

Analysis of Trade Costs and FTA Effects on Bilateral Trade Flows in the Southern African Development Community

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Abstract

The study measured the relative effect of the SADC FTA, logistical and governance induced trade costs on trade flows, using a gravity model based on the Pseudo-Maximum Likelihood (PPML) estimations, covering the period 2005 to 2014. The study did not find evidence of trade creation by the SADC FTA, but found robust evidence regarding the trade diverting effects of the SADC FTA. Additionally, the study suggests that improvements in governance and reductions in logistics related costs raise trade flows. Further, trade indicators show that the SADC FTA resulted in increased intra-SADC trade intensity, implying a growing consumer market and potential enhancer of growth in the region.

Key words: Economic Integration, SADCFTA, Nontariff Barriers

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I. Introduction

International trade literature has emphasized the importance of trade costs and regional trade agreements' impact on trade flows. (e.g., Anderson and Van Wincoop, 2001; Behar and Edward, 2011; Hoekman and Nicita, 2008; Jacks et al., 2011; Kandelwal, 2004; Lee and Woodall, 1998; Marruping, 2005; Mthuli et al., 2014). Recently, international trade and development policy research in Africa has emphasized the importance of reducing trade costs associated not only with tariff barriers but also with nontariff barriers (NTBs) and other trade costs, particularly, trade costs arising from political instabilities, multilateral resistance factors, administrative red tapes, and entry barriers (Hoekman and Nicita, 2008; Kalenga, 2012).

The Southern Africa regional integration strategy paper (SARISP) of 2011-2015 emphasized on reducing policy related trade costs within the Southern African Development Community (SADC) to boost intra-regional trade, which accounts for less than 20% of SADC total trade. A free trade agreement (FTA) for the SADC countries was launched in 2008 as the first milestone to achieving deeper integration and eventually, reduce trade costs. It was motivated by the understanding that higher intra-regional trade in SADC could accelerate economic growth and eventually reduce poverty levels in the region (SADC, 2011). This study measures the effect of changes in trade costs on the trade flows and gives insight to the magnitude of obstacles to achieving deeper regional integration in the SADC.

Although much has been written about the significance of reducing barriers to trade and increased intra-regional trade flows (e.g., Kimura and Lee, 2006; Lee and van der Mensbrugge, 2008; Mthuli et al., 2014; Negasi, 2009; Wilson et al., 2004), considerably little attention has been paid to the reductions in governance and logistics induced trade costs especially for the SADC region. In addition, the analysis of SADC trade using a gravity model estimation has been limited. This study seeks to provide answers to the following and other related questions: How large are the trade costs? Is it likely that trade value will continue to rise with the implementation of the SADC FTA? Is the steady regional economic growth the reason for the rise in intra-SADC trade? Are the improvements in political environment the reason for the rise in intra-SADC trade volumes? And what about the effects of improvements in trade facilitation?

This study contributes to the literature by reviewing trade indicators and evaluating the relative effect of the SADC FTA, logistical and governance performance induced trade costs on the volume of trade, using a gravity model and the Poisson pseudo-maximum likelihood (PPML) estimator, which provides consistent estimates of the original nonlinear model (Santos Silva and Tenreyro, 2006, 2011; Shepherd, 2013). This study finds that the share of intra-SADC trade increased after 2008 and remained higher than the levels for the years before 2009 for the period 2005 to 2014. Intra-region trade intensity and the trade introversion index for SADC has been on the rise since 2008, implying that SADC countries have a bias towards trading within themselves, following the launch of the SADC FTA, in 2008. I find robust evidence that reductions in governance and logistical related trade costs by exporting and/or importing countries is vital for trade flows to increase between SADC members.

The rest of the paper is organized as follows. Section 2 reviews the literature. Section 3 illustrates the methodology and model specifications. Section 4 analyses trade indices and undertakes the empirical analysis of the relative impact of the SADC FTA and trade costs on the volume of trade. Section 6 concludes.

II. A Brief Literature Review

This paper builds on previous empirical studies analyzing trade costs and regional integration. Most studies

estimated various versions of the gravity model with varying estimation methods to infer bilateral trade costs while other studies estimated directly, different measures of trade costs on trade flows. Most of these studies did not include African countries and let alone SADC countries in their data sets, and thus, little is known about the different trade barriers that hamper intra-SADC trade.

A study by Jacks, Meissner and Novy (2011), employed a micro-founded measure of trade frictions such as, exchange rate regimes, and a gravity model with ordinary least squares (OLS) method, to test the importance of bilateral trade costs in determining international trade flows. By sampling 130 country pairs from the Americas, Asia, Europe and Oceania from 1870 to 2000, they demonstrated that declining trade costs were vital to the pre-World War I trade boom while the post-World War II trade boom was mainly, determined by changes in output. On the other hand, a study by Hoekman and Nicita (2008), used a gravity regression framework with PPML estimations for 2006 data for 104 importers and 115 exporters to estimate the impact of tariffs, NTBs, LPI, domestic trade costs and other trade barriers on trade flows. They found that tariff and NTBs were a significant obstacle to trade flows for low-income countries despite preferential access programs. Wilson, Mann and Otsuki (2004) used gravity equations to examine a relationship between trade facilitation and trade flows across 75 countries and found that improvements in trade facilitation would increase trade.

