0.64)
Social Surplus (US$ Million)	1 (4.66)	2 (7.62)	-1 (-0.04)
Beef			
Producer Price (US$/MT)	-939 (-15.51)	454 (34.92)	-829 (-14.95)
Consumer Price (US$/MT)	-1047 (-15.22)	528 (38.82)	-914 (-15.41)
Quantity Demanded ('000 MT)	294 (19.3)	-43 (-35.54)	155 (16.36)
Quantity Supplied ('000 MT)	-121 (-19.66)	43 (12.65)	-81 (-16.88)
Quantity Traded ('000 MT)			
Kenya	1 (0.19)	0 (0)	0 (0)
Uganda	2 (9.70)	-3 (-1.8)	5 (19.23)
Tanzania	1 (1.50)	0 (0)	-2 (-0.5)
Consumer Surplus (US$ Million)	3 (1.51)	-5 (-3.36)	9 (1.65)
Producer Surplus (US$ Million)	-2 (-0.18)	9 (6.46)	-7 (-0.84)
Social Surplus (US$ Million)	1 (1.33)	4 (3.10)	2 (0.81)
Total Surplus (US$ Million)	2 (0.09)	6 (0.56)	1 (0.11)

Note: The values represent differences from the base scenario; figures in parentheses are percentage changes and total surplus is the summation of consumer and producer surplus for both maize and beef; MT = metric ton.

Source: Authors' SEM Analysis, 2008.

The welfare changes emanating from a complete abolishment of NTBs in the maize trade within EAC vary across the three countries. In Kenya, consumer surplus increases by 7%, while producer surplus falls by 3% (Table 5). In contrast, consumer surplus in Uganda falls by 5%, while producer surplus increases by 12%. In Tanzania, producer surplus falls by 0.6% while consumer surplus increases marginally 0.6%. The net welfare effect within the maize subsectors in Kenya and Uganda is an increase in social surplus by 5% and 8%, respectively, while the social surplus in Tanzania declines by a percentage point (Table 5).

Within the maize subsector, the greatest gainers from a complete abolishment of NTBs would be maize producers in Uganda while the greatest losers from this policy change would be maize producers in Kenya. Ugandan maize producers benefit from the increasing domestic maize prices and expand their exports to Kenya. In contrast, Kenya's maize producers are hurt by declining maize prices and as a result cut back on production. However, maize consumers in Kenya and Tanzania benefit from a complete abolishment of NTBs, while their counterparts in Uganda are hurt by this policy change. Overall, the gainers from a complete elimination of NTBs within the EAC maize subsector can potentially compensate the losers and thus, the policy can be recommended based on the compensation principle.

Within the beef subsector, a complete elimination of NTBs yields a 15% decline in beef producer prices in both Kenya and Tanzania but leads to a 35% increase in Ugandan beef producer prices relative to the base scenario (Table 5). Similarly, beef retail prices in both Kenya and Tanzania decline by more than 15%, but increase by 39% in Uganda. Subsequently, beef consumption in Kenya and Tanzania increases by 19% and 15%, respectively, while it falls by 35% in Uganda (Table 5). In contrast, beef production in Kenya and Tanzania falls by 20% and 17%, respectively, while beef production increases by 13% in Uganda. As a result, Uganda expands its beef exports to Kenya and Tanzania by 10% and 19%, respectively, while Tanzanian beef exports to Kenya rise by about 2%.

The changes in beef prices and volumes occasion changes in welfare measures. As a result, consumer surplus in both Kenya and Tanzania increase by 2% and falls by 3% in Uganda (Table 5). However, producer surplus within the beef subsectors in Kenya and Tanzania fall by less than 1%, while in Uganda producer surplus for beef producers increases by 6% relative to the base scenario. The net welfare gain within the beef subsectors of the three countries is a 3% increase in social surplus in Uganda and

