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Trade effects of the East African Customs Union in Tanzania

Application of a structural gravity model

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Abstract: By measuring the effects of forming and joining a regional integration bloc using an augmented structural gravity model, this paper finds that the East African Community (EAC) and EAC Customs Union have significantly enhanced Tanzanian trade into EAC markets. Kenya has continued to be the main trading partner for Tanzania in the EAC markets, and from 2015 onwards the trade deficit with Kenya changed into a surplus, signalling improvement in the balance of trade. Tanzania has also maintained a significant trade balance surplus with the other EAC Partner States. There have, however, been no significant changes in Tanzania's trade patterns, which have remained primarily inter-industry rather than intra-industry, signalling a lack of structural change and productivity in the economy and suggesting that Tanzania's trade in EAC markets is not linked with industrialization and transformation. Furthermore, continued trade imbalances, especially with Kenya, threaten a backlash in the long term and are not healthy for the future and sustainability of the EAC integration process.

Key words: East Africa, EAC Customs Union, single customs territory, gravity model, Tanzania

JEL classification: H23, H53

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Note: list of acronyms in Appendix C

Acronyms

CES	Constant Elasticity of Substitution
CET	Common External Tariffs
CU	Customs Union
EAC	East African Community
EAC-CM	East African Community Common Market
EAC-CO	East African Community Certificate of Origin
EAC-CU	East African Community Customs Union
EAC-MU	East African Community Monetary Union
EAC-SCT	East African Community Customs Union Single Customs Territory
EEC	European Economic Community
EU	European Union
FDI	Foreign Direct Investment
FTA	Free Trade Area
GDP	Gross Domestic Product
GNI	Gross National Income
IIT	Intra Industry Trade
MTR	Multilateral Trade Resistance
NTB	Non-Tariff Barrier
OLS	Ordinary Least Square
OSBP	One Stop Border Post
REC	Regional Economic Community
RoO	Rules of Origin
RoW	Rest of the World
SACU	South African Customs Union
URT	United Republic of Tanzania

Table of Contents

1. Introduction

From the Permanent Tripartite Commission for East African Co-operation that was tasked with reviving regional cooperation in 1993 to the establishment of East African Co-operation in 1996, the Treaty for the establishment of the East African Community (EAC)[1] in 2000 and the protocols for the establishment of EAC Customs Union (EAC-CU) in 2005 and the Single Customs Territory (EAC-SCT) in 2014, regional integration in East Africa has come a long way.[2] Significant progress has been made by the EAC Partner States in implementing the EAC-CU. Trade within the EAC is now free from import duties, and Partner States have adopted a three-band Common External Tariff (CET). In addition, most Partner States have reduced their dependence on trade taxes as a source of revenue by introducing valued added taxation,[3] and export restrictions have been phased out for most products since late 1990s (Karingi et al. 2016; Mayer and Thoening 2016).

Viner (1950) posits that, by dismantling tariff barriers to trade (i.e. removing border measures), a customs union like the EAC-CU could lead to either trade creation or trade diversion, such that the impact of a customs union on welfare is ambiguous.[4] These are comparative *static effects* that relate to the impact of a customs union on welfare, comparing the welfare of a country before and after the formation of the customs union.[5] Forming a regional integration bloc also entails adjustment of needs, as prices on the domestic market change in response to tariff reforms, which will have an overall effect on profit margins, productivity, wages, and employment. If the price of final goods or production inputs in the importing country market falls, this will be to the benefit of consumers and input-purchasing producers. Other static welfare effects include: administration savings from the elimination of customs officers; harmonization of customs procedures and domestic regulations; and improvements in collective terms of trade, as the customs union has much more bargaining power than all of its members separately (Walkenhorst 2005).

The effects of forming a customs union that arise from the removal of tariff barriers to trade are based on perfect competitive trade theory, which assumes dissimilar, and hence substitutable, goods. In contrast, the effects of forming a customs union that arise both from the removal of border measures (tariff barriers to trade) and behind-the-border measures (non-tariff barriers to trade) are based on imperfect competitive trade theory, where firms derive profits from exploiting market dominance, be it through economies of scale, increased competition, improved technology, and/or greater specialization. This entails an integration process involving reforms that facilitate trade and remove non-tariff barriers (NTBs) to trade. These include reforms to customs procedures; domestic regulation of services and production that discriminates against foreigners; product standards that differ from international norms or where testing and certification of foreign goods is complex and perhaps exclusionary; regulation of inward investments; competition policy; intellectual policy protection; and rules surrounding access to government procurement. Nations forming a customs union that addresses both the border and behind-the-border impediments to trade are likely to benefit from *dynamic effects* on the rate of output growth.

Studies have shown that the gains from a successful process of removing behind-the-border measures could be considerably higher than the losses which may arise from removing the border measures (as they lead to deeper market integration). The possible range of larger gains associated with removing behind-the-border measures includes: technology transfer and diffusion through both trade and FDI (though the impact on FDI is

[1] A list of acronyms can be found in Appendix C.

[2] The EAC started with three Partner States, Kenya, Tanzania, and Uganda, before Rwanda and Burundi joined in 2007 and South Sudan in 2016. In 2010, the EAC Common Market (EAC-CM) was formed, in 2013 the bloc signed the protocol for the establishment of EAC Monetary Union (EAC-MU), and the Partner States are aspiring to form a Political Federation in the future.

[3] 0 per cent for raw materials, 10 per cent for intermediate goods, and 25 per cent for finished products.

[4] Even though it is generally assumed that trade creation exceeds trade diversion.

[5] *Trade creation* occurs when domestic production in a member nation is replaced by lower-cost imports from another member nation. This leads to increased welfare for members as nations specialize in comparative advantages and for non-members as increased real income spills over into increased imports from the rest of the world. *Trade diversion* occurs when lower-cost imports from non-members are replaced by higher-cost imports from members. By itself, trade diversion lowers welfare as it shifts resources away from comparative advantages.

ambiguous as it is often a substitute for trade)[6]; pro-competitive gains from increasing import competition in an environment of imperfect competition; greater exploitation of economies of scale in production and greater use of intermediate inputs; increased geographical dispersion of production through trade that supports the exploitation of different factor proportions for different parts of the production process; local economies of scale through finer specialization and division of labour in production; and externalities arising from institutional changes that lead to large increases in productivity (Gonzalez and Cirera 2012).

It is within this context that African countries have embraced regional integration as an important component of their growth and development strategies since the early 20th century. Africa's long history of regional integration initiatives dates back to the establishment of the South African Customs Union (SACU) in 1910. Kenya and Uganda first formed a customs union in 1917, which Tanganyika joined in 1927, and the first East African Community (EAC) was formed in 1967 (Alemayehu and Kibret 2002; Jenkins 2000). Since then, a number of regional economic communities (RECs) have been formed across the continent, even though most of them have performed poorly in comparison with the EEC/EU.

The main reasons for the poor performance of most RECs in Africa, EAC being one, is the high prevalence of NTBs in the region, which create considerable obstacles to trade flow. This is reflected in the extremely high average costs of trading within the EAC region. Since 2012, the EAC Secretariat has been publishing quarterly reports on the status of NTB elimination in the region; the reports detail NTBs, their sources, and the affected Partner States; some seem to reflect complaints about the application of agreed rules or regulations rather than actual NTBs. In 2013, average costs in ad valorem equivalents were about 118.8 per cent, prominent among these being the costs of transport, bureaucracy, corruption, and settlement of payment.[7]

According to Article 13 of the Treaty that established the EAC, 'each of the Partner States agrees to remove, with immediate effect, all the existing NTBs to the importation into their respective territories of goods originating in the other Partner States and, thereafter, not to impose any new non-tariff barriers'. Nevertheless, attempts by Partner States to deal with NTBs through various initiatives like the EAC Time-Bound Programme for Elimination of Identified NTBs (EACS 2009), as well as simplification, standardization, and harmonization of standards, competition policy and trade law, seem to have achieved little, and NTBs remain prevalent and continue to frustrate trade flows within the Community. Indeed, the trend from 2014 to date shows that new NTBs arise as Partner States formulate and implement new laws and regulations that aim to achieve legitimate public policy objectives. Some of the unresolved NTBs relate to laws that await reform, which is often a protracted process. Such NTBs manifest themselves in the form of, for example, prolonged clearance procedures; delays at the ports of entry/exit; delays at weighbridges and the numerous road blocks; delays in ferrying of cargo by transit vehicles; non-recognition of EAC Certificates of Origin (EAC-CO); non-recognition of quality marks issued by EAC Bureaux of Standards; and retesting of products (Etyang 2019; Oiro et al. 2017).

Besides efforts to overcome these challenges, there have been renewed impetuses for the revival of regional integration in Africa, primarily driven by the economic rationale of overcoming the constraint of small, fractioned, and landlocked economies working in isolation and inspired by the success of the EEC/EU. As regional integration has intensified in East Africa, interest in the link between the formation of the EAC, EAC-CU, and EAC-SCT and trade performance in Tanzania in terms of deep integration and other realized benefits of a customs union has also intensified. Ever since the revival of the EAC in 2000, there have been concerns on the part of Tanzania about its effects on trade performance, the economy, and people's wellbeing. While some policy-makers and the public in general have been arguing in support of deep integration to the level of a monetary union and a political federation, there are those who are sceptical given the experience of the demise of the first EAC after significant trade imbalances led to its collapse in 1977.

[6] Common rules on investment in a regional integration bloc have the potential to encourage increased inflows of FDI by enhancing the credibility of FDI policies and providing a restraint on sudden policy reversals.

[7] The Economist (2013) estimates that shipping a car from China to Tanzania across the Indian Ocean costs US$4,000, whereas transporting it from Tanzania to neighbouring Uganda can cost US$5,000. A survey in 2011 of East Africa's transport corridors uncovered significant levels of bribery, unnecessary delays (e.g., large amounts of documentation, slow pace of services, poor understanding of clearing procedures), and high tax levels. In Tanzania, bribes constituted about 18.6 per cent of the total value of goods transported in 2012 (Transparency International 2012).

This paper assesses the effects of the EAC, EAC-CU, and EAC-SCT on Tanzania's trade performance in the EAC markets. Joining a regional group like the EAC is expected to expand a country's market size relative to its population size and GDP per capita (or GNI) on the one hand (size effects) and to lower trade costs on the other hand (trade cost effects). Both of these effects are expected to enhance the trade performance of a member country by increasing both exports to, and imports from regional markets. Such effects are best captured and assessed by applying a structural gravity model, whose main variables are, traditionally, economic mass and distance. According to Bergstrand (1985, 1989) and Helpman and Krugman (1985), the gravity model is a direct successor to a model of trade based on monopolistic competition developed by Krugman (1979, 1980). Anderson and van Wincoop (2003) expand this by introducing into the gravity model the concept of Multilateral Trade Resistance (MTR), which can be interpreted as an indicator of the overall accessibility to trade of an entity/country.

By augmenting the structural gravity model to include regional integration in bilateral trade flows, this paper assesses whether 20 years of the EAC, 15 years of the EAC-CU, and more than 6 years of the EAC-SCT have enhanced Tanzania's bilateral trade volumes (exports and imports) in EAC markets, these being a key component for any country's growth. This is done first by tracking the evolution of trade flows in the run-up to the formation of the Customs Union (1997–2005) and then by looking at how patterns of specialization evolved in Tanzania thereafter (2005–2017), taking into account the introduction of the EAC-CU in 2005 and the EAC-SCT in 2014.

2. Regional integration and bilateral trade flows

The desire to understand and explain what determines trade patterns (flow), either bilateral or multilateral, is at the heart of any trade theory. Following David Ricardo's formulation of a law of comparative advantage in 1871 (whereby gains from trade are due to differences in technology) and the Heckscher-Ohlin model of factor endowment in 1933 (where gains from trade are due to differences in factor endowment), up until the 1970s everyone was convinced that trade flow can be explained only by differences in comparative advantage across countries. This trade theory is referred to as traditional (classical) trade theory and is based on perfect competitive models and constant returns to scale, taking the country as the unit of analysis and assuming that, since trade exists due to differences in comparative advantage, flow is due to inter-industry trade (i.e. trade in dissimilar goods between countries). Individual firms within a country in these trade models are atomic and negligible (Feenstra 2004).

While up until the 1970s the traditional trade theories did well in explaining why countries trade, with time they became less relevant in explaining modern trade flow. From the late 1970s and early 1980s, economists such as Krugman, Helpman, and Brander started to observe that there is more trade between countries that are similar in everything (technology, factor endowment, tastes), than between countries that are dissimilar (more than 80 per cent of global trade is among countries that are similar). Hence, it was impossible to reconcile modern trade patterns with the traditional trade models, where countries trade because they are different. This led to the birth of a new trade theory based on an imperfect competition model and increasing returns to scale, where a beneficial (gainful) trade can exist even if countries are identical. Such a trade pattern is referred to as intra-industry trade (trade in similar but slightly differentiated products), as opposed to the inter-industry trade pattern of classical trade models (trade in dissimilar products) (Helpman and Krugman 1985).

In his 1979 article, Krugman formalized the idea that economies of scale together with imperfect competition can give rise to trade even in the absence of comparative advantage, due to (i) people's desire for variety, which allows firms to specialize in the production of similar but slightly differentiated products (also referred as product differentiation), and (ii) increasing returns to scale due to economies of scale; both of which lead to intra-industry trade. He pioneered the incorporation of increasing returns to scale and product differentiation into trade models. With this we have trade in similar but slightly differentiated products between countries due to either identical factors or technology or preference (Krugman 1979, 1980).