Yotov (2012), Lin (2013), and Lin and Sim (2012) focused on estimating the negative impact of distance on trade flows that increased over time when a gravity model was estimated using OLS. Using a gravity model with alternative estimation methods to the OLS, they showed robust evidence of a downward trend of the impact of distance on trade. Dutt and Traca (2010) analyzed a gravity model with OLS estimations, from 1980 to 2004 for 28 industrial sectors in 122 countries and included corruption to assess its impact on bilateral trade. This is because empirical studies had suggested that corruption was a barrier to trade. They found the effect of corruption to be ambiguous and contingent on tariffs, as their results suggested that the marginal effect of corruption on trade was enhancing in high tariff environments.

Studies by Baier and Bergstrand (2007, 2009) estimated the original European Economic Community (EEC) and Central American Common Market (CACM) with data from 1960 to 2000. Used a gravity model to estimate the effects of FTAs on trade flows. They found that FTAs, on average increased members' bilateral trade flows overtime. Other studies by Anderson and van Wincoop (2003, 2004), Anderson (2011), Anderson and Yotov (2008, 2012), De Bruyne, Magerman and Van Hove (2013), and Bergstrand, Egger and Larch (2013) used a structural gravity model to estimate unobserved trade costs using data on trade flows and observable trade costs such as distance, borders, language, and multilateral resistance factors. They highlighted the effects of distance, borders, multilateral resistance, and other observable trade costs, while confirming the restrictiveness of a structural gravity model despite structural gravity theory's robustness in empirical research on disaggregated trade flows with missing or non-credible data.

Regarding the estimation techniques appropriate for the gravity models, several studies by Santos Silva and Tenreyro (2006), Martínez-Zarzoso, Nowak-Lehmann and Vollmer (2007), and Gómez-Herrera (2013) compared OLS, Gamma pseudo-maximum-likelihood (GPML), a Non-Linear Least Squares (NLS), PPML, and other estimation techniques' performance in constant elasticity models. Studies by Martínez-Zarzoso, Nowak-Lehmann and Vollmer (2007) found that there was no 'best' estimator and highly recommended to follow a model selection approach using a number of tests to select the more appropriate estimator for any application. Most recent studies by Santos Silva and Tenreyro (2011), Bosquet and Boulhol (2009), Prehn, Brümmer and Glauben (2012), and Fally (2015) confirmed Santos Silva and Tenreyro (2006) claim that the PPML technique is the appropriate estimator for constant elasticity models such as the gravity models in the presence of zero trade flows and heteroscedasticity. While the OLS estimation technique of log linearized models was found to overstate the magnitude of the coefficients. They dismissed the claim of no best estimator by Martínez-Zarzoso, Nowak-Lehmann and Vollmer (2007) who used data sets that were not for constant elasticity models.

The empirical literature reviewed have limitations that this paper attempts to address. The previous studies did not include a large number of African countries in their data sets, let alone SADC countries, mostly focussing on high and some middle income countries. African and SADC countries are either middle income or low income countries that are usually excluded by most studies. Studies that covered Africa, are limited in coverage of SADC and very little is known about the effects of governance and logistical related costs with regards to the SADC FTA that was launched in 2008 and fully implemented in 2012.

III. Methodology

A. Model

To assess the impact of trade costs and the SADC FTA on trade flows, this chapter utilizes a gravity model similar to Anderson and van Wincoop (2003), and Fally (2015), that included multilateral resistance terms in their models. The gravity framework predicts that the volume of trade between any two countries will be positively related to the size of their economies (usually measured by GDP) and inversely related to the trade costs between them, such as distance (Frankel, 1998). At an empirical level, such a model has proved successful in predicting the pattern of

trade and assessing the effects of commercial and monetary policies.

Studies such as Hoekman and Nicita (2008), Jacks et al. (2011), Kimura and Lee, (2006), and Wilson et al. (2004) that included various trade costs related to policy, economic and political environment in their models, found them to have an effect on the flow of trade. Generally, literature supports the hypothesis that, besides tariffs and NTBs, other trade costs related to the economic and governance/political environment are significant determinants of trade flows between countries. This study builds on the existing literature using gravity models to investigate the importance of the SADC FTA and trade costs related to the economic and political environment in determining trade flows.