Table 6. Welfare impacts of reducing the existing NTBs by half

Variable Description	**50% reduction in existing NTBs**		
	Kenya	Uganda	Tanzania
Maize			
Producer Price (US$/MT)	-7 (-4.43)	11 (8.27)	-9 (-5.66)
Consumer Price (US$/MT)	-4 (-1.97)	29 (20.14)	-7 (-4.19)
Quantity Demanded ('000 MT)	33 (2.97)	16 (1.53)	16 (1.42)
Quantity Supplied ('000 MT)	-85 (-2.63)	370 (2.79)	-34 (-1.89)
Quantity Traded ('000 MT)			
Kenya	0 (0)	0 (0)	0 (0)
Uganda	67 (25)	-29 (-2.65)	0 (0)
Tanzania	15 (17.44)	0 (0)	-5 (-0.13)
Consumer Surplus (US$ Million)	7 (3.39)	-7 (-4.34)	1 (0.3)
Producer Surplus (US$ Million)	-6 (-2.05)	8 (6.15)	-2 (-0.64)
Social Surplus (US$ Million)	1 (1.34)	1 (1.84)	-1 (-0.34)
Beef			
Producer Price (US$/MT)	-659 (-5.45)	384 (19.54)	-749 (-8.32)
Consumer Price (US$/MT)	-1048 (-7.27)	538 (19.56)	-904 (-9.86)
Quantity Demanded ('000 MT)	295 (9.61)	-45 (-17.19)	154 (6)
Quantity Supplied ('000 MT)	-121 (-9.06)	43 (7.65)	-79 (-6.46)
Quantity Traded ('000 MT)			
Kenya	0 (0)	0 (0)	0 (0)
Uganda	1 (4)	-1 (-0.6)	2 (7.69)
Tanzania	0 (0)	0 (0)	0 (0)
Consumer Surplus (US$ Million)	1 (0.15)	-3 (-2.01)	4 (0.82)
Producer Surplus (US$ Million)	-0.5 (-0.09)	3 (3.63)	-4 (-0.48)
Social Surplus (US$ Million)	0.5 (0.14)	3 (1.62)	1 (0.34)
Total Surplus (US$ Million)	**1 (0.04)**	**2 (0.23)**	**0 (0.06)**

Note: The values represent differences from the base scenario, figures in parentheses are percentage changes from the base scenario and total surplus is the summation of consumer and producer surplus for both maize and beef; MT = metric ton.

Source: Authors' SEM Analysis, 2008.

1% increases in social surplus in both Kenya and Tanzania. Thus, social surplus in the three countries increases by an aggregate 4%. Once again, beef producers in Uganda would gain most from a complete removal of NTBs within the EAC while beef producers in Tanzania would be the greatest losers from this policy change. As observed in the maize subsector, the gainers from a complete removal of NTBs within the EAC beef subsector can potentially compensate the losers. Thus, a complete elimination of beef trade NTBs leads to a potential improvement in welfare and should be advocated as an appropriate policy.

Impact of a 50% reduction in NTBs

The impacts of a 50% reduction in NTBs within the EAC closely track those of a complete elimination of NTBs, but are much more dampened. When the NTB rates within the EAC are reduced by half, maize producer and consumer prices in Kenya fall by about 4% and 2%, respectively, increase by 8% and 20%, respectively, in Uganda and fall by 6% and 4%, respectively, in Tanzania. Table 6 illustrates this scenario. The fall in price benefits Kenyan maize consumers, who gain US$ 7 million while producers lose US$ 6 million. This results in a rise in maize consumption in Kenya, but leads to a decline in domestic maize production. Price increases in Uganda lead to consumers losing US$ 7 million while producers gain US$ 8 million. In Tanzania, consumers gain US$ 1 million while producers lose US$ 2 million. On the other hand, Uganda's maize production increases by about 3% or 370,000 tons, while maize production in Tanzania increases by 34,000 tons (2%) but declines in Kenya by 3% (85,000 tons). These changes are accompanied by changes in the trade pattern. Uganda's maize exports to Kenya increase by 67,000 tons and by 15,000 tons from Tanzania. Ugandan and Tanzanian producers benefit from the increased production, but no similar gains accrue to Kenyan producers who lose 2%. As a result, social welfare in the maize subsector increases in Kenya and Uganda but declines marginally in Tanzania. Overall, total benefit in the maize subsector increases by 1% (US$ 1 million) in Kenya, by 2% (US$1 million) in Uganda, but declines by 0.3% in Tanzania.