Therefore, the formation of a regional integration bloc that develops into a customs union and thereafter a single customs territory such as the EEC and in our case the ECA-CU and ECA-SCT (i.e. that moves from *shallow* integration to *deep* integration) will significantly expand the market in terms of population size and GDP per capita (or GNI) on the one hand[8] and significantly lower trade costs on the other hand[9], allowing firms to take advantage of consumers' desire for variety and economies of scale to expand production and so exports. As a result, more firms will enter the market and compete in producing similar but slightly differentiated products. This affects both the number of products each firm produces and technology transfer across countries, which in turn enhances competition and export diversification. This process alters the trade pattern structure from inter-industry trade towards intra-industry trade and increases trade volumes (exports and imports).

There are many works examining the economic effects of regional integration both before and after accession (*ex ante* and *ex post*). Most of these studies assess and quantify the costs and benefits associated with the removal of border measures (tariff barriers to trade) in terms of trade flow, welfare (the distributive effects), and government revenue. The benefits that result from such shallow integration are referred to as the static effects of regional integration. Studies on the static effects of regional integration on welfare are based either on *ex ante* modelling techniques (partial or general equilibrium) or *ex post* modelling techniques (econometric analysis), where it is assumed that a higher creation effect (diversion effect) is an indication of a country's gain (loss). More recently, as countries implement more trade facilitation measures, there has been a movement

[8] That is, the size effect: larger producers will export more to all destinations, big/rich markets will import more from all sources, and trade flows between countries *i* and *j* will be larger the more similar in the size the trading partners are.

[9] That is, the trade cost effect, which captures the total effects of trade costs that drive a wedge between realized and frictionless trade.

from shallow integration (removal of border measures) to deep integration (removal of behind-the-border measures, i.e. NTBs). Hence, instead of simply assessing whether integration creates more trade, leads to greater welfare, or pushes more efficient producers out of the market, a number of studies now focus on the effects of deeper integration that is the removal of behind-the-border measures of protection.

A few empirical studies have assessed the implementation and effect of regional integration in East Africa. Using a partial equilibrium approach, Khorana and Kimbugwe (2009) quantify and evaluate the trade and welfare effects of EAC liberalization of inter- and intra-regional trade on Uganda for the products classified as 'sensitive'[10] from the Ugandan perspective. The findings of quantification vary with the level of product aggregation applied. This begs the question whether EAC regional integration has had any real benefits on the stakeholders; suggesting that selecting industries for protection should be based on predicted welfare outcomes rather than on pressure from vested interests for the partner countries to benefit from trade liberalization within the regional integration bloc.

The study by Gonzalez and Cirera (2012) shows that intra-regional imports have been increasing in value though not in share, and that the largest share of imports is from sources outside the region, suggesting that the agreements and protocols that apply within the EAC have not had large effects. At the same time, the share of intra-regional exports has been rising, implying that there has been a modest trade expansion among Partner States. This could have come as a result of either trade creation or trade diversion (depending on various factors), yet the low value of this expansion implies that the aggregate *shallow* integration effects of EAC integration are likely to have been small. Overall, the results suggest that the effects of the Customs Union has been important in the restructuring of intra-EAC trade but much less so in terms of total trade and *deep* integration.

Shinyekwa (2015), using an expanded gravity model and a panel data set ranging from 2001 to 2011, investigated the potential impact of the EAC Treaty on trade creation and diversion. His results suggest that the implementation of the EAC Treaty has indeed created trade, contrary to widely held views that South–South regional integration largely diverted trade. Karingi et al. (2016) showed that the Customs Union has supported intra-regional trade and industrialization, in particular through the development of competitive smokestack-free industries. It concludes that regional integration has provided a supportive environment for the development of such industries, but significant opportunities still exist within the region.

Mayer and Thoening (2016) assessed the consequences of existing and prospective trade integration in the EAC. Their study shows that the EAC-CU has been very successful in increasing bilateral trade among members—by 213 per cent on average (much more than COMESA, which led to an increase of 80 per cent, or the SADC, which led to an increase of 110 per cent)—and that the trade gains have translated into welfare improvements and stability. Real GDP is estimated to have risen by 0.45 per cent in the EAC, and the statistical risk of bilateral conflicts between members decreased by 12 per cent in response to the trade increase.

[10] 'Sensitive products' for a country in a regional integration bloc are products that a country has asked to be protected from import competition from other countries in order to enhance its industrialization.

3. A structural gravity model of bilateral trade flows

Drawing from Newton's law of universal gravitation, which states that the gravitational force between two objects is directly proportional to the product of their masses and inversely proportional to the square of the distance between them, we can state that the attractive force F_{ij} between two objects *i* and *j* is given by

$$F_{ij} = G\frac{M_i M_j}{{D_{ij}}^2} \tag{1}$$

such that F_{ij} is the 'attractive force', M_i and M_j are the masses, D_{ij} is distance between the objects, and *G* is the gravitational constant depending on units of measurement for the masses and forces.

Jan Tinbergen (1962) was the first to propose a similar equation to explain trade flows between countries, such that the gravity-like specification of bilateral trade is given as

$$F_{ij} = G\frac{{M_i}^{\alpha}{M^{\beta}}_j}{{D_{ij}}^{\theta}} \tag{2}$$

where *Fij* is the trade flows from *i* to *j*, M_i and M_j are 'economic masses' (size), D_{ij} is the distance between the two locations, and *G* is a constant (equal to Newton's law if $\alpha=\beta=1$ and $\theta=2$). Tinbergen postulated that the level of trade between two countries is directly proportional to the product of the masses (proxied by their economic size, i.e. GDP or GNI) and inversely proportional to the distance (i.e. trade costs or trade barriers[11]) between them. When taking the natural log of equation (20) we arrive at estimable equation

$$lnF_{ij} = \alpha lnM_i + \beta lnM_j - \theta lnD_{ij} + lnG + e_{it} \tag{3}$$

If *e* is the classical error term, equation (3) can be estimated using OLS; the coefficients of the equation are then interpreted as elasticities.

Despite its huge intuition, however, the first applications of the gravity equation by Jan Tinbergen (1962) did not have a theoretical underpinning. Starting with Anderson (1979), theoretical models have since been derived that lead to gravity-like equations.[12] Anderson showed that, because of the Armington assumption, countries would trade more on the basis of their size, and that the level of trade would be curtailed by the transport costs that increase with distance—hence the gravity-like model. A shortfall of this explanation, however, was the assumption that the only differentiating factor for goods was the country of origin.

A more complete formulation of theoretical models with gravity-style bilateral trade patterns was derived using the idea of monopolistic competition in differentiated products. Bergstrand (1985, 1989) and Helpman and Krugman (1985) pushed the argument of a theoretical foundation for the gravity model further by postulating that the model is a direct reference to the model of trade based on monopolistic competition developed by Krugman (1979, 1980). The assumption made here is that because of consumers' desire for variety, identical countries trade in differentiated goods and therefore specialize in the production of different sets of goods. Therefore, goods are differentiated by product attributes, and not just by country of origin. This theoretical basis overcame the undesirable feature of trade based on the Armington assumption that had been put forward by Anderson (1979).[13]

[11] Barriers include culture, religion, and language.

[12] See Head and Mayer (2014) for a comprehensive survey of the gravity equation literature.

[13] As in Anderson's interpretation of the gravity model, Bergstrand (1985) shows that countries with large incomes would most likely trade more and their consumers have larger preferences (because they can afford to pay for them) than poorer countries. The volume of trade, however, would be curtailed by distance, which acts like a tax on trade. Bergstrand (1985) asserts that, typically, the log-linear gravity model equation specifies that economic forces at a trade flow's origin, economic forces at the flow's destination, and economic resistance forces either aiding or resisting the trade movement from origin to destination can explain a trade flow from origin *i* to destination *j*.

Later, Deardorff (1998) derived a gravity-type relationship from the Heckscher-Ohlin model of trade based on factor endowments, while Eaton and Kortum (2002) showed how the Ricardian model of trade from comparative advantage can also lead to a gravity equation. Both of these, in addition to Bergstrand (1989, 1990), extended the model to its very complicated border effects index, such that it becomes difficult for people to apply it. However, Anderson and van Wincoop (2003) significantly simplify that complexity, making the equation provide more useful interpretations of the findings.

Anderson and van Wincoop (2003) introduced the concept of Multilateral Trade Resistance (MTR) to the gravity model. MTR can be interpreted as an indicator of the overall accessibility to trade of an entity/country. The argument for incorporating MTR into the gravity model was premised on the idea that the flow of trade between countries depends not only on the usual Newtonian factors of economic mass and distance, but also on the factors that restrict each country's trade with its trading partners. Anderson and van Wincoop (2003) further stated that exports are affected not only by bilateral trade costs, but also by bilateral trade costs relative to a measure of both countries' trade costs to all other countries—what they called 'multilateral trade resistances'.[14] Hence, starting with Anderson and van Wincoop (2003), who structurally connected an Armington model framework to results obtained from gravity regressions, trade cost estimates were obtained that showed that naive analyses overstated bilateral trade costs. Subsequently, Helpman et al. (2009) showed how the Melitz (2003) model of international trade in differentiated goods with heterogeneous firms also leads to a gravity-type model.[15]

In this study I propose to augment the structural gravity model to include the effects of forming the EAC in 2000, the EAC-CU in 2005, and the EAC-SCT in 2014 on Tanzania's trade performance (exports and imports) in EAC markets. By augmenting the structural gravity model in accordance with Anderson and van Wincoop (2003), I show that, as expected, regional integration and customs union in the EAC enhances bilateral trade—in particular export volume (and value) because the removal of both tariff barriers (border measures) and non-tariff barriers (behind-the-border measures) to trade acts as trade facilitation that reduces trade costs (supply side), while at the same expanding the market due to an increase in population size and/or GDP (or GNI) (demand/income side). Thus we are considering both the size effect (income effect due to market size and economies of scale) and the trade costs component effect of forming and joining a regional integration bloc and customs union on Tanzania's bilateral trade (exports and imports). I therefore seek to show how the formation of the EAC and EAC-CU, based on the monopolistic competition argument, may induce changes in bilateral trade patterns when included in a structural gravity model.

To begin with, I take the model formulated by Anderson and van Wincoop (2003) and Anderson (2011), as this takes account of the effects of the formation of a customs union and a single customs territory. Accordingly, assume that the world has *N* countries and that each country (*i*) is endowed with a differentiated good. Consumers in each country (*j*) have constant elasticity of substitution (CES) preferences given by

$$U_j(c) = \left(\sum_{i=1}^{N} \beta_i^{(1-\sigma)/\sigma} c_{ij}^{(\sigma-1)/\sigma}\right)^{\frac{\sigma}{\sigma-1}}, \tag{4}$$

in which c_{ij} is consumption in country *j* of the good originating in country *i*, b_i is a taste parameter, and *s* is the elasticity of substitution. Let E_j denote total expenditure for consumers in country *j* and assume that consumers maximize utility for given goods prices and the budget constraint; then the nominal demand for each good, X_{ij}, is equal to $p_{ij}c_{ij}$, where p_{ij} is the price of good *i* at destination *j*, given by

$$X_{ij} = E_j \left(\frac{\beta_i p_{ij}}{P_j}\right)^{1-\sigma}, \tag{5}$$

where P_j is the aggregate price index given by

$$P_j = \left(\sum_{i=1}^{N} \left(\beta_i p_{ij}\right)^{1-\sigma}\right)^{1/(1-\sigma)} \tag{6}$$

[14] De Bruyne et al. (2013) write that trade between any country pair is affected by both trading partners' interfaces with the rest of the world and that these third-country effects on trade are captured very well by the concept of MTR.

[15] For surveys on recent advances related to estimating gravity equations, see Donaldson (2016) and Head and Mayer (2014).

Assuming 'iceberg'-type trade costs, the consumer price is related to the producer price by $p_{ij} = p_i t_{ij}$, where p_i is the price of good i at origin and $t_{ij} \geq 1$ is the trade cost factor between origin and destination.