This study uses a gravity model that includes panel data of time invariant trade impediments (distance, contiguity, common language, colonial ties, landlockedness), as well as trade policy, economic and political environment trade cost variables. The study also includes multilateral resistance term proposed by Anderson and van Wincoop (2003) proxied by “remoteness” variables following Hoekman and Nicita (2008). A now widely-used strategy following (Santos Silva and Tenreyro 2006, 2011), is to estimate a constant elasticity model such as the gravity model using Poisson pseudo-maximum-likelihood (PPML) estimation method. Therefore, this study estimates a gravity equation using PPML as the main estimator, and fixed effects and pooled OLS as the alternatives. The PPML estimator produces consistent estimates in the presence of zero trade flows and heteroscedasticity, and is more robust to truncation. This study estimates the following gravity model:

$$Imports_{mxt} = A_0 \frac{(GDP_{mt})^{\beta_1} (GDP_{xt})^{\beta_2} (GDPPC_{mt})^{\beta_3} (GDPPC_{xt})^{\beta_4}}{dist_{mx}^{\beta_5}} \times e^{\beta_6(contig_{mx})} \\ \times e^{\beta_7(comlang_{mx})} e^{\beta_8(comcol_{mx})} e^{\beta_9(landl_m)} e^{\beta_{10}(landl_x)} \\ \times e^{\beta_{11}(remot_{mt})} e^{\beta_{12}(remot_{xt})} e^{\beta_{13}(PS_{mt})} e^{\beta_{14}(PS_{xt})} \\ \times e^{\beta_{15}(LPI_{mt})} e^{\beta_{16}(LPI_{xt})} e^{\beta_{17}(DM_t)} e^{\beta_{18}(DX_t)} e^{\beta_{19}(SADC_{xmt})} \gamma_t \varepsilon_{mxt} \quad (1)$$

Where,

$Imports_{mxt}$ is the bilateral imports in levels between country m and country x in year t ;

GDP_{mt} is the natural log of importer country’s GDP in year t ; GDP_{xt} is the natural log of exporter country’s GDP in year t ; $GDPPC_{mt}$ is the natural log of importer country’s GDP per capita in year t ; $GDPPC_{xt}$ is the natural log of exporter country’s GDP per capita in year t ; $dist_{mx}$ is natural log of the geographic distance between the capitals of country m and country x ; $contig_{mx}$ refers to a dummy variable indicating contiguity between country pairs; $comlang_{mx}$ refers to a dummy variable indicating whether the country pairs share a common official and second language(s); $comcol_{mx}$ refers to a dummy variable indicating whether the country pairs had a common colonizer; $landl_m$ refers to a dummy variable indicating whether the importing country is landlocked; $landl_x$ refers to a dummy variable indicating whether the exporting country is landlocked; $remot_m$ is natural log of the remoteness or relative distance of the importing country; $remot_x$ is natural log of the remoteness or relative distance of the exporting country; PS_{mt} is the political stability index of the importing country in year t ; PS_{xt} is the political stability index of the exporting country in year t ; LPI_{mt} is the logistics performance index of the importing country in year t ; LPI_{xt} is the logistics performance index of the exporting country in year t ; DM_t is the number of documents required per shipment to import goods; DX_t is the number of documents required per shipment to export goods; $SADC_{xmt}$ refers to the trade policy dummy variable that takes the value 1 if both exporting and importing countries are members of the SADC FTA at time t , or if the importing country is a member of SADC FTA and zero otherwise; γ_t refers to year fixed effects; ε_{mxt} is the error term; m is the importer (reporter/destination) country subscript; x is the exporter (partner /origin) country subscript; and t is the year subscript.

The study also analyzed trade Interdependence indices to add more insights to the gravity model estimations. Trade intensity and Introversion indices were analyzed. Intraregional trade intensity (HI) is defined as the intraregional trade share divided by the share of the region’s total trade in world trade. The closer the HI is to the value of 1, then the more neutral the regional members’ trade is. In other words, the region tends to not have any bias toward trading between its members or with outsiders. If the indicator is more than 1, then the region has a bias toward trading within itself; if the indicator is less than 1, then the region has a bias toward trading with outsiders. The HI will tend to rise when the share of a region’s trade within itself rises faster than its share of world trade¹. The following is the formula for the intra-regional trade intensity:

$$HI = \left(\frac{T_{ii}/T_i}{T_w/T_w} \right) \quad (2)$$

where T_{ii} = exports of region i to region i plus imports of region i from region i ; T_i = total exports of region i to the world plus total imports of region i from the world; T_w = total world exports plus total world imports

Extra-regional trade intensity (HE) index measures the trade intensity of countries in the region with those

¹ Plummer, et al (2010) provide detailed explanations in their report on the Methodology for Impact Assessment of FTAs.

outside, calculated as the extra regional trade share divided by the share of the region's total trade in world trade. The closer the HE is to the value of 1, then the more neutral the regional members' trade with the outsiders. In other words, the region tends to not have any bias toward trading between its members or with outsiders. If the indicator is more than 1, then the region has a bias toward trading with the outsiders; if the indicator is less than 1, then the region has a bias toward trading within itself. The HE will tend to rise when the share of a region's trade with outsiders rises faster than its trade within itself. The following is the formula for the extra-regional trade intensity:

$$HE = \left(\frac{T_{ij}/T_i}{T_i/T_w} \right) \quad (3)$$

Where T_{ij} = exports of region i to region j plus imports of region i from region j ; T_i = total exports of region i to the world plus total imports of region i from the world; T_w = total world exports plus total world imports

Regional trade introversion (RTI) index measures the relative intensity of regional trading versus trading with outsiders. Intraregional trade intensity (HI_i) and extra-regional trade intensity (HE_i) are functions of the region's share of outsiders' total trade and not of world trade as in the previous trade intensity index. The index's range is -1 to 1 and it is independent of the size of the region. The index rises (or falls) only if the intensity of intraregional trade grows more (or less) rapidly than that of extra-regional trade. If the index is equal to zero, then the region's trade is geographically neutral. If it is more than zero, then the region's trade has an intraregional bias; if it is less than zero, then the region's trade has an extra-regional bias¹.