Within the beef subsector, the reduction of NTBs by half results in a 5% and 8% fall in beef producer prices in Kenya and Tanzania, respectively, but leads to a 20% increase in beef prices in Uganda (Table 6). The increased beef prices in Uganda lead to an 8% (43,000 tons) rise in beef production in Uganda, while production in Kenya and Tanzania declines by 9% (121,000 tons) and 6% (79,000 tons), respectively, from the base scenario. On the other hand, beef retail prices fall in Kenya and Tanzania by 7% and 10%, respectively, while they increase by 20% in Uganda. As a result, beef consumption in Kenya and Tanzania increases by 10% (295,000 tons) and 6% (154,000 tons), respectively, while Uganda's beef consumption declines by 17% (45,000 tons). In addition, Uganda's beef exports to Kenya and Tanzania increase by 4% (1,000 tons) and 8% (2,000 tons), respectively.

The effect of this is that the consumer surplus for beef in both Kenya and Tanzania increases by about 0.2% and 0.8%, respectively, from the base scenario, while consumer surplus falls by about 2% in Uganda (Table 6). In contrast, beef producer surplus falls by about 0.1% and 0.5% from the base scenario in Kenya and Tanzania, respectively, while it increases by about 4% in Uganda. Thus, beef producers in Uganda would gain the most from a 50% reduction in beef NTBs within the EAC while beef consumers in Uganda would be the greatest losers from this policy change.

In addition, the welfare effects of separately eliminating individual types of NTBs such as roadblocks, permits and customs clearance were also analyzed but the results[11] are not presented. The welfare impacts of eliminating specific NTBs were positive but marginal. However, the welfare impacts give compelling evidence in support of eliminating NTBs. The foregoing analysis seems to suggest that a complete abolishment or a reduction of the existing NTBs in maize and beef trade increases intra-EAC maize and beef trade flows as Kenya imports more maize from both Uganda and Tanzania and Uganda exports more beef to Kenya and Tanzania. As a result, positive net welfare gains are attained for the entire EAC maize and beef sub-sectors. In both cases, the gainers from the proposed reductions in NTB can potentially compensate the losers. These findings give compelling evidence in support of eliminating NTBs within the EAC customs union.

Conclusions and policy implications

The main purpose of this study was to assess the impact of NTBs on maize and beef cattle cross-border trade in the East African Community with a view to suggesting areas of reform in order to enhance regional trade. The main NTBs are corruption through

[11]Results are available from the authors on request.

various bribes, roadblocks, custom procedures, and harassment or discrimination during licensing and obtaining permits. There are also numerous administrative requirements while trading in maize and beef cattle in EA (at least 10). Licenses and municipal and council permits are required across all three countries. Most NTBs are difficult to quantify and it can also be difficult to get raw data (e.g., for bribes).

The SEM results show that complete removal of all NTBs brings positive welfare change in East Africa. Reduction or removal of individual NTBs brings very minimal welfare changes, so a comprehensive approach to addressing the barriers is warranted. In particular, the effects of eliminating three types of NTBs – mainly roadblocks, permits and customs clearances – reported positive but marginal welfare impacts (less than 0.5% change). The impact of NTBs on social welfare stresses the importance of eliminating or reducing the NTBs in order to gain trade benefits in the region. The specific policy recommendations that can be drawn from this study include:

- Member countries should streamline administrative procedures at border points to improve efficiency by harmonizing trade regulations.
- Member countries should speed up implementation of procedures at points of origin and at border points.
- There is need to consider ways to minimize time lost at checkpoints, such as roadblocks and weighbridges.
- EAC countries should take a regional approach to removing NTBs, since they are similar across the member countries and across commodities, so as to exploit economies of scale.
- EAC countries should design and implement efficient monitoring systems to provide feedback to the relevant authorities on the implementation of measures to remove unnecessary barriers to trade in the region. This can be done by establishing a system of gathering information on NTBs, including private-sector and government participation in verification and monitoring. This will ensure that the measures implemented will be sustainable. Monitoring bodies should comprise stakeholders from government and the private sector, and small-scale traders should also be represented to ensure beneficial impacts for all levels of traders.
- There is need to greatly improve the road network to reduce high transportation costs.

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