Finally, market clearing provides the value of production in country i as the sum of demand at destination prices

$$Y_i = \sum_{j=1}^{N} X_{ij}, \tag{7}$$

and the individual factory gate prices can be found by summing over individual demand and solving for the individual price p_i

$$(\beta_i p_i)^{1-\sigma} = \frac{Y_i}{\sum_{j=1}^{N} (t_{ij}/P_j)^{1-\sigma} E_j}. \tag{8}$$

Substituting this into the price index (6) and subsequently the demand equation (5) leads to the structural gravity model of Anderson and van Wincoop (2003):

$$X_{ij} = \frac{Y_i E_j}{Y} \left(\frac{t_{ij}}{\Pi_i P_j} \right)^{1-\sigma}, \tag{9}$$

$$\Pi_i^{1-\sigma} = \sum_{j=1}^{N} \frac{E_j}{Y} \left(\frac{t_{ij}}{P_j} \right)^{1-\sigma}, \tag{10}$$

$$P_j^{1-\sigma} = \sum_{i=1}^{N} \frac{Y_i}{Y} \left(\frac{t_{ij}}{\Pi_i} \right)^{1-\sigma}. \tag{11}$$

where Y is the value of world production, which equals world expenditure

$$(Y = \sum_{i=1}^{N} Y_i = \sum_{j=1}^{N} E_j = \sum_{i=1}^{N} \sum_{j=1}^{N} X_{ij}).$$

We include a customs union and a single customs territory in this structural gravity model in two ways: first, the formation of a customs union and a single customs territory increases expenditure (E_j) following the market size expansion in the destination country for goods coming from the exporting country due to consumer desire for variety and economies of scale. Inserting the expression for expenditure in equations (9) and (10) we can analyse the impact of a customs union and a single customs territory on bilateral trade. To simplify the analysis, we follow Baier and Bergstrand (2009) and look at a log-linearized version of the model. The resulting (simplified) expressions for the multilateral trade resistance terms are given as

$$\begin{aligned} ln\Pi_i &= \sum_{j=1}^{N} \frac{Y_j}{Y} Int_{ij} + \sum_{k=1}^{N} \sum_{l=1}^{N} \frac{Y_k}{Y} \frac{E_l}{Y} Int_{kl}, \qquad i = 2, \ldots N, \\ InP_j &= \sum_{i=1}^{N} \frac{E_i}{Y} Int_{ij}, \qquad j = 2, \ldots N. \end{aligned} \tag{12}$$

The second way in which we include a customs union and a single customs territory in this structural gravity model is by assuming that they may affect trade costs (t_{ij}) along the lines of bilateral or regional trade agreements, which not only that dismantle tariff barriers to trade (i.e. remove border measures) but, equally importantly, remove NTBs to trade (remove behind-the-borders measures). The latter include measures such as a common external tariff (CET), authentication of certificates of rules of origin (RoO) at borders, reduction in documentation required, and introduction of one-stop border posts (OSBPs). All these measures, either directly or indirectly, affect bilateral trade costs.

Cultural barriers to trade are also a behind-the-border measure. For instance, Somalia and North Sudan may trade more with the Arab world than with fellow African countries due their cultures, which include the Muslim religion and Arabic language. However, within the Anderson and van Wincoop framework, cultural interaction may be modelled through preferences. Specifically, in the structural model, changing preferences

are akin to changes in trade costs. As shown in Anderson and van Wincoop (2003), introducing a product-specific taste parameter, $\tilde{t}_{ij}$, and representing consumer preferences as

$$\widetilde{U}_j(c) = \left(\sum_{i=1}^{N} \beta_i^{(1-\sigma)/\sigma} \left(\frac{c_{ij}}{\tilde{t}_{ij}} \right)^{(\sigma-1)/\sigma} \right)^{\frac{\sigma}{\sigma-1}} \tag{13}$$

will result in a gravity model in which the taste parameter will be completely analogous to the standard trade cost parameter, resulting in more general trade costs that include some parts of the preferences.

Turning to the functional form, there is no direct guidance from the theoretical model; hence, as for most of the more traditional trade cost parameters, the choice is arbitrary. In previous studies the norm has been to assume that trade cost reductions due to a customs union or a single customs territory are of a constant elasticity form such that the log of the absolute size of the flows is added to the gravity model. I use a specification that attains some flexibility while not adding too much complexity to our regression model. Based on the structural model, I assume that the trade cost effect of a customs union or a single customs territory is related to size-weighted flows and allow a size-independent effect to be qualitatively analogous to a trade agreement. I test two different formulations of the trade cost effect of a single customs territory. One formulation, the importer perspective, relates a customs union or a single customs territory (lower trade costs) to the GNI of the importing country, given as

$$ln\, t_{ij}^{aid}(E) = \begin{cases} \tau_1 + \tau_2 \frac{|F_{ij}|}{Y_j + F_{-j}} & if\ F_{ij} > 0 \\ \tau_3 + \tau_4 \frac{|F_{ij}|}{Y_j + F_{-j}} & if\ F_{ij} < 0 \end{cases} \tag{14}$$

The other formulation, the exporter perspective, relates a customs union or a single customs territory (lower trade costs) to the exporting country's GDP, given as

$$ln\, t_{ij}^{aid}(Y) = \begin{cases} \delta_1 + \delta_2 \frac{|F_{ij}|}{Y_i} & if\ F_{ij} > 0 \\ \delta_3 + \delta_4 \frac{|F_{ij}|}{Y_i} & if\ F_{ij} < 0 \end{cases} . \tag{15}$$

In the first formulation, I include spill-over effects from other non-member countries as I use the market income plus other transfers as the demand size measure. This choice aligns a customs union or a single customs territory and the trade cost adjustments. Both formulations allow different effects for different country sizes.

4. Empirical strategy and data

4.1. Estimation of the structural gravity model

In the empirical analysis I focus on estimation of the trade cost effects of forming a customs union and a single customs territory, controlling for other factors per the structural gravity model. I analyse a single country, Tanzania, using annual observations covering 1997 to 2017 and establishing a panel of seven waves averaging three years each. Applying the constraints given by the structural model, the dependent variables are the logarithm of the scaled share of imports from EAC Partner States to Tanzania and the logarithm of the scaled share of exports from Tanzania to EAC Partner States, given as

$$\begin{aligned} ln\, S_{it} &= ln\, X_{it}^{TZA} - ln\, Y_{it} - ln\, E_t^{TZA} + \frac{1}{2}\left[ln(\textstyle\sum_i Y_{it}) + ln\left(\textstyle\sum_j E_{jt}\right)\right] \\ ln\, S_{jt} &= ln\, X_{jt}^{TZA} - ln\, Y_t^{TZA} - ln\, E_{jt} + \frac{1}{2}\left[ln(\textstyle\sum_i Y_{it}) + ln\left(\textstyle\sum_j E_{jt}\right)\right], \end{aligned} \tag{16}$$

where X_{it}^{TZA} and X_{jt}^{TZA} are the values of bilateral imports to, and exports from, Tanzania at time *t*, respectively; Y_{it} is nominal GDP in country *i* at time *t*; E_{jt} is nominal GNI plus other transfers flowing to (from) country *j* at time *t*; while Y_t^{TZA} and E_t^{TZA} are nominal GDP and nominal GNI plus other transfer flows (such as foreign aid) in Tanzania, respectively.

I regress the two dependent variables on standard measures of trade costs due to the formation of a customs union and a single customs territory: distance, common border, common colony, common language, common religion, landlocked, land area, and regional trade agreements (SADC, WTO, EU). For all trade cost indicators, there are have three terms: the direct bilateral term and the two multilateral resistance terms Π_i and P_j. For example, the trade cost variable is given as a physical distance between Tanzania and its trading partners in EAC markets is specified as follows in the import regression:

$$\begin{aligned} &TC(dist_{jt}) = \\ &ln\, dist_{TZAj} - \\ &\left(\textstyle\sum_{k=1}^{N} \frac{Y_{jt}}{Y_t} ln\, dist_{TZAk} - \sum_{k=1}^{N}\sum_{l=1}^{N} \frac{Y_{kt}}{Y_t}\frac{E_{lt}}{Y_t} ln\, dist_{kl} + \sum_{l=1}^{N} \frac{E_{it}}{Y_t} ln\, dist_{lj}\right), \quad j = 2, \ldots N, \end{aligned} \tag{17}$$

where *dist* is the distance between the largest cities in each Partner State. As seen, even though distance is time invariant, the trade cost associated with distance varies over time because of the time variation in the multilateral resistance effects. As noted in Baier and Bergstrand (2009), by applying this transformation to all trade cost variables we impose the parametric restrictions given by the structural gravity model. The regression specification for Tanzanian import therefore becomes

$$\begin{aligned} &InS_{jt} = \\ &\theta_1 TC\left(dist_{jt}\right) + \theta_2 TC\left(WTO_{jt}\right) + \theta_3 TC\left(SADC_{jt}\right) + \theta_4 TC\left(Common\ border_{jt}\right) + \\ &\theta_5 TC\left(Common\ colony_{jt}\right) + \gamma TC\left(aid_{jt}\right) + \lambda_t + \varepsilon_{jt} \end{aligned} \tag{18}$$

In this specification WTO, SADC, common border, common colony, common language, common religion, and landlocked are all indicator variables taking the values 1 or 0. WTO is 1 for members of the World Trade Organization, SADC is 1 for members of the Southern African Development Community, common border is 1 for countries sharing a border, common language is 1 for countries sharing a language, landlocked is 1 for countries without a coastline, and common colony is 1 for country pairs having a common colonizer post 1945. In addition to the trade cost variables, I add other transfers and time-fixed effects, the latter mainly to capture measurement errors in total GDP and total GNI. I use an analogous specification for Tanzanian exports.

Clearly, analysing only Tanzanian trade and including time-fixed effects in the regression renders some of the data transformations redundant as the transformations are 'removed' by the fixed effects. This holds in particular for the double sum in the multilateral resistance Π_i. However, I have chosen to be explicit about all data transformations to retain a close link between the regressions and the structural gravity model.

4.2. Data type and sources

Trade data for this study were sourced from UN COMTRADE[16] with data on GDP and GNI coming from World Development Indicators (WDI, www.worldbank.org) and geographical data from CEPII.[17] For sensitivity analysis, I complement the standard trade statistics data from COMTRADE, WDI, and CEPII with data from the Tanzania National Bureau of Statistics (NBS).

COMTRADE has trade data for almost 200 countries or areas. I exclude countries that either export or import less than US$1,000, to allow for zero exports and imports. As a result, this study covers 172 countries over 20 years. This yields a potential sample of 2,235 observations, but missing observations for GDP or GNI leave us with 2,179 observations for Tanzanian exports and 2,192 observations for imports.

CEPII harmonizes data from different sources to produce indicators and statistical measures. It therefore has geographic and cultural data for 225 countries that include distances, community of border, language, colonial history, etc. It has gravity data that are updated to the year 2015. These are harmonized data for the estimation of gravity equations: GDP, population, trade and money agreements for each pair of countries from 1948 to 2015. It has a language variable that provides data for the latter part of this period for common official language (COL), common spoken language (CSL), and common native language (CNL) for 195 countries. Table 1 provides summary definitions and sources for all the variables.

Table 1: Variables—summary definitions and sources

No.	Variable type	Variable description	Data source
1.	lnSX	Log (scaled share of exports)	COMTRADE
2.	lnSM	Log (scaled share of imports)	WDI
3.	GDP	Gross Domestic Product	WDI
4.	GNI	Gross National Income	WDI
5.	EAC	East African Community dummy	COMTRADE
6.	EAC-CU	EAC Customs Union dummy	COMTRADE
7.	EAC-SCT	EAC Single Customs Territory dummy	COMTRADE
8.	Distance (log)	Distance between the largest cities in all Partner States	CEPII
9.	Common border	is 1 for countries sharing a border	CEPII
10.	Common colony	is 1 for country pairs having a common colonizer post 1945	CEPII
11.	Common language	is 1 for countries sharing a language	CEPII
12.	Common religion	is 1 for countries sharing a religion	CEPII
13.	Landlocked	is 1 for countries without a coastline	CEPII
14.	Land area (log)	Land area in square kilometres	CEPII
15.	SADC member	Southern African Development Community dummy	COMTRADE
16.	EU-EPA member	European Union Economic Partnership Agreement dummy	COMTRADE
17.	WTO member	World Trade Organization dummy	COMTRADE

Source: author's compilation.

Table 2 provides summary statistics of the key variables and Table 3 provides the correlation matrix.

[16] See www.comtrademap.un.org

[17] See www.cepii.fr

Table 2: Summary statistics of the key variables

No.	Variables	Obs.	Mean	Std. Dev.	Min	Max
1.	Export(log)	3,216	5.3	3.84	-6.21	14.04
2.	Import(log)	3,216	6.14	4.14	-6.91	15.6
3.	TanzaniaGDP(log)	3,216	23.95	.58	22.76	24.78
4.	DestinationGDP(log)	3,216	24.24	2.3	16.36	30.65
5.	Distance(log)	3,216	8.68	.65	6.52	9.64
6.	CommonBorder	3,216	.05	.21	0	1
7.	CommonReligion	3,216	.18	.1	0	.32
8.	CommonColony	3,216	.29	.45	0	1
9.	CommonLanguage	3,216	.29	.45	0	1
10.	Landlocked	3,216	.19	.39	0	1
11.	EAC	3,216	.02	.14	0	1
12.	SADC	3,216	.08	.28	0	1
13.	WTO	3,216	.86	.35	0	1
14.	EU-EPA	3,216	.46	.5	0	1

Source: author's compilation.