The following is the formula for the regional trade introversion index:

$$RTI \text{ Index}_i = \left(\frac{HI_i - HE_i}{HI_i + HE_i} \right) \quad (4)$$

where $HI_i = \left(\frac{T_{ii}/T_i}{TO_i/TO} \right)$ and $HE_i = \frac{[1 - (T_{ii}/T_i)]}{[1 - (TO_i/TO)]}$

T_{ii} = exports of region i to region i plus imports of region i from region i

T_i = total exports of region i to the world plus total imports of region i from the world TO_i = exports of region i to outsiders plus imports of region i from outsiders

TO = total exports of outsiders plus total imports of outsiders

B. Data

The list of countries covered is reported in Table 9 in the Appendix I. Information on bilateral imports comes from UN Comtrade database. Data on real GDP and GDP per capita come from the World Bank's World Development Indicators (World Bank 2015). Data on distance and dummies indicating contiguity, common language (official and second languages), colonial ties are constructed from the CEPII database (CEPII, 2014). The data on language and colonial links are presented on Tables 4 and 5 in the Appendix.

Remoteness or relative distance calculated as $rem_m = \sum \frac{distance_{mx}}{GDP_x/GDP_w}$, where, rem_m is the remoteness of the importing country; $distance_{mx}$ is the distance between capital cities of the country pairs; GDP_x/GDP_w is the ratio of the exporting country's GDP to world GDP (UN and WTO, 2012). Information on the membership to SADC FTA comes from SADC (2011). Table 12 in Appendix I displays the SADC membership. Finally, to account for economic and political environment trade costs, the study utilizes the LPI as in Hoekman and Nicita (2008), as well as the number of documents to import and export (DM and DX) to capture further transaction costs and the political stability indices (PS) to capture governance and political environment effects, because of the volatile political environment among SADC countries. Data on the LPI and number of documents to import and export is from the World development indicators (World Bank, 2015), while the data on political stability indices comes from the World Bank's Worldwide Governance Indicators (WGI) (World Bank, 2015). In cases where the data values' range were deemed to be too large by Stata for convergence to occur, it was rescaled as an option in Stata. Although this affects the scale of coefficients and standard errors, it does not affect the significance and interpretation of results (Woodridge, 2013). For GDP, GDPPC, distance and relative distance, natural logarithms were used to rescale just as in Hoekman and Nicita (2008) and Santos Silva and Tenreyro (2006). LPI and Political stability indices were also rescaled to reduce the range of the data value using a commonly used rescaling formula².

IV. Estimation Results and Trade Indices

A. Trade Interdependence Indices

Figure 1 below graphs the Extra-SADC trade intensity indices on the left side, and Intra-SADC trade intensity on the right, from 2005 to 2014, based on the author's own calculations from UN Comtrade database. The intra-

¹ Plummer, et al (2010) provide detailed explanations in their report on the Methodolgy for Impact Assesment of FTAs.

² Rescaling formula used for LIP and Political stability indices was $f(x) = \frac{(b-a)(x-\min)}{\max-\min} + a$ implying rescaling a range [min, max] to [a, b], where min and max are the minimum and maximum values in the original data set, while a and b are the new range.

SADC intensity index has been steadily rising since 2005 while the extra-SADC trades intensity index has been on a steady decline. This implies that SADC countries have a bias towards trading within themselves. The reasons for this bias is explained by the gravity model results in the next sub-section.