Table 3: Correlation matrix of the key variables

No.	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1.	Export(log)	1.00													
2.	Import(log)	0.69*	1.00												
3.	TanzaniaGDP(log)	0.12*	0.10*	1.00											
4.	DestinationGDP(log)	0.56*	0.68*	0.18*	1.00										
5.	Distance(log)	-0.33*	-0.13*	0.01	0.23*	1.00									
6.	CommonBorder	0.28*	0.12*	-0.01	-0.15*	-0.55*	1.00								
7.	CommonReligion	-0.12*	-0.09*	-0.01	-0.06*	-0.05*	-0.04	1.00							
8.	CommonColony	0.03	0.01	-0.03	-0.28*	-0.20*	0.14*	-0.05*	1.00						
9.	CommonLanguage	0.12*	0.06*	-0.02	-0.17*	-0.11*	0.21*	-0.23*	0.57*	1.00					
10.	Landlocked	-0.07*	-0.15*	0.04	-0.18*	-0.32*	0.30*	-0.06*	-0.06*	0.01	1.00				
11.	EAC	0.21*	0.10*	0.06*	-0.06*	-0.38*	0.61*	-0.01	0.10*	0.15*	0.18*	1.00			
12.	SADC	0.17*	0.10*	0.01	-0.17*	-0.48*	0.28*	-0.15*	0.21*	0.31*	0.20*	-0.04	1.00		
13.	WTO	0.21*	0.21*	0.09*	0.22*	0.14*	0.09*	-0.02	0.09*	0.10*	-0.06*	0.06*	-0.00	1.00	
14.	EU-EPA	0.08*	-0.07*	0.18*	-0.25*	-0.28*	0.18*	-0.04	0.11*	0.28*	0.13*	0.15*	0.27*	0.12*	1.00

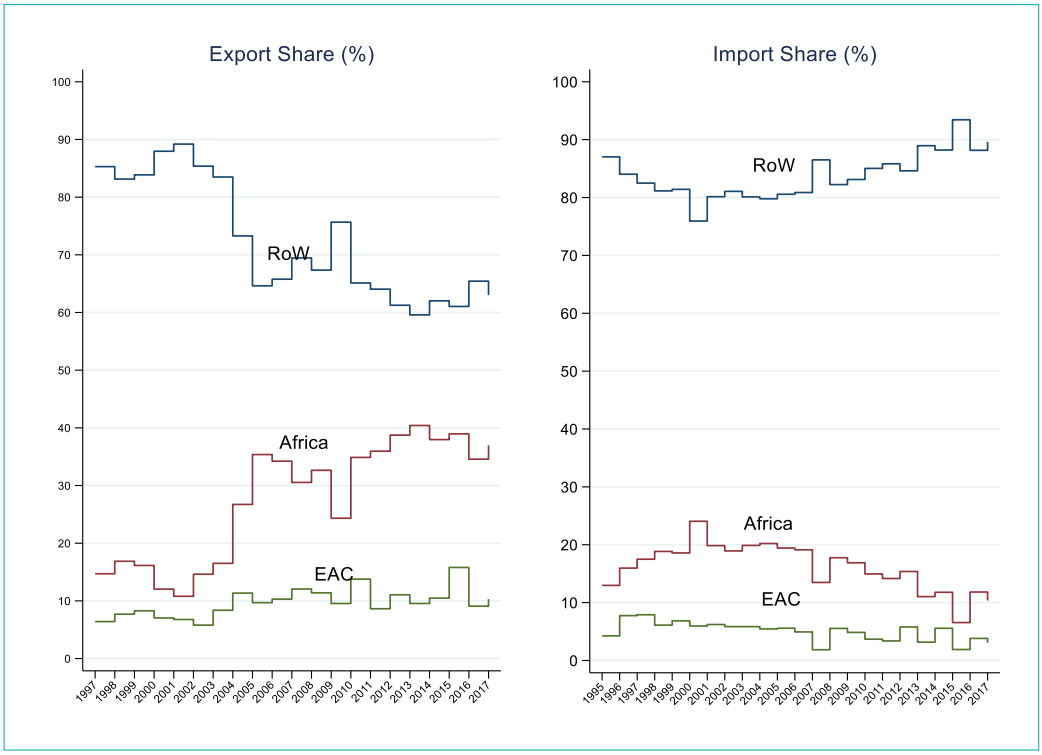
Note: * shows significance at the 0.01 level.

Source: author's construction.

5. East Africa regional integration and Tanzania trade performance

I begin the discussion of my findings with detailed descriptive statistics of Tanzania's trade relationship with its trading partners in the EAC markets. The formation of the EAC in 2000 and the development of the EAC-CU in 2005 and EAC-SCT in 2014 were expected to increase the market for Tanzanian exports in terms of population size and expenditure (i.e. GDP or GNI) on the one hand and to lower trade costs for Tanzanian exports and imports on the other hand. This was in turn expected to allow Tanzanian firms to take advantage of the opportunities presented by the fact that more firms were entering and competing in the EAC markets. This would then increase both export diversification (number of Tanzanian products/firms in the EAC markets) and competitiveness, both of which were expected to enhance trade volumes (exports and imports) in the EAC markets.

Figure 1: Tanzania's total exports and imports share (%) to EAC, Africa, and RoW



Source: author's computation from UN COMTRADE data.

As shown in Figure 1 and Appendix Table A1, Tanzanian exports into EAC markets more than doubled between 1997 and 2015—from about 6 per cent to about 16 per cent—before dropping to about 10 per cent in 2017. On the other hand, total imports from EAC markets declined by half in the same period: from about 8 per cent in 1997 to about 2 per cent in 2015, then rising to 4 per cent in 2017. Over the entire period (1997–2017), on average, Tanzanian exports into EAC markets accounted to about 10 per cent of its total exports, while EAC imports accounted for only about 5 per cent of its total imports. This implies that a significant share of Tanzanian trade is with countries outside the EAC. As shown in Figure 1 and Appendix Table A1, on average, about 70 per cent of Tanzanian exports are to the rest of the world (RoW) and 20 per cent with African countries other than those in the EAC. At the same time, on average, about 85 per cent of Tanzanian imports are from RoW and about 10 per cent from African countries outside the EAC. One important thing to note, as revealed by trade statistics, is the sharp and significant drop in Tanzanian exports to and imports from EAC markets from 2015 onwards. This moment coincided with the creation of the EAC-SCT in July 2014 and accession to power of the fifth United Republic of Tanzania (URT) government in November 2015. This

suggests that while the formation of the EAC-SCT could have had a positive effect, the government could have had a doubly negative effect due to the policy incoherence and rampant NTBs it introduced.

This pattern is also reflected when one decomposes Tanzania's trade pattern into figures for each EAC Partner State. As shown in Figure 2 and Appendix Table A2, the total share of exports from Tanzania to Kenya rose from 20 per cent in 1997 to about 77 per cent in 2015 before declining to about 60 per cent in 2017. On the other hand, the imports share fell from about 80 per cent in 1997 to about 23 per cent in 2015 before rising to about 40 per cent in 2017. The share of Tanzanian exports to and imports from Uganda, in contrast, exhibited huge volatility, with an average of around 65 per cent and about 35 per cent, respectively. Tanzania's export share to Rwanda and Burundi over the entire period remained extremely high, at over 95 per cent, while imports from both countries remained low, each accounting for only about 5 per cent of total imports.

Figure 2: Tanzania's total exports and imports share (%) to and from EAC partner states

Source: author's computation from UN COMTRADE data.

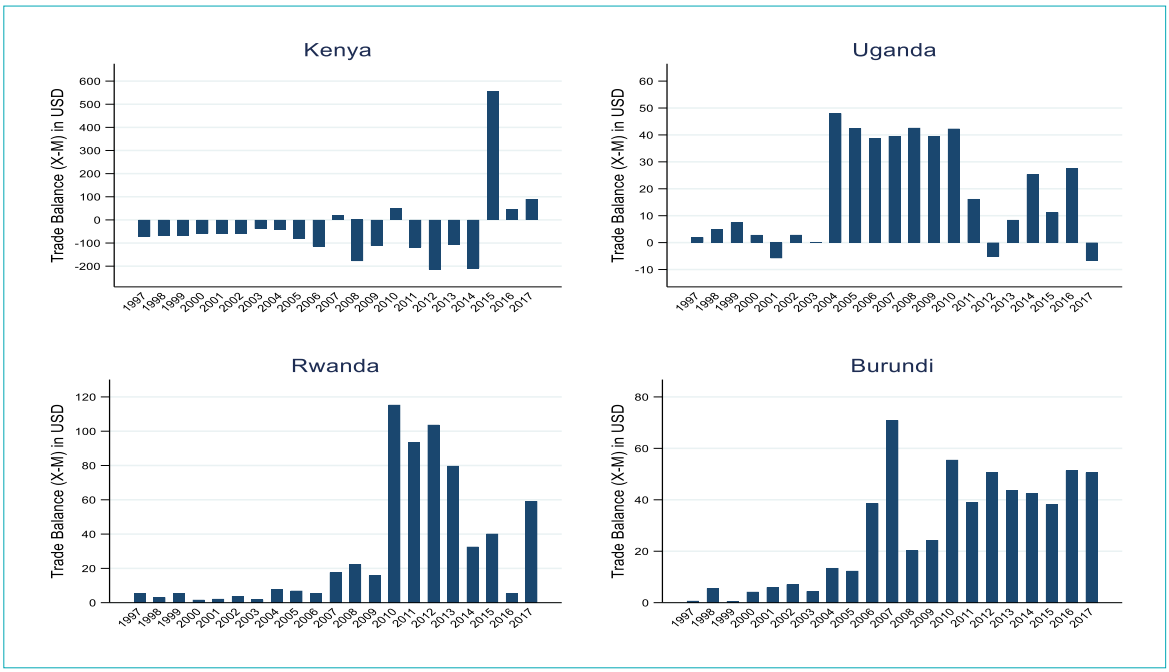
Although the combination of exports and imports shows a positive trade balance for Tanzanian trade in the EAC markets, which is considered 'good' for Tanzania, the trouble is that it threatens Tanzania's trade sustainability in the EAC markets, especially trade between Kenya and Tanzania, as the positive trade balance is likely to have resulted from declining trade, with one partner consistently losing at the expense of the other.

This scenario threatens a repeat of what happened with the first EAC in the late 1960s and early 1970s, when Tanzania was a perpetual loser against Kenya, resulting in the collapse of the first EAC in 1977.

Furthermore, as shown in Figure 2 and Appendix Tables A2 and A3, Kenya has remained the major trading partner for Tanzania in EAC markets, as on average for the entire period it accounted for about 70 per cent of all Tanzania's exports into EAC markets and 90 per cent of all Tanzania's imports from EAC markets. The next largest trading partner was Uganda, which accounted for about 15 per cent of all exports and 5 per cent of all imports, followed by Rwanda with 10 per cent of all exports and 0.7 per cent of all imports and Burundi with about 9 per cent of all exports and 0.3 per cent of all imports. However, the patterns of trade were highly erratic, with significant changes every few years, suggesting that exports to and imports from trading partners in EAC markets have been driven largely by business cycles of demand and supply and climatic changes.

Although for the greater part of this period (1997–2017), as shown in Figure 3, Tanzania maintained a trade deficit with Kenya, that changed significantly in 2015. From 2015 onwards Tanzania began to maintain a significant trade surplus balance with Kenya, signalling an improved trading position. As noted earlier, this period also coincides with the beginning of both the EAC-SCT in 2014 and the fifth URT government in 2015. Overall, as shown, Tanzania maintained a trade surplus with the other Partner States during this period, signalling a positive trade balance in the EAC markets.

Figure 3: Tanzania's trade balance with EAC Partner States

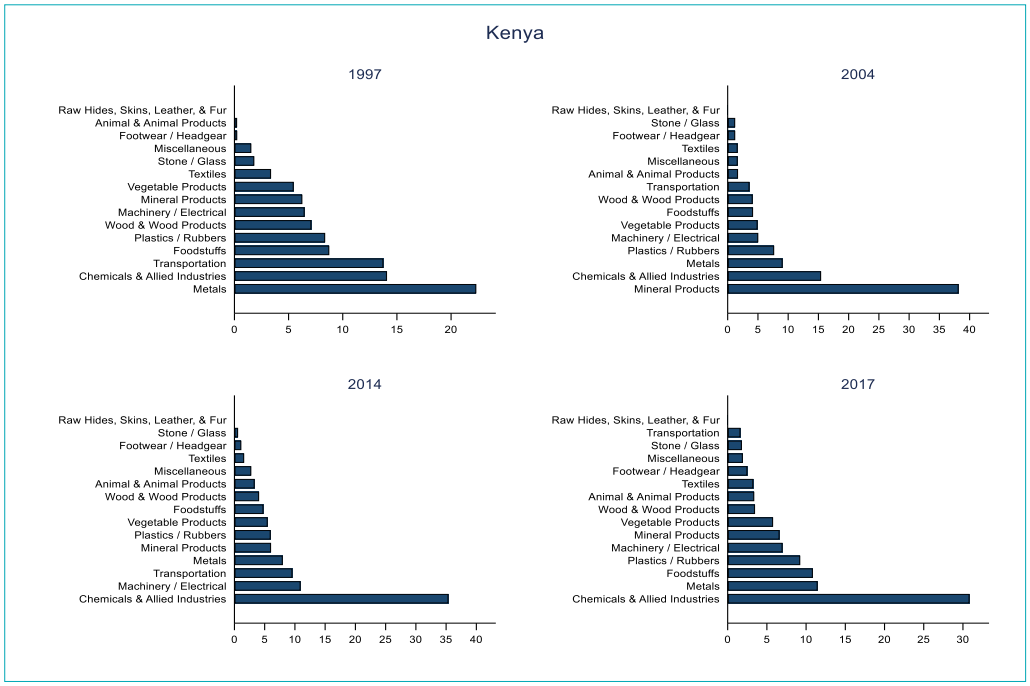


Source: author's computation from UN COMTRADE data.

The key question is whether these changes (due to Tanzania forming and joining the EAC in 2000, the EAC-CU in 2005, and the EAC-SCT in 2014) altered Tanzania's trade structure in the EAC markets from primarily inter-industry trade (exporting and importing dissimilar products) to primarily intra-industry trade (exporting and importing similar products), which would indicate improved trade performance in terms of both export diversification and increased competitiveness. I attempt to gauge this by decomposing the above total figures into categories of products to identify the top exports and imports. I do so by disaggregating them at two HS code product levels for each EAC Partner State.

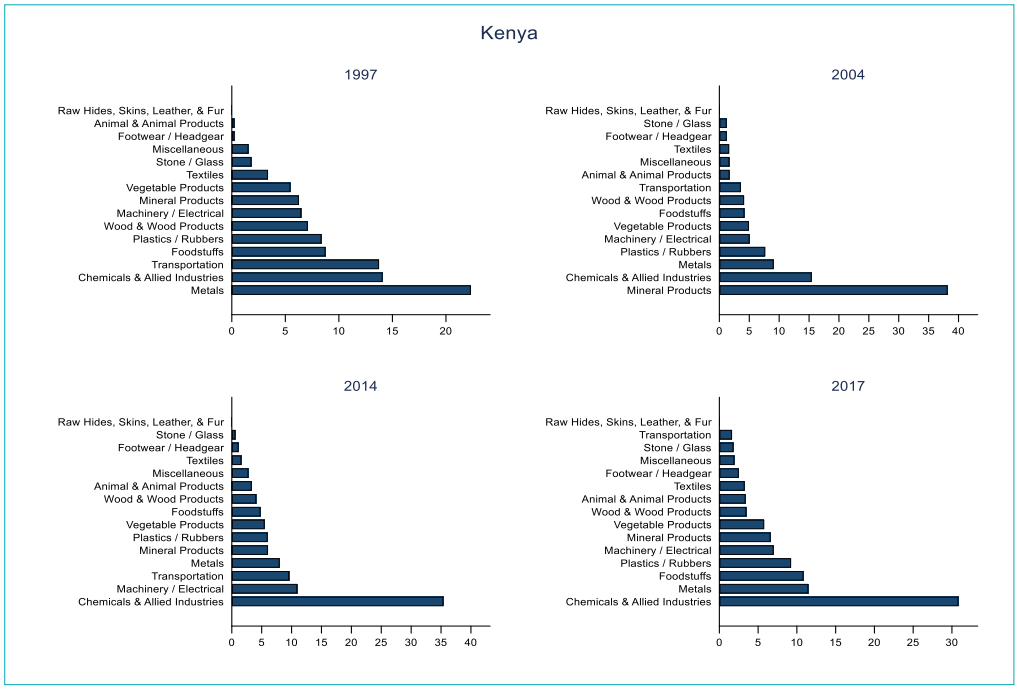
As shown in Figure 5 for the case of Kenya (the dominant trading partner for Tanzania in EAC markets), the top five exported product categories are: vegetable products; textiles; foodstuffs; animal and animal products; and wood and wood products. The top five import product categories are: chemical and allied industries; metals; plastics and rubbers; foodstuffs; and machinery and electrical. It can be seen that there is a substantial mismatch between what Tanzania exports into and imports from Kenya markets, signalling lack of significant structural change in the Tanzanian economy.

Figure 5A: Top export products to Kenya by category



Source: author's computation from UN COMTRADE data.

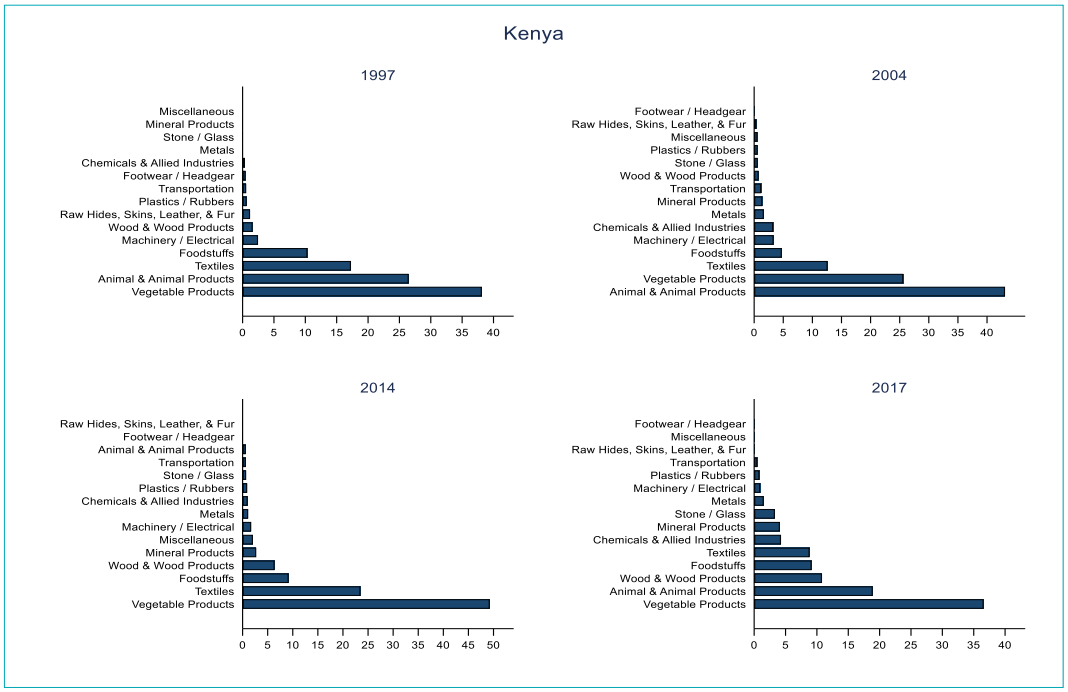
Figure 5B: Top import products from Kenya by category



Source: author's computation from UN COMTRADE data.

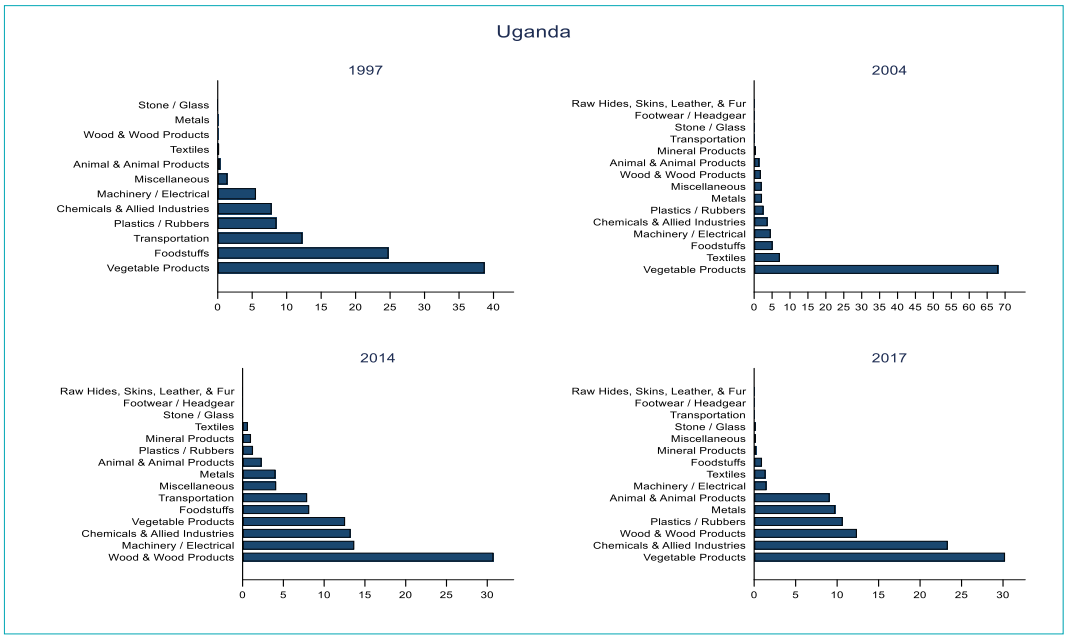
In the case of Uganda (Figure 6), the patterns are nearly the same as for Kenya, as the top five exports into Uganda are: vegetable products; textiles; animal and animal products; foodstuffs; and wood and wood products; while the top five imports are: vegetable products; chemical and allied industries; machinery and electrical; foodstuffs; and wood and wood products.

Figure 6A: Top export products to Uganda by category



Source: author's computation from UN COMTRADE data.

Figure 6B: Top import products from Uganda by category



Source: author's computation from UN COMTRADE data.

The same can be said for Rwanda and Burundi (see Figures A1 and A2 in Appendix A), which again shows a lack of structural change in the trade pattern and so in the economy.

6. Structural gravity model results

Changes in trade volume as a result of increased inter-industry and/or intra-industry trade due to the formation and joining of the EAC in 2000 and subsequently the EAC-CU in 2005 and EAC-SCT in 2014 are an important indicator of Tanzania's trade performance in the EAC markets. To measure those changes I use a structural gravity model that allows for 'multilateral trade resistance' (MTR) between Tanzania and its trading partners in the EAC. The results are also compared with the findings using the 'traditional gravity model' (see Appendix B).

Sub-section 6.1 presents results for exports and sub-section 6.2 for imports. All regression results include time dummies. To allow for zero exports or imports in our regressions, despite the fact that the derivation of scaled shares of exports or imports addresses zero exports and imports a priori, the estimates are restricted to countries with exports and imports that exceed US$1,000 dollars per year. All models (1–4) use a scaled share of exports or imports as the dependent variable. Model 1 controls for bilateral distance. Model 2 further controls for MTR variables that include common colony, common language, and the trading partner country being landlocked. Model 3 controls for membership of the trading partner countries in trade agreements. Model 4 limits the sample to exports to or imports from African countries only.

I first estimate the structural gravity model using an OLS technique and thereafter construct a panel of seven waves (averaging three years each for the period 1997–2017). I then estimate the structural gravity model for pooled OLS and random effects (RE) techniques. To further gauge whether the effects differ for the Community (EAC: 1997–2017) from the Customs Union (EAC-CU: 2005–2017) and the Single Customs Territory (EAC-STC: 2014–2017) I ran an estimation for each of these periods separately. As the results for OLS are largely the same as for pooled OLS and RE in terms of signs and significance, I present and discuss only the structural gravity results for pooled OLS, comparing them with the same for the 'traditional gravity model' in Appendix B.

6.1. Estimated trade cost parameters for Tanzanian exports

Table 4 presents the pooled OLS export gravity equation results for the EAC, Table 5 for EAC-CU, and Table 6 for the EAC-SCT, where the dependent variable is the log of scaled share of exports, each using the four models as discussed. The income and trade cost effects of forming and joining a regional integration bloc in East Africa on Tanzanian exports are modelled by indicator variables taking the value of 1 if the export destination country is either Kenya/Uganda or Rwanda/Burundi and 0 otherwise.[18]

Table 4: Pooled OLS: gravity equation (dep. var.: scaled share of export)

	Model 1	Model 2	Model 3	Model 4
East African Community	2.298***	2.110***	2.019***	1.412***
	(0.352)	(0.481)	(0.531)	(0.503)
Distance (log)	-2.481***	-2.511***	-2.408***	-2.822***
	(0.151)	(0.161)	(0.195)	(0.294)
Common colony		0.134	0.119	0.144
		(0.186)	(0.187)	(0.356)
Common language		1.323***	0.963***	0.079
		(0.170)	(0.185)	(0.382)
Landlocked		-1.013***	-0.985***	-0.515*
		(0.206)	(0.199)	(0.277)
1=SADC Member			0.626**	0.515
			(0.316)	(0.322)

[18] Given the proximity of Tanzania, Uganda, and Kenya, I dropped the common border effect in this specification, as this might have raised significant multicolinearity issues with any EAC dummy.

	Model 1	Model 2	Model 3	Model 4
1=EU-EPA member			0.627***	0.642*
			(0.166)	(0.335)
1=WTO member			1.329***	1.449***
			(0.209)	(0.366)
R^2	0.365	0.428	0.465	0.586
Adjusted R-squared	0.360	0.421	0.457	0.565
Observations	1003	1003	1003	290

Note: robust standard errors are in parentheses and all regression results include time dummies; *p< 0.1, **p< 0.05, ***p< 0.01

Source: author's calculations.

Table 5: Pooled OLS: gravity equation (dep. var.: scaled share of export)

	Model 1	Model 2	Model 3	Model 4
EAC Customs Union	2.287***	2.071***	1.902***	1.060**
	(0.394)	(0.561)	(0.576)	(0.495)
Distance (log)	-2.556***	-2.576***	-2.503***	-3.027***
	(0.145)	(0.157)	(0.184)	(0.251)
Common colony		0.111	0.092	0.103
		(0.186)	(0.187)	(0.360)
Common language		1.368***	1.032***	0.002
		(0.168)	(0.179)	(0.387)
Landlocked		-0.980***	-0.942***	-0.484*
		(0.207)	(0.200)	(0.278)
1=SADC Member			0.462	0.306
			(0.297)	(0.279)
1=EU-EPA member			0.640***	0.622*
			(0.167)	(0.339)
1=WTO member			1.371***	1.565***
			(0.208)	(0.354)
R^2	0.362	0.425	0.463	0.582
Adjusted R-squared	0.356	0.418	0.455	0.560
Observations	1003	1003	1003	290

Note: robust standard errors are in parentheses and all regression results include time dummies; *p< 0.1, **p< 0.05, ***p< 0.01

Source: author's calculations.