Figure 1 Extra-SADC Trade Intensity and Intra-SADC Trade Intensity

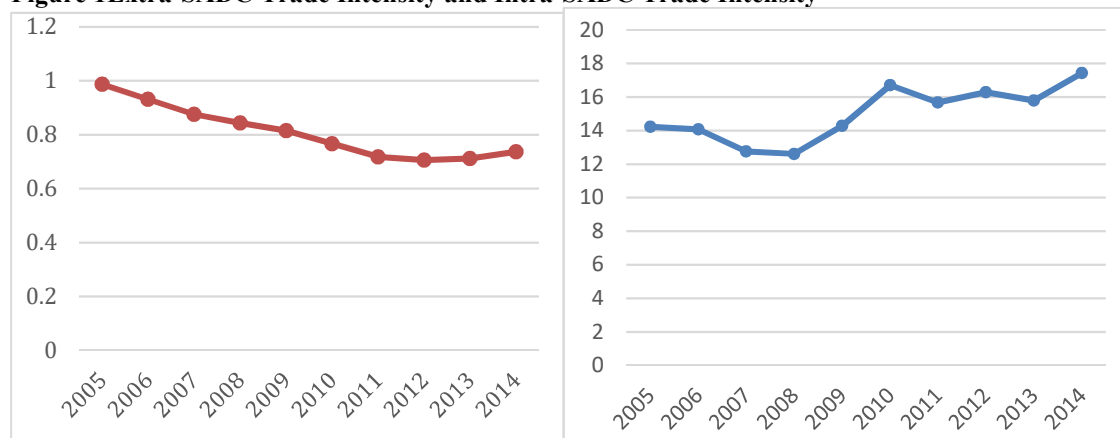
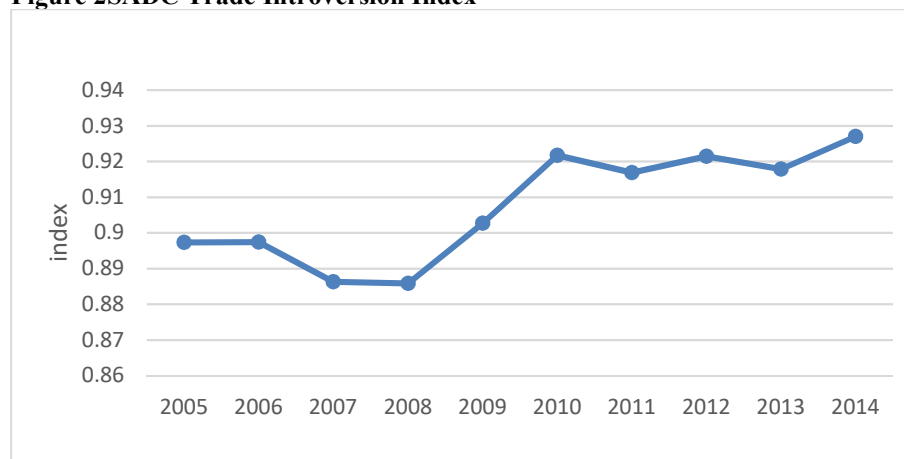


Figure 2 below graphs the regional trade introversion index for SADC from 2005-2014. The index after 2008 has been at slightly over 0.9 and at around 0.89 before 2008. The sharp change after 2008 is notable, reflecting the effect of the SADC FTA. The index clearly shows the intra SADC trade bias which grew after the launch of the FTA in 2008, implying that the intra-SADC trade intensity grew more rapidly than that of extra-SADC trade.

Figure 2 SADC Trade Introversion Index



Source: Authors own calculations from UN Comtrade database

B. Gravity Model estimation results

Table 1 below present results from the PPML estimations, with the value of imports as the dependent variable, and shows coefficients of the regular gravity equation variables with coefficients of additional variables for this study. Equations 1 to 4 shows PPML estimates that take into account the effects of politics, logistics performance and the number of documents required for imports and exports.¹

The regular gravity model variables have the expected signs and are statistically significant for all the equations, except for common language, which was dropped from the results presented in Table 1 below. GDPPC and remoteness were dropped from the estimations due to solve the problem of multicollinearity. GDP coefficients are, highly statistically significant with the exporting countries' GDP coefficients less than the importing countries' coefficients, and is similar to the study by Hoekman and Nicita (2008).

¹ Equations 1 accounts for all the trade costs with overall SADC FTA effects considered in the study, while the effects of LPI and docs, politics and docs, and politics and LPI, are excluded in equations 2, and then politics is included in equation 3, while and equation 4 captures LPI.

Table 1 PPML Estimation Results

Variables	equation 1	equation 2	equation 3	equation 4	equation 5
lnGDP_m	1.112*** (0.0437)	1.386*** (0.0435)	1.344*** (0.0434)	1.103*** (0.0448)	1.303*** (0.0456)
lnGDP_x	0.895*** (0.0426)	1.218*** (0.0441)	1.187*** (0.0450)	0.953*** (0.0478)	1.198*** (0.0495)
Indist	-0.427*** (0.0447)	-0.691*** (0.0428)	-0.576*** (0.0454)	-0.402*** (0.0445)	-0.561*** (0.0457)
contig	1.476*** (0.0782)	1.403*** (0.0714)	1.469*** (0.0759)	1.512*** (0.0775)	1.440*** (0.0768)
comcol	0.820*** (0.0907)	0.188* (0.111)	0.373*** (0.106)	0.768*** (0.0931)	0.363*** (0.109)
landl_m	-0.548*** (0.0465)	-0.410*** (0.0484)	-0.591*** (0.0500)	-0.591*** (0.0456)	-0.463*** (0.0479)
landl_x	-0.663*** (0.0557)	-0.551*** (0.0514)	-0.664*** (0.0570)	-0.698*** (0.0502)	-0.571*** (0.0567)
PS_m	-0.0708*** (0.0204)		0.267*** (0.0199)		
PS_x	-0.0249 (0.0180)		0.162*** (0.0230)		
SADC	-0.805*** (0.0622)	-1.017*** (0.0686)	-1.026*** (0.0697)	-0.771*** (0.0645)	-0.967*** (0.0675)
LPI_m	0.788*** (0.0370)			0.790*** (0.0289)	
LPI_x	1.258*** (0.0534)			0.740*** (0.0334)	
DM	-0.0227*** (0.00696)				-0.107*** (0.00554)
DX	0.177*** (0.0162)				-0.0113 (0.0131)
year2009	-0.0884* (0.0534)	-0.111** (0.0550)	-0.101* (0.0548)	-0.109** (0.0548)	-0.135** (0.0555)
Constant	-11.57*** (0.454)	-6.698*** (0.361)	-8.269*** (0.327)	-9.784*** (0.309)	-5.903*** (0.427)
Observations	72,250	72,250	72,250	72,250	72,250
R-squared	0.432	0.399	0.406	0.409	0.394