Table 6: Pooled OLS: gravity equation (dep. var.: scaled share of export)

	Model 1	Model 2	Model 3	Model 4
EAC Single Customs Territory	2.024***	1.785**	1.561**	0.581*
	(0.486)	(0.725)	(0.709)	(0.601)
Distance (log)	-2.638***	-2.647***	-2.598***	-3.179***
	(0.140)	(0.154)	(0.177)	(0.230)
Common colony		0.086	0.066	0.077
		(0.186)	(0.187)	(0.364)
Common language		1.417***	1.103***	0.052
		(0.168)	(0.177)	(0.393)

	Model 1	Model 2	Model 3	Model 4
Landlocked		-0.945***	-0.900***	-0.467*
		(0.208)	(0.201)	(0.277)
1=SADC Member			0.298	0.153
			(0.285)	(0.264)
1=EU-EPA member			0.652***	0.596*
			(0.167)	(0.340)
1=WTO member			1.412***	1.652***
			(0.207)	(0.350)
R^2	0.357	0.422	0.460	0.578
Adjusted R-squared	0.352	0.415	0.452	0.556
Observations	1003	1003	1003	290

Note: robust standard errors are in parentheses and all regression results include time dummies; *p< 0.1, **p< 0.05, ***p< 0.01

Source: author's calculations.

Looking first at the standard trade cost indicators, we find, as expected, that trade costs increase with physical distance, leading to lower trade. But the estimated distance elasticity is quite large compared with global trade regressions[19] and there is a slight difference among the three specifications: slightly higher for the SCT than for the CU and for the CU than for the Community. With a slight variation they are larger than the results using the traditional gravity model, as shown in Appendix B Tables B1, B2, and B3. The three specifications show that a 10 per cent increase in distance is accompanied by a decrease in export flow of between 24 per cent (gravity coefficient of -2.408) and 32 per cent (gravity coefficient of -3.179).

The impact of colonial ties (common colony) is a little smaller and positive but statistically insignificant; however, it is positive and slightly significant when using the traditional gravity model, as shown in Appendix B Tables B1, B2, and B3. Having a common language, as expected, increases Tanzanian exports into EAC markets, as its coefficients are positive and statistically significant (one gets nearly the same results with the traditional gravity model). Being landlocked lowers Tanzania's exports into EAC markets, as the coefficients are negative and statistically significant throughout (landlocked is also negative and statistically significant in the traditional gravity model, with a higher magnitude than for the structural gravity model; see Appendix B tables). In percentage terms being landlocked reduces Tanzanian exports into EAC markets on average by 157 per cent[20] during this period.

Being a member of the SADC has positive and statistically significant effects on bilateral exports only for the Community specification and only for Model 3 (i.e. the entire sample). It is positive but statistically insignificant for the other models and specifications. This could be due to the fact that South Africa, which is in the SADC, is the major destination of Tanzanian exports in the SADC region, while Kenya is the major destination for exports in the EAC region; together, the two countries account for about 99 per cent of all exports to African markets. Being a member of the WTO has positive and statistically significant effects on bilateral exports in the third estimation, which makes sense given that the majority of Tanzanian exports (over 70 per cent) are with RoW, where most countries are WTO members. However, Tanzanian bilateral exports with countries that are members of the EU is positive and statistically significant across all the models and specifications. It becomes negative and statistically significant when using the traditional gravity model, as shown in Appendix B Tables B1 and B2.

Based only on Model 3, which accounts for the entire sample and all variables, the coefficient magnitudes are relatively higher for the Community (with a gravity coefficient of 2.019) than for the Customs Union (gravity coefficient 1.902) and for the Customs Union than for the Single Customs Territory (gravity coefficient 1.561)

[19] See, for example, Head and Mayer (2014) and Helpman et al. (2009) for estimates of trade cost parameters based on global data sets.

[20] $\left[e^{\ddot{\beta}_{Landlocked}} - 1\right]x100$

specification. The estimates of the gravity coefficient for the EAC show that Tanzanian exports into EAC markets increased during the period the Community came into being (between 2000 and 2017) by an average of about 653 per cent.[21] Taking a representative value for the elasticity of substitution from the literature of □ = 5, the average tariff-equivalent fall resulting from the introduction of the EAC amounts to about 33 per cent.[22] The gravity coefficient of 1.902 for the Customs Union implies that the Customs Union, which came into effect between 2005 and 2017, increased Tanzania's exports into EAC markets by 570 per cent, with the average tariff-equivalent fall due to the introduction of the Customs Union amounting to about 32 per cent. At that same time, with a gravity coefficient of 1.561, the introduction of the Single Customs Territory between 2014 and 2017 increased Tanzania's exports by 376 per cent, with an average tariff-equivalent fall due to the introduction of the SCT of about 27 per cent. Overall, the EAC increased Tanzania's exports into EAC markets by 533 per cent with an average tariff-equivalent fall due to the introduction of the EAC of 31 per cent. The values of these coefficients are much lower when a traditional gravity model is used, as shown in Appendix B Tables B1, B2, and B3. Though using different approaches, the findings of this study are similar to those of previous studies on the trade effects of customs union on Tanzania and other EAC Partner States, as detailed below.

Steven Buigut's (2012) study on the effects of the EAC-CU on Tanzanian intra-EAC trade, for the period from 1996 to 2009, found that the Customs Union had no significant effects on either exports to or imports from EAC markets. In 2016, he looked again at the overall trade effects of the EAC-CU on intra-EAC trade for the period from 2000 to 2013 and found that the EAC-CU had a moderate positive effect, increasing intra-EAC trade by 22.1 per cent (Buigut 2016). Shinyekwa (2015) estimated the impact of the EAC-CU for the period 2001 to 2011 on trade creation and diversion and found that the formation of the Customs Union had created trade contrary to the widely held view that it had diverted trade. Mayer and Thoenig (2016) found, among other things, a positive and statistically significant effect of the EAC agreement in promoting bilateral trade between its members of up to 121 per cent.

My results show that the implementation of the EAC since 2000, the EAC-CU since 2005, and the EAC-SCT since 2014 has had highly and statistically significant contemporaneous effects on Tanzania's exports into EAC markets. Comparing my results with those of the above-mentioned studies, the extent of the effect across all four models in all three specifications is larger.

6.2. Estimated trade cost parameters for Tanzanian imports

The results for Tanzanian imports are presented in Table 7 for the EAC specification, in Table 8 for the EAC-CU specification, and in Table 9 for the EAC-SCT specification, using the same sequence of variables and estimators as for exports (Tables 4–6).

Looking across the regression Models 1 to 4 for all three specifications, we find slightly smaller effects of distance in lowering imports from EAC markets than for exports to EAC markets. As with exports, the coefficient magnitudes differ slightly across the four models and across the three specifications. They are slightly higher for the Community and the Single Customs Territory than for the Customs Union. They are also larger than the results using the traditional gravity model, as shown in Appendix B Tables B4, B5, and B6. The three specifications show that a 10 per cent increase in distance is accompanied by a decrease in export flow of between 15 per cent (gravity coefficient of -1.464) and 18 per cent (gravity coefficient of -1.760).

Table 7: Pooled OLS: gravity equation (dep. var.: scaled share of import)

	Model 1	Model 2	Model 3	Model 4
East African Community	1.029***	1.047***	1.397***	1.449***
	(0.394)	(0.328)	(0.397)	(0.533)
Distance (log)	-1.539***	-1.707***	-1.565***	-1.464***
	(0.133)	(0.137)	(0.148)	(0.259)

[21] $[e^{2.019} - 1]x100$

[22] $[e^{2.019/(-5)} - 1]x100$

	Model 1	Model 2	Model 3	Model 4
Common colony		0.515**	0.478**	0.417
		(0.216)	(0.211)	(0.326)
Common language		0.815***	0.607***	1.156***
		(0.207)	(0.215)	(0.401)
Landlocked		-1.427***	-1.445***	-0.839**
		(0.208)	(0.211)	(0.348)
1=SADC Member			1.027**	1.353***
			(0.429)	(0.495)
1=EU-EPA member			-0.070	-0.199
			(0.168)	(0.411)
1=WTO member			0.913***	1.835***
			(0.245)	(0.393)
R2	0.149	0.228	0.248	0.418
Adjusted R-squared	0.142	0.220	0.238	0.390
Observations	1126	1126	1126	313

Note: robust standard errors are in parentheses and all regression results include time dummies; *p< 0.1, **p< 0.05, ***p< 0.01

Source: author's calculations.

Table 8: Pooled OLS: gravity equation (dep. var.: scaled share of import)

	Model 1	Model 2	Model 3	Model 4
EAC Customs Union	0.903**	0.890**	1.144***	0.842
	(0.437)	(0.359)	(0.412)	(0.539)
Distance (log)	-1.575***	-1.743***	-1.637***	-1.706***
	(0.129)	(0.132)	(0.141)	(0.241)
Common colony		0.504**	0.461**	0.390
		(0.215)	(0.211)	(0.327)
Common language		0.841***	0.660***	1.229***
		(0.205)	(0.213)	(0.399)
Land Locked		-1.409***	-1.412***	-0.810**
		(0.208)	(0.209)	(0.349)
1=SADC Member			0.895**	1.102**
			(0.413)	(0.464)
1=EU-EPA member			-0.057	-0.236
			(0.168)	(0.410)
1=WTO member			0.942***	1.972***
			(0.244)	(0.383)
R2	0.148	0.227	0.246	0.411
Adjusted R-squared	0.141	0.219	0.236	0.383
Observations	1126	1126	1126	313

Note: robust standard errors are in parentheses and all regression results include time dummies; *p< 0.1, **p< 0.05, ***p< 0.01

Source: author's calculations.

Table 9: Pooled OLS: gravity equation (dep. var.: scaled share of import)

	Model 1	Model 2	Model 3	Model 4
EAC Single Customs Territory	1.173**	1.141***	1.365***	1.138**
	(0.467)	(0.408)	(0.435)	(0.549)
Distance (log)	-1.593***	-1.760***	-1.672***	-1.756***
	(0.123)	(0.128)	(0.133)	(0.219)
Common colony		0.499**	0.454**	0.382
		(0.215)	(0.211)	(0.326)
Common language		0.854***	0.685***	1.247***
		(0.205)	(0.210)	(0.396)
Land Locked		-1.401***	-1.396***	-0.804**
		(0.207)	(0.207)	(0.348)
1=SADC Member			0.832**	1.052**
			(0.398)	(0.431)
1=EU-EPA member			-0.051	-0.247
			(0.168)	(0.409)
1=WTO member			0.957***	2.001***
			(0.243)	(0.377)
R2	0.148	0.227	0.246	0.412
Adjusted R-squared	0.141	0.219	0.236	0.384
Observations	1126	1126	1126	313

Note: robust standard errors are in parentheses and all regression results include time dummies; *p< 0.1, **p< 0.05, ***p< 0.01

Source: author's calculations.

Unlike the case of exports, a common colonial background has a larger positive and statistically highly significant effect for the first three models, which include the entire sample, than for the African sample in Model 4, where the effect is positive but statistically insignificant. The coefficients on common language are positive, as for exports, but statistically much more highly significant in all models and all specifications than for exports. Though the coefficients are lower in magnitude, they remain nearly the same as with the traditional gravity model, as shown in Appendix B Tables B4, B5, and B6. Being landlocked is negative and statistically highly significant, as it was for exports, even though the magnitudes for imports are larger than for exports and lower than those using the traditional gravity model (Appendix B Tables B4, B5 and B6). In percentage terms, being landlocked reduces Tanzania's imports from EAC markets on average by 313 per cent during this period.

Being a member of the SADC or the WTO has high and statistically significant effects on bilateral imports in the EAC-CU estimation. Compared with exports, all SADC and WTO coefficients are much larger and statistically significant across all models and all three specifications. This has not come as a surprise, as more than 85 per cent of Tanzanian imports are from markets outside the EAC, African markets accounting for only about 10 per cent of its imports (mainly South Africa) and the rest being from RoW, where most countries are WTO members. Unlike the case of exports, Tanzania's bilateral imports with countries that are members of the EU-EPA are negative and statistically insignificant, whether we focus on the entire sample in Model 3 or only on the African sample in Model 4. When applying the traditional gravity model, the signs turn positive but statistically insignificant (Appendix B Tables B4–B6).

When estimating the effects of forming and joining a regional integration bloc, that is the EAC in 2000, the EAC-CU in 2005, and the EAC-SCT in 2014, on Tanzanian imports from EAC markets, we find a positive and statistically highly significant effect in all four models and all three specifications. There is, however, a slightly difference across the specifications as the coefficient magnitude is higher for the EAC than for the EAC-SCT and for the EAC-SCT than for the EAC-CU. Based only on Model 3 for the three specifications, with a gravity coefficient of 1.397, the introduction of the EAC between 1997 and 2017 increased Tanzanian imports from

EAC markets by 304 per cent, with an average tariff-equivalent fall of about 24 per cent. The introduction of the Customs Union between 2005 and 2017, with a gravity coefficient of 1.144, increased Tanzanian imports from EAC markets by 214 per cent, with an average tariff-equivalent fall of about 20 per cent. And the introduction of the Single Customs Territory between 2014 and 2017, with a gravity coefficient of 1.365, increased Tanzanian imports from EAC markets by 292 per cent, with an average tariff-equivalent fall of about 24 per cent. Overall, the EAC has increased Tanzania's exports into EAC markets by 270 per cent, with an average tariff-equivalent fall due to the introduction of the EAC of 23 per cent.

The coefficient magnitudes and percentage changes are considerably lower for the import estimates than for the export regressions. What this says is that, though the formation of a regional integration bloc in East Africa has significantly enhanced Tanzania's trade in EAC markets, the effects are much higher for exports than for imports. When the traditional gravity model is applied, as shown in Appendix B Tables B4–B6, the results remain largely the same in sign, albeit with slightly lower magnitudes.

7. Summary and implications

Ever since the revival of the EAC in 2000, there have been concerns in Tanzania about its effects on the economy, trade performance, and people's well-being. While some policy-makers and the public at large have argued in support of EAC deep integration to the level of a monetary union and a political federation, there are those who have argued against it, following the experience of the demise of the first EAC in 1977, when significant trade imbalances led to its collapse, fearing that the revived EAC would not represent any significant trade gains for Tanzania.

In estimating the effects of forming and joining a regional integration bloc by applying an augmented structural gravity model, this paper finds that forming and joining the EAC, EAC-CU, and EAC-SCT have greatly and statistically significantly enhanced Tanzania's trade volumes with EAC markets; and the effects are much higher for exports (about a 533 per cent increment with a tariff-equivalent fall of about 44 per cent) than for imports (about a 270 per cent increment with a tariff-equivalent fall of about 32 per cent). The choice of estimator also affects the magnitude of the effect, as the effects on export volumes are larger when applying the structural gravity model than when using the traditional gravity model. The same can be said of the import coefficients when comparing structural gravity estimates to the traditional model results.

These findings are corroborated by detailed descriptive statistics revealing that, while exports into EAC markets more than doubled between 1997 and 2017, imports dropped by more than 50 per cent. Kenya has continued to be the main trading partner for Tanzanian exports and imports in the EAC markets, and the trade balance with Kenya has improved significantly in recent years. Decomposing the data further into the types of products that Tanzania is trading in the EAC markets reveals that there has been no significant change over the years in the structure of Tanzania's trade patterns, which have remained primarily inter-industry (exporting and importing dissimilar products) rather than intra-industry (exporting and importing similar products), signalling a substantial lack of structural change in the economy and by extension in the country's trade structure. Furthermore, EAC markets represent only a small part of Tanzania's total trade, accounting on average for only about 10 per cent of all of its exports and 5 per cent of all of its imports.

Clearly, given the abundant resources Tanzania has relative to other EAC Partner States, the country has huge potential to tap these opportunities for advancing growth and employment generation. This will entail, among other things, reducing trade diversion by increasing productivity and increasing trade creation, which will help transform Tanzania's economy such that its trade in EAC markets is linked to its industrialization efforts, which aim at boosting export diversification and increasing the country's competitiveness in regional markets and beyond.

Non-tariff barriers and other distortions are significant in Tanzanian trade in the EAC markets in comparison with its major regional trade partners. This is in addition to policy incoherence, where the government taxes and regulates activities that it wants to encourage such that Tanzanian exporters and importers have to deal with (too) many ministries and regulators. And the costs of taxation and regulation are not fully recognized. Dealing with these prevalent NTBs and improving trade facilitation measures to enhance the country's competitiveness and export diversification in EAC markets is critical for Tanzania's future economic performance.

Though the increase in exports into EAC markets, especially exports to Kenya, represents a positive trade balance, which is considered to be 'good' for Tanzania, there is a danger of a backlash in the long term such that it is not healthy for the future sustainability of the EAC, especially in terms of trade between Kenya and Tanzania, as the positive trade balance is likely to have resulted from declining trade, with one partner consistently losing at the expense of the other. This scenario signals a repeat of what happened with the first EAC in the late 1960s and early 1970s, when Tanzania was perpetual loser against Kenya, resulting in the collapse of the first EAC in 1977.

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Appendix A: Additional descriptive statistics

Table A1: Tanzanian exports and imports shares for EAC vs Africa and RoW (%)

	Exports					Imports				
Years	RoW	Africa	SADC	EAC	Non-RECs	RoW	Africa	SADC	EAC	Non-RECS
1997	85.3	14.7	7.1	6.4	1.2	82.5	17.5	9.4	7.9	0.2
1998	83.1	16.9	8.8	7.7	0.4	81.2	18.8	12.3	6.1	0.4
1999	83.9	16.1	7.4	8.3	0.4	81.4	18.6	11.6	6.8	0.2
2000	88.0	12.0	4.7	7.0	0.3	75.9	24.1	10.7	6.0	7.4
2001	89.2	10.8	3.8	6.8	0.2	80.1	19.9	12.5	6.2	1.2
2002	85.4	14.6	8.3	5.8	0.5	81.1	18.9	11.9	5.9	1.1
2003	83.5	16.5	7.6	8.4	0.5	80.1	19.9	13.3	5.8	0.8
2004	73.3	26.7	14.8	11.4	0.5	79.8	20.2	13.8	5.5	0.9
2005	64.6	35.4	24.7	9.7	1	80.6	19.4	13.0	5.6	0.8
2006	65.8	34.2	22.0	10.3	1.9	80.9	19.1	13.6	4.9	0.6
2007	69.5	30.5	17.4	12.1	1	86.5	13.5	11.2	1.9	0.4
2008	67.4	32.6	19.2	11.4	2	82.2	17.8	11.1	5.5	1.2
2009	75.7	24.3	13.0	9.6	1.7	83.1	16.9	11.4	4.9	0.6
2010	65.1	34.9	19.2	13.8	1.9	85.0	15.0	10.7	3.7	0.6
2011	64.0	36.0	25.9	8.6	1.5	85.8	14.2	10.1	3.4	0.7
2012	61.3	38.7	27.0	11.1	0.6	84.6	15.4	9.2	5.8	0.4
2013	59.6	40.4	28.3	9.6	2.5	89.0	11.0	7.3	3.2	0.5
2014	62.0	38.0	21.7	10.5	5.8	88.2	11.8	5.7	5.6	0.5
2015	61.0	39.0	20.7	15.8	2.5	93.4	6.6	4.3	1.9	0.4
2016	65.4	34.6	25.0	9.1	0.5	88.2	11.8	7.4	3.8	0.6
2017	63.0	37.0	26.2	10.3	0.5	89.6	10.4	6.8	3.1	0.5
2018	37.1	62.9	25.7	34.2	3	89.3	10.7	6.6	3.6	0.5

Note: RoW represents the share of exports with non-African countries.

Source: author's computation from UN COMTRADE data.

Table A2: Tanzanian exports and imports growth shares with EAC Partner States (%)

	Kenya		Uganda		Rwanda		Burundi	
Years	Export	Import	Export	Import	Export	Import	Export	Import
1997	19.9	80.1	57.8	42.2	88.2	11.8	85.3	14.7
1998	23.0	77.0	64.7	35.3	99.8	0.2	99.8	0.2
1999	25.9	74.1	81.2	18.8	96.7	3.3	92.7	7.3
2000	25.9	74.1	60.2	39.8	92.6	7.4	99.7	0.3
2001	28.4	71.6	32.8	67.2	96.7	3.3	97.5	2.5
2002	27.1	72.9	67.4	32.6	98.9	1.1	99.9	0.1
2003	40.3	59.7	50.7	49.3	76.0	24.0	93.6	6.4
2004	40.7	59.3	87.9	12.1	98.5	1.5	99.9	0.1
2005	34.9	65.1	88.4	11.6	99.6	0.4	97.7	2.3

	Kenya		Uganda		Rwanda		Burundi	
Years	Export	Import	Export	Import	Export	Import	Export	Import
2006	32.3	67.7	89.1	10.9	97.4	2.7	100.0	0.0
2007	54.4	45.6	87.7	12.3	99.9	0.1	100.0	0.0
2008	37.0	63.0	77.7	22.3	99.8	0.2	98.0	2.0
2009	38.8	61.2	81.0	19.0	99.9	0.1	98.8	1.2
2010	54.1	45.9	77.1	22.9	98.8	1.2	98.9	1.1
2011	39.5	60.5	59.1	40.9	98.4	1.6	98.1	1.9
2012	38.3	61.7	48.8	51.2	98.0	2.0	93.4	6.6
2013	40.5	59.5	53.4	46.6	97.9	2.1	96.4	3.6
2014	40.5	59.5	60.4	39.6	91.8	8.2	98.7	1.3
2015	77.0	23.0	56.3	43.7	97.4	2.6	97.4	2.6
2016	54.0	46.0	65.5	34.5	85.3	14.7	98.5	1.5
2017	59.2	40.8	44.6	55.4	97.9	2.1	99.5	0.5
2018	57.7	42.3	78.6	21.4	99.8	0.2	97.1	2.9

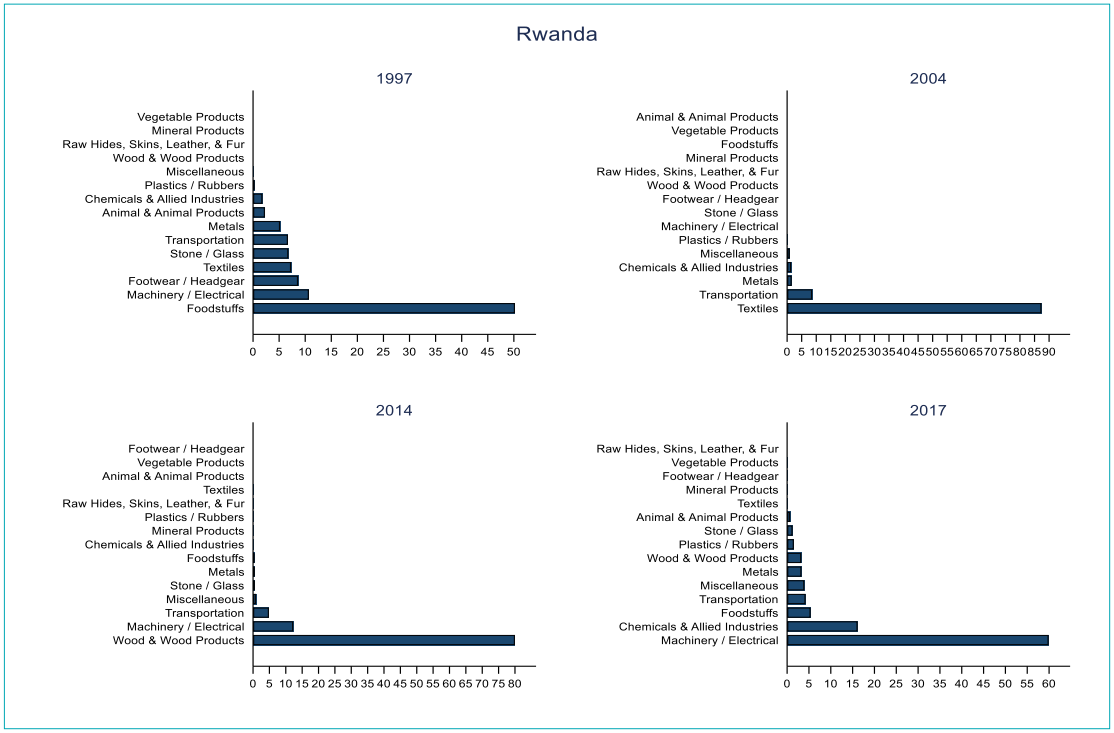
Source: author's computation from UN COMTRADE data.

Table A3: Tanzanian exports and imports shares with EAC Partner States (%)

	Kenya		Uganda	
Years	Exports	Imports	Exports	Imports
1997–2000	65.08	94.89	19.72	4.77
2001–2005	67.29	93.94	18.75	5.77
2006–2010	59.76	95.39	17.32	4.41
2011–2015	65.14	87.05	12.63	12.22
2016–2018	55.88	85.29	11.81	14.02
	Rwanda		Burundi	
Years	Exports	Imports	Exports	Imports
1997–2000	9.20	0.28	6.00	0.05
2001–2005	4.71	0.17	9.25	0.12
2006–2010	8.51	0.12	14.42	0.08
2011–2015	14.06	0.40	8.17	0.33
2016–2018	23.42	0.46	8.89	0.23

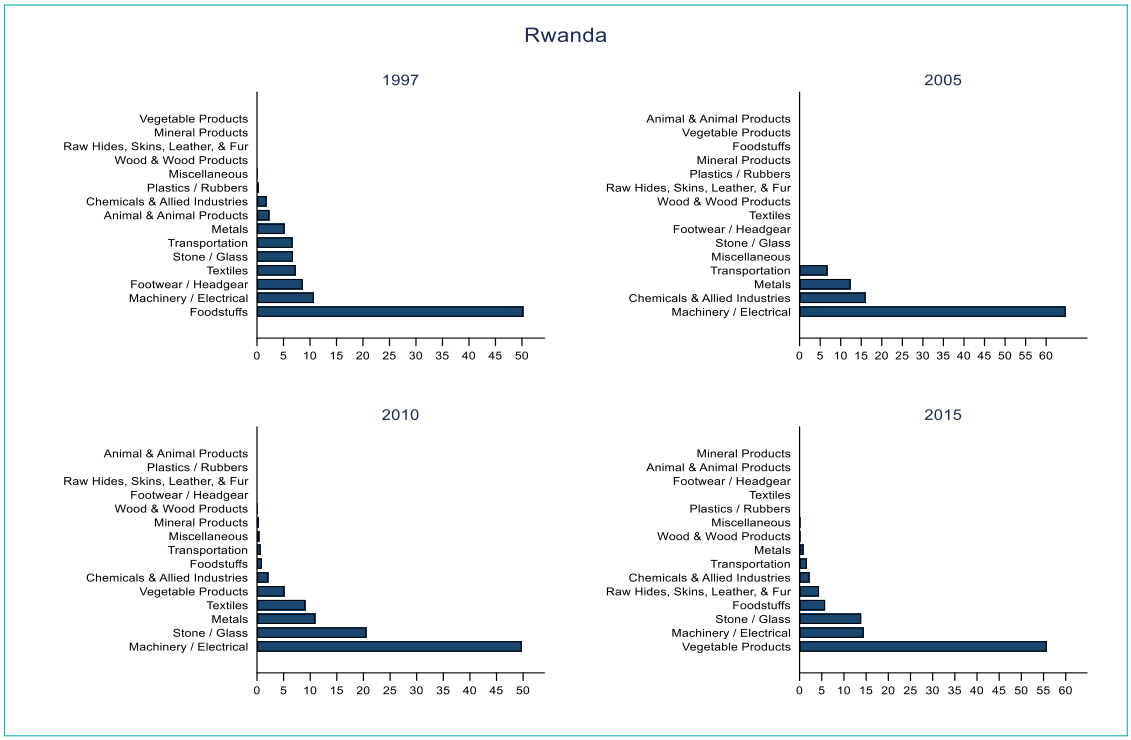
Source: author's computation from UN COMTRADE data.