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Distance has the expected negative coefficients that are significant at 1%. The negative distance coefficients highlight that trade between countries pairs that are closer to each other will be greater than trade between country pairs that are far apart. This is probably one of the reasons why SADC countries trade more with the EU 28, Africa and China compared to its trade with the USA, the largest economy in the world¹. Therefore, distance is vital for trade flows to increase between country pairs, regardless of whether they are in a regional integration arrangement or not.

The contiguous (contig) has the expected positive sign and statistically significant at 1%. This implies that countries that share a common border (such as most SADC FTA members) tend to trade more than countries that don't share a border. Similarly, landlocked dummy has the expected negative sign and is statistically significant at 1%. Additionally, landlockedness coefficients for exporting countries are larger than those for importing countries. This implies that landlocked countries tend to trade less, especially when it comes to exports. About 50% of the SADC FTA members are landlocked, and therefore, intra- SADC FTA trade is potentially reduced.

Trade between countries that had a common colonizer is high as shown by the coefficients for comcol that have expected signs and statistically significant for all the equations. Common colonial ties has larger coefficient when the additional gravity model trade costs are accounted in the regression such as equation 1. Particularly, the inclusion of LPI increases the size of the coefficient for common colonial ties, implying that logistics efficiency, of customs clearance process, quality of trade and transport related infrastructure, ease of arranging competitively

¹ Stylized facts about SADC in section 3 highlight the trends in SADC trade

priced shipments, quality of logistics services, ability to track and trace consignments, and frequency with which shipments reach the consignee within the scheduled time, are vital to the trade flows even if countries have the common colonizers. Therefore, the results are robust to the notion that countries with common colonial ties trade more.

The SADC FTA has a negative and statistically significant coefficient at 1%, implying that the value of imports tends to reduce after the launch of the SADC FTA in 2008. Additionally, when considering the trade creation and diversion effects of the SADC FTA, there was no evidence of trade creation since the coefficients are negative and significant at 1%. On the other hand, there is strong evidence of trade diversion by the SADC FTA, resulting in the significant reduction in the value of imports after 2008. This implies that SADC countries' imports have been diverted from efficient producers to the inefficient member countries due to the reduced trade costs as a result of lowered tariffs and/or zero tariffs on various products. Whether trade diversion is welfare deteriorating for SADC countries or not, is still a debatable topic that still requires further general equilibrium research analysis that should be addressed by future research.

With regards to the governance performance effects on trade flows, the positive expected coefficients at 1% significance level, in equation 2, indicates robust evidence to support the importance of governance which is estimated using the political stability index. Therefore, improvements in the political stability of a country increases imports and exports considerably, especially exports as governance performance has a direct effect on domestic production and the costs associated with exporting. This result emphasizes the importance of governance in trade flows and the realization of the full potential of the regional arrangements like the SADC FTA. However, when additional trade costs are included, political stability, has the negative coefficient that is statistically significant at 1% for importers (PS_m) and insignificant for exporters (PS_x). This implies that countries will import less when they experience improvements in political stability, probably due to the likely increase in domestic production associated with improvements in governance.

LPI has the positive coefficients as expected and significant at 1%. Implying that improvements in LPI significantly increases both imports and exports, especially exports for all estimated equations. Therefore, logistics efficiency, of customs clearance process, quality of trade and transport related infrastructure, ease of arranging competitively priced shipments, quality of logistics services, ability to track and trace consignments, and frequency with which shipments reach the consignee within the scheduled time, is vital to the rise in trade flows in the SADC. Similarly, when this study proxied the logistical/transaction costs with the number of documents required per shipment of imports or exports, the PPML estimations show that the number of documents required for importing considerably, reduces imports when all other additional trade costs are considered, and when other costs are excluded. However, the increase in the number of documents required for exports appear to increase exports when all costs are considered and significant at 1% level. This unexpected outcome may imply that the number of documents required for exporting does not matter much to the exporters as they can cover such transaction costs through the price of exports without affecting the demand and thus, other costs are more prominent for exporters. Additionally, the global financial crisis in 2008-2009, had a negative and statistically significant effect on trade flows. This was the case probably due to the fact that South Africa and the EU28, the major exporters to SADC member countries were heavily affected by the financial crises, thus reduced the level of exports due to the volatility of the payment system during the crisis¹.

The study also compared the PPML estimates with those of pooled OLS and fixed effects regressions and found the results to be similar with pooled OLS estimates, though PPML estimates had smaller coefficients for most variables, similar to Santos Silva and Tenreyro (2006, 2011). While the Fixed effects regressions excluded distance, contiguous, common colonial ties and landlockedness due to their non-variability over time, but had similar expected coefficient signs for most variables except for the SADC FTA (See Table 2 below). The fixed effects regression shows a positive SADC FTA coefficient that is statistically significant, implying evidence of trade creation, contrary to the PPML and Pooled OLS regressions which show robust evidence of trade diverting effects of the SADC FTA. This contradictory result may be due to the excluded traditional gravity model variables that are constant over time, but vital determinants of the trade flows. The results are consistent with the recent literature that emphasize the suitability of the PPML estimation technique in constant elasticity models such as the gravity model, since it produces consistent estimates in the presence of zero trade flows and heteroscedasticity, and is more robust to truncation.

¹ Tables A1 and A2 in Appendix A and Table 3.3 in section 3 shows the trends in growth rates for SADC countries and the rest of the world that shows a significant slowdown in year 2009. Figure 3.3B in section 3 shows the trends in SADC trade that also reflects the 2008-2009 global financial crisis.

Table 2 PPML, Fixed Effects and Pooled OLS Estimations

VARIABLES	PPML	Fixed Effects	Pooled OLS
lnGDP_m	1.112*** (0.0437)	1.775*** (0.0594)	1.279*** (0.0157)
lnGDP_x	0.895*** (0.0426)	0.787*** (0.0588)	1.518*** (0.0170)
Lndist	-0.427*** (0.0447)		-1.901*** (0.0282)
Contig	1.476*** (0.0782)		1.683*** (0.0610)
Comcol	0.820*** (0.0907)		0.825*** (0.0550)
landl_m	-0.548*** (0.0465)		-0.838*** (0.0299)
landl_x	-0.663*** (0.0557)		-0.370*** (0.0301)
politics_m	-0.0708*** (0.0204)	-0.0339 (0.0250)	-0.0704*** (0.0142)
politics_x	-0.0249 (0.0180)	-0.108*** (0.0249)	-0.0231 (0.0157)
SADC	-0.805*** (0.0622)	0.0472** (0.0239)	-0.668*** (0.0340)
LPI_m	0.788*** (0.0370)	0.0359* (0.0216)	0.831*** (0.0196)
LPI_x	1.258*** (0.0534)	0.0195 (0.0217)	0.962*** (0.0220)
docs_m	-0.0227*** (0.00696)	-0.0217*** (0.00472)	-0.0679*** (0.00463)
docs_x	0.177*** (0.0162)	-0.0406*** (0.00811)	-0.167*** (0.00765)
year2009	-0.0884* (0.0534)	-0.0564*** (0.0169)	0.146*** (0.0348)
Constant	-11.57*** (0.454)	-11.28*** (0.335)	-9.593*** (0.194)
Observations	72,250	66,158	66,158
R-squared	0.432	0.055	0.560

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Generally, the size of the importers and exporters' economies, relative distance, contiguity, landlockedness, and logistics performance of the country pairs seem to be the major factors for the growth of the value of trade, based on the size of the coefficients, while the SADC FTA coefficient size is also considerably large enough for the negative effects on the value of trade. It is clear that the size of the economies of SADC member countries has been associated with increases in trade, although the value of imports to SADC have reduced due to the SADC FTA indicating trade diversion. Apart from the obvious direct trade costs such as tariffs, the governance and transaction related costs also significantly affects the volume of trade as indicated by the size of coefficients.

It should be stressed that the results of my regression analysis provides mainly the impact of the trade costs and the SADC FTA on the trade flows, but does not analyse the effects on production, welfare, factor returns, prices, customs revenue and dynamic variables such as changes in capital flows. This is because computable general equilibrium (CGE) models are more appropriate techniques for such variables. Plummer et al (2010) explained in detail the limitations and advantages of gravity models in comparison to CGE models. Additionally, gravity models do not account for macroeconomic convergence implications, which are important for the prospects of deep regional integration in the SADC. Macroeconomic convergence is a concept from growth theory, thus require a growth approach to analyse the implications for the SADC region. The next chapter will address some of the limitations of the gravity model by analysing the macroeconomic convergence implications for the prospects of deep SADC regional interaction. Future research that can analyse the effects of SADC FTA on customs revenue, prices and dynamic variables using CGE models is highly recommended.

V. Conclusion

This study measured the relative effect of the SADC FTA, logistical and governance performance induced trade costs on the value of trade, using a gravity model and the PPML estimator covering the period 2005 to 2014. This study aimed at providing insight to the magnitude of obstacles to achieving deeper integration in the SADC. Overall the study suggests that the size of the importers and exporters' economies, relative distance, contiguity, landlockedness, and logistics performance of the country pairs seem to be the major factors for the growth of the value of trade. The study also found that even if the countries that share a common border (such as most SADC FTA members) tend to trade more than countries that don't share a border, landlocked countries (50% of SADC FTA countries) tend to trade less, thus, complicating the effects of the SADC FTA on intra-regional trade flows. Another interesting results is about the impact of the global financial crisis in 2008-2009, which had a significant negative impact on the value of imports. This is attributed to the negative effects of the global financial crisis on SADC's major trading partners, South Africa and the EU28.