Figure A1A: Top export products from Rwanda by category



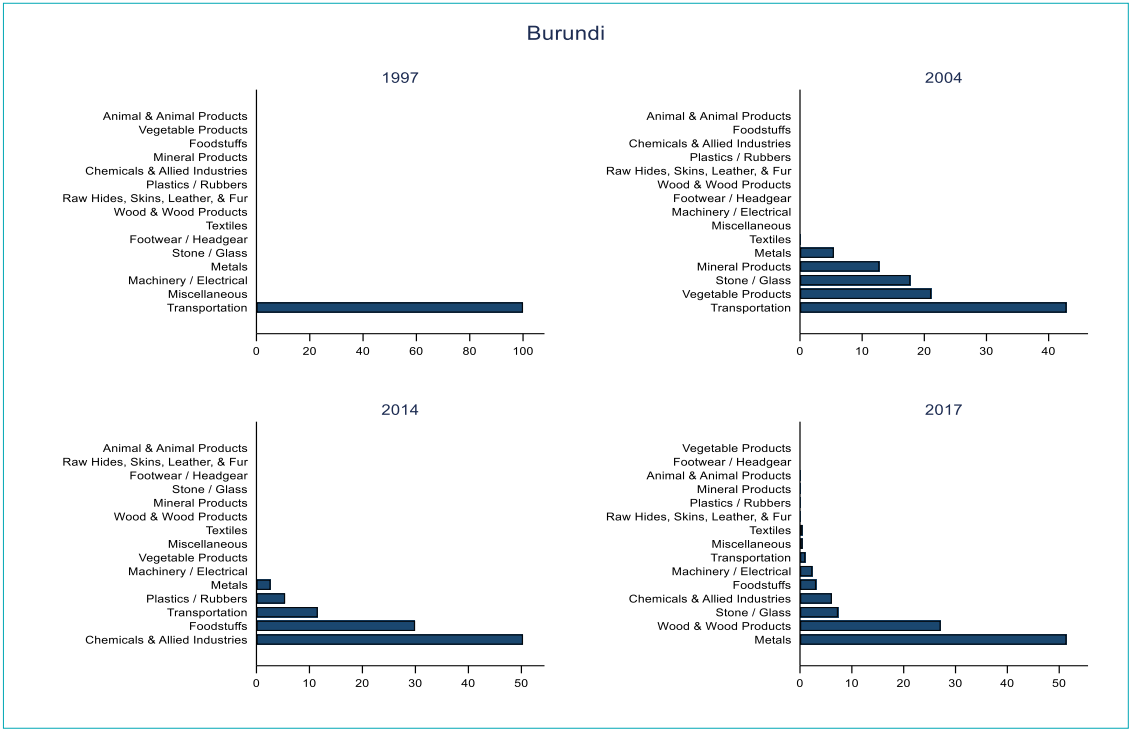
Source: author's computation from UN COMTRADE data.

Figure A1B: Top import products from Rwanda by category



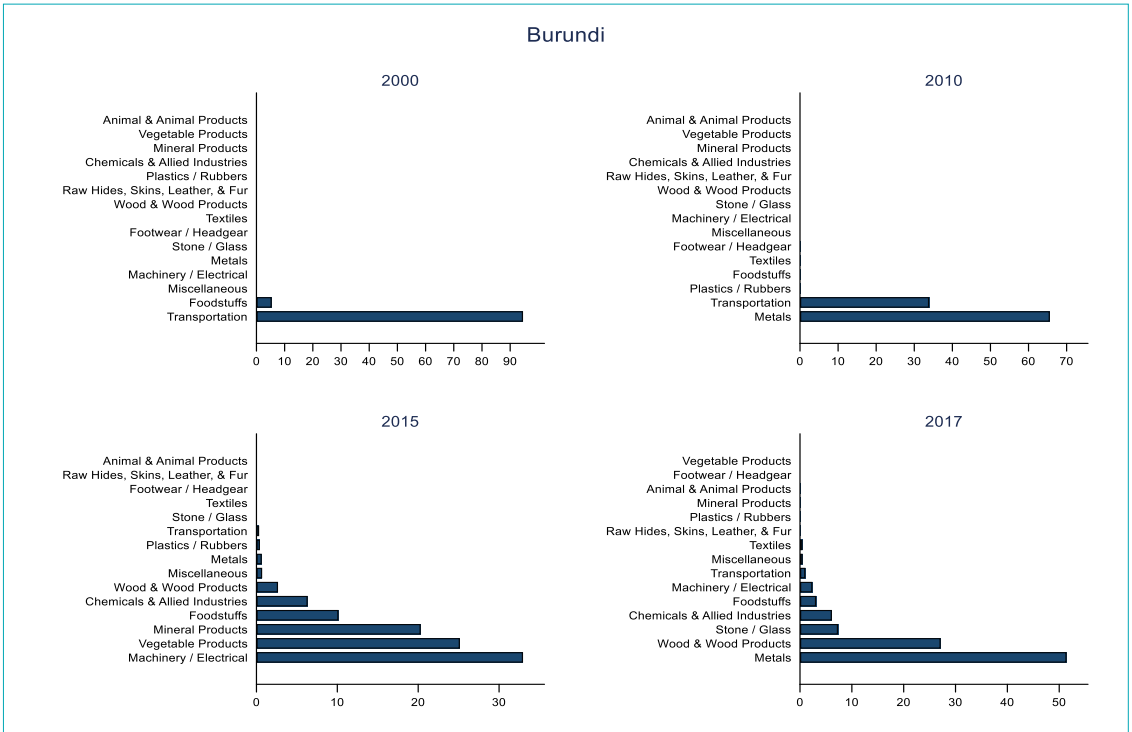
Source: author's computation from UN COMTRADE data.

Figure A2A: Top export products to Burundi by category



Source: author's computation from UN COMTRADE data.

Figure A2B: Top import products from Burundi by category



Source: author's computation from UN COMTRADE data.

Appendix B: Additional estimation results

Table B1: Pooled OLS: gravity equation (dep. var.: log(export))

	Model 1	Model 2	Model 3
East African Community	1.513***	1.649***	1.809***
	(0.266)	(0.383)	(0.446)
Tanzania GDP (log)	0.799***	0.765***	1.094***
	(0.229)	(0.221)	(0.233)
Destination country GNI (log)	0.579***	0.713***	0.600***
	(0.077)	(0.080)	(0.074)
Distance (log)	-2.265***	-2.515***	-2.656***
	(0.126)	(0.135)	(0.173)
Common religion		0.010	-0.045
		(1.002)	(0.994)
Common colony		0.650*	0.301
		(0.276)	(0.261)
Common language		0.405	0.879**
		(0.264)	(0.272)
Landlocked		-2.044***	-2.043***
		(0.215)	(0.219)
SADC			0.764*
			(0.370)
WTO			1.536***
			(0.192)
EU-EPA			-1.315***
			(0.239)
Observations	915	915	915

Note: robust standard errors are in parentheses and all regression results include time dummies; *p< 0.1, **p< 0.05, ***p< 0.01

Source: author's calculations.

Table B2: Pooled OLS: gravity equation (dep. var.: log(export))

	Model 1	Model 2	Model 3
EC Customs Union	1.739***	1.825***	1.942***
	(0.261)	(0.439)	(0.468)
Tanzania GDP (log)	0.793***	0.758***	1.086***
	(0.229)	(0.221)	(0.233)
Destination country GNI (log)	0.579***	0.715***	0.600***
	(0.077)	(0.080)	(0.074)
Distance (log)	-2.298***	-2.551***	-2.723***
	(0.120)	(0.131)	(0.160)
Common religion		0.044	-0.052
		(1.002)	(0.994)
Common colony		0.636*	0.278
		(0.276)	(0.261)

	Model 1	Model 2	Model 3
Common language		0.437	0.933***
		(0.262)	(0.267)
Landlocked		-2.030***	-2.023***
		(0.214)	(0.218)
SADC			0.646
			(0.352)
WTO			1.565***
			(0.191)
EU-EPA			-1.308***
			(0.239)
Observations	915	915	915

Note: robust standard errors are in parentheses and all regression results include time dummies; *p< 0.1, **p< 0.05, ***p< 0.01

Source: author's calculations.

Table B3: Pooled OLS: gravity equation (dep. var.: log(export))

	Model 1	Model 2	Model 3
EAC Single Customs Territory	1.683***	1.729**	1.784**
	(0.300)	(0.591)	(0.592)
Tanzania GDP (log)	0.792***	0.756***	1.080***
	(0.230)	(0.222)	(0.233)
Destination country GNI (log)	0.582***	0.719***	0.602***
	(0.076)	(0.080)	(0.074)
Distance (log)	-2.352***	-2.604***	-2.812***
	(0.116)	(0.128)	(0.153)
Common religion		0.082	-0.075
		(1.002)	(0.994)
Common colony		0.622*	0.255
		(0.277)	(0.263)
Common language		0.477	0.999***
		(0.262)	(0.267)
Landlocked		-2.012***	-1.997***
		(0.215)	(0.218)
SADC			0.481
			(0.341)
WTO			1.598***
			(0.191)
EU-EPA			-1.297***
			(0.239)
Observations	915	915	915

Note: robust standard errors are in parentheses and all regression results include time dummies; *p< 0.1, **p< 0.05, ***p< 0.01

Source: author's calculations.

Table B4: Pooled OLS: gravity equation (dep. var.: log(import))

	Model 1	Model 2	Model 3
East African Community	1.037**	0.971**	1.503***
	(0.369)	(0.309)	(0.372)
Tanzania GNI (log)	1.657	0.370	0.300
	(3.092)	(2.710)	(2.693)
Destination country GDP (log)	1.199***	1.252***	1.242***
	(0.033)	(0.034)	(0.034)
Distance (log)	-1.587***	-1.746***	-1.490***
	(0.135)	(0.129)	(0.152)
Common religion		-1.583*	-1.353
		(0.694)	(0.692)
Common colony		0.898***	0.901***
		(0.216)	(0.213)
Common language		0.740***	0.453*
		(0.194)	(0.202)
Landlocked		-1.209***	-1.236***
		(0.197)	(0.194)
SADC			1.085**
			(0.379)
WTO			0.538*
			(0.249)
EU-EPA			0.177
			(0.161)
Observations	1,204	1,204	1,204

Note: robust standard errors are in parentheses and all regression results include time dummies; * p < 0.05, ** p < 0.01, *** p < 0.001

Source: author's calculations.

Table B5: Pooled OLS: gravity equation (dep. var.: log(import))

	Model 1	Model 2	Model 3
EAC Customs Union	1.129**	0.969**	1.309***
	(0.406)	(0.369)	(0.393)
Tanzania GNI (log)	0.292	0.228	0.083
	(0.251)	(0.239)	(0.255)
Destination country GDP (log)	1.222***	1.282***	1.261***
	(0.030)	(0.031)	(0.034)
Distance (log)	-1.590***	-1.820***	-1.628***
	(0.126)	(0.121)	(0.136)
Common religion		-1.413*	-1.251
		(0.694)	(0.692)
Common colony		0.875***	0.839***
		(0.215)	(0.221)
Common language		0.857***	0.626**
		(0.192)	(0.203)
Landlocked		-1.376***	-1.380***
		(0.195)	(0.190)

	Model 1	Model 2	Model 3
SADC			0.848*
			(0.368)
WTO			0.630**
			(0.233)
EU-EPA			0.170
			(0.169)
Observations	1,204	1,204	1,204

Note: robust standard errors are in parentheses and all regression results include time dummies; *p< 0.1, **p< 0.05, ***p< 0.01

Source: author's calculations.

Table B6: Pooled OLS: gravity equation (dep. var.: log(import))

	Model 1	Model 2	Model 3
EAC Single Customs Territory	1.368**	1.203*	1.488**
	(0.425)	(0.473)	(0.460)
Tanzania GNI (log)	0.288	0.224	0.079
	(0.252)	(0.240)	(0.256)
Destination country GDP (log)	1.222***	1.282***	1.259***
	(0.030)	(0.031)	(0.034)
Distance (log)	-1.616***	-1.841***	-1.677***
	(0.120)	(0.116)	(0.127)
Common religion		-1.407*	-1.268
		(0.694)	(0.692)
Common colony		0.868***	0.826***
		(0.215)	(0.221)
Common language		0.871***	0.659**
		(0.191)	(0.201)
Landlocked		-1.370***	-1.369***
		(0.195)	(0.190)
SADC			0.765*
			(0.354)
WTO			0.648**
			(0.233)
EU-EPA			0.170
			(0.169)
Observations	1,204	1,204	1,204

Note: robust standard errors are in parentheses and all regression results include time dummies; *p< 0.1, **p< 0.05, ***p< 0.01

Source: author's calculations.

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