The study clearly, illustrates the absence of trade creation by the SADC FTA, but found robust results with regards to the SADC FTA having trade diverting effects. It's not certain as to whether trade diversion is welfare deteriorating for SADC FTA countries or not. Nevertheless, the SADC FTA has resulted in increased trade among SADC countries, as shown by the trade interdependence indices, implying a growing consumer market and potential enhancer of growth in the region, thus, meeting the deep integration targets would be beneficial for SADC member states.

Additionally, the study found that improvements in governance as estimated by the political stability index leads to a rise in trade flows and therefore, vital for SADC countries' increase in the value of intra-regional imports. The study also shows that reductions in logistics related costs can considerably raise trade between countries pairs. Furthermore, the study suggests that, logistics quality is equally important for trade and thus, vital for SADC countries' regional trade growth potential. It is also clear that imports are sensitive to the number of documents required for importers, while exports are not sensitive to the number of document required for exports. The study recommends for SADC member states to prioritize logistics efficiency, such as customs clearance process, transport infrastructure, and documents required per shipment, which are sub-standard, and a source of high trade costs incurred by SADC member states.

The study suggests that future research should analyse the effects of SADC FTA on customs revenue, prices and on dynamic variables using CGE models, provided the availability of data.

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Appendix

Table 3 List of Countries covered

Africa		Europe		North America		South America	
Algeria	Mauritius	Austria	Luxembourg	Canada		Argentina	
Angola	Morocco	Belgium	Malta	Mexico		Brazil	
Botswana	Mozambique	Bulgaria	Netherlands	United States of America		Chile	
Burundi	Namibia	Croatia	Norway			Colombia	
Comoros	Nigeria	Cyprus	Poland	Asia		Venezuela	
Congo, D R	Rwanda	Czech Republic	Portugal	China		Oceania	
Côte d'Ivoire	Senegal	Denmark	Romania	India		Australia	
Djibouti	Seychelles	Estonia	Russian Federation	Indonesia		New Zealand	
Egypt	South Africa	Finland	Slovakia	Japan			
Eritrea	Sudan	France	Slovenia	Korea			
Ethiopia	Swaziland	Germany	Spain	Malaysia			
Ghana	Tanzania	Greece	Sweden	Saudi Arabia			
Kenya	Tunisia	Hungary	Switzerland	Singapore			
Lesotho	Uganda	Ireland	Turkey	Thailand			
Libya	Zambia	Italy	United Kingdom	United Arab Emirates			
Madagascar	Zimbabwe	Latvia					
Malawi		Lithuania					

Table 4 Common Official and second languages

English		Turkish		Arabic		Greek	
Australia	Uganda	Cyprus		Algeria		Cyprus	
Botswana	United Kingdom	Turkey		Comoros		Greece	
Canada	USA			Djibouti			
Eritrea	Zambia	Hungarian		Egypt		Italian	
Ethiopia	Zimbabwe	Hungary		Eritrea		Italy	
Ghana		Romania		Israel		Switzerland	
India	French			Libya			
Indonesia	Belgium	Dutch		Morocco			
Ireland	Burundi	Belgium		Saudi Arabia		German	
Kenya	Comoros	Luxembourg		Sudan		Austria	
Lesotho	Congo, D R	Netherlands		Tanzania		Germany	
Malawi	Côte d'Ivoire			Tunisia		Switzerland	
Malaysia	Djibouti	Spanish		United Arab Emirates			
Mauritius	France	Argentina				Portuguese	
Namibia	Madagascar	Chile		Malay		Angola	
New Zealand	Mauritius	Colombia		Indonesia		Brazil	
Nigeria	Morocco	Mexico		Malaysia		Mozambique	
Rwanda	Rwanda	Spain		Singapore		Portugal	
Seychelles	Senegal	Venezuela					
Singapore	Seychelles			Chinese			
South Africa	Switzerland	Swahili		China			
Swaziland	Tunisia	Kenya		Malaysia			
Tanzania		Tanzania		Singapore			

Table 5 Colonial Ties

United Kingdom			France	Italy	Portugal
Australia	Kenya	South Africa	Algeria	Libya	Angola
Botswana	Lesotho	Sudan	Burundi	Eritrea	Brazil
Canada	Malawi	Swaziland	Comoros		Mozambique
Cyprus	Malaysia	Tanzania	Côte d'Ivoire	Spain	
Egypt	Mauritius	Uganda	Djibouti	Argentina	
Ghana	Namibia	USA	Madagascar	Chile	
India	New Zealand	Zambia	Morocco	Colombia	
Indonesia	Nigeria	Zimbabwe	Rwanda	Mexico	
Ireland	Seychelles		Senegal	Venezuela	
Israel	Singapore		Tunisia		

Table 6 Southern African Development Community (SADC) Countries

SADC members			SADC FTA Members	
Angola	Mauritius	Tanzania	Botswana	Namibia
Botswana	Mozambique	Zambia	Lesotho	South Africa
Congo, D R	Namibia	Zimbabwe	Madagascar	Swaziland
Lesotho	Seychelles		Malawi	Tanzania
Madagascar	South Africa		Mauritius	Zambia
Malawi	Swaziland		Mozambique	Zimbabwe