Masunda and Mhonyera
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Effects of free trade on export efficiency of COMESA member-states

Stein Masunda[1] and Gabriel Mhonyera[2*]

*Correspondence:
gmhonyera@uj.ac.za

[1] DAED, Faculty of Business Sciences, Midlands State University, P. Bag 9055, Senga Road, Gweru, Zimbabwe
[2] SPMGPP, College of Business and Economics, University of Johannesburg, P.O Box 524, Auckland Park, Johannesburg 2006, South Africa

Abstract

Regional integration in Africa is deepening, and the existing regional groupings are making frantic efforts to remove barriers to trade. One way in which trade among countries can be promoted is through the establishment of free trade areas with member-states. However, regulatory quality that supports international trade in most African countries is exceptionally low. This study investigates the effect of the Common Market for Eastern and Southern Africa (COMESA) free trade area (FTA) on the bilateral export efficiency of member-states over the period 1997–2021. The results obtained using a stochastic frontier specification of the gravity model and panel data of 16 exporting COMESA member-states show a positive effect of the COMESA free trade area on export efficiency. In addition, the study finds regulatory quality to have a positive impact on export efficiency. Controlling for regulatory quality, the results also show that the FTA stimulates export efficiency. Hence, non-FTA COMESA members ought to contemplate joining the FTA in order to expand their respective exports with other member-states to their maximum potential.

Keywords: Export efficiency, COMESA, Regulatory quality, Stochastic frontier gravity model

JEL Classification: F1, F15

Introduction

Although there is some scepticism among various groups on the importance of free trade, there is a consensus among economists that freer trade generates trade efficiency gains (Doan and Xing 2018; Rodrik 2018; Sheng et al. 2015). Free trade is defined as a policy by which a government does not discriminate against imports or interfere with exports through the application of tariffs. In light of this, a number of favourable policy interventions aimed at facilitating free trade has been instituted by governments over the past decades, more especially since the establishment of the World Trade Organization (WTO) in 1995 (Ha et al. 2016). Such trade policies include, among others, the establishment of free trade zones (FTZ)s and free trade area (FTA)s.

While FTZs are mainly established to facilitate trade by allowing fewer customs formalities (Alansary and Al-Ansari 2023), FTAs are more comprehensive, encompassing both trade and investment facets (Lun and Hoffmann 2016). Notwithstanding, the effects of regional trade agreements on trade performance differ. FTAs tend to generate

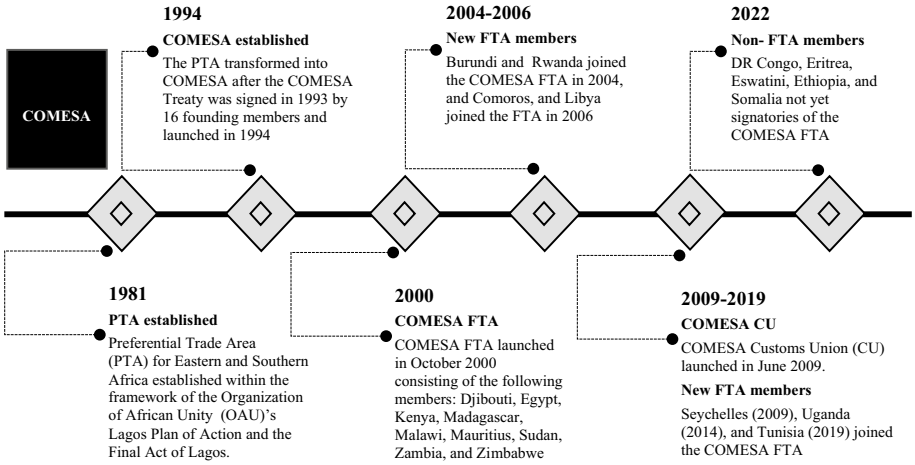

Fig. 1 Timeline of developments within COMESA since 1981. *Source*: Authors' own illustration

more gains than comparable trade facilitation measures (Kaushal 2022). In this regard, FTA-related benefits include: greater access to low-priced, high-quality goods; greater efficiency and innovation in production; increased economic development and living standards; and overall economic growth (Lai et al. 2019).

Emanating from the gains of FTAs and central to this study is the concept of export efficiency, an element of trade efficiency, drawn from the conventional notion of technical efficiency in production economics. For operational definition, export efficiency refers to the ratio of actual exports to the potential exports (Doan and Xing 2018). Potential exports relates to the maximum possible exports achievable under a free trade scenario, while export efficiency, in other words, indicates the extent of realised export potential (Kaushal 2022).

In support of and to reap the benefits of free trade, there has been a global proliferation of regional trade agreements, over the previous years, that sought to promote trade through the reduction of tariffs and non-tariff measures (Irwin 2020). In Africa, there are eight[1] regional economic groupings recognized by the African Union. Amongst these is the Common Market for Eastern and Southern Africa (COMESA). On 31 October 2000, COMESA launched its FTA with only nine member-states as a means of promoting intra-COMESA trade. However, as of December 2022, the number of countries in the FTA had increased to 16 out of a possible 21. The 16 member-states include Burundi, Comoros, Djibouti, Egypt, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Tunisia, Uganda, Zambia, and Zimbabwe (see the timeline detailing the developments within COMESA from 1984 to 2022 in Fig. 1). At the end of December 2022, only five countries had not joined the FTA and these are DR Congo, Eritrea, Eswatini, Ethiopia and Somalia.

The formation of the FTA sought to provide preferential treatment to products originating from the COMESA region as guided by the COMESA rules of origin (ROO).

[1] Some of the regional economic communities in Africa include the Southern Africa Development Community (SADC), Community of Sahel-Saharan States (CEN-SAD), Economic Community of Central African States (ECCAS), East African Community (EAC), Arab Maghreb Union (UMA/AMU), Intergovernmental Authority on Development (IGAD), and the Economic Community of West African States (ECOWAS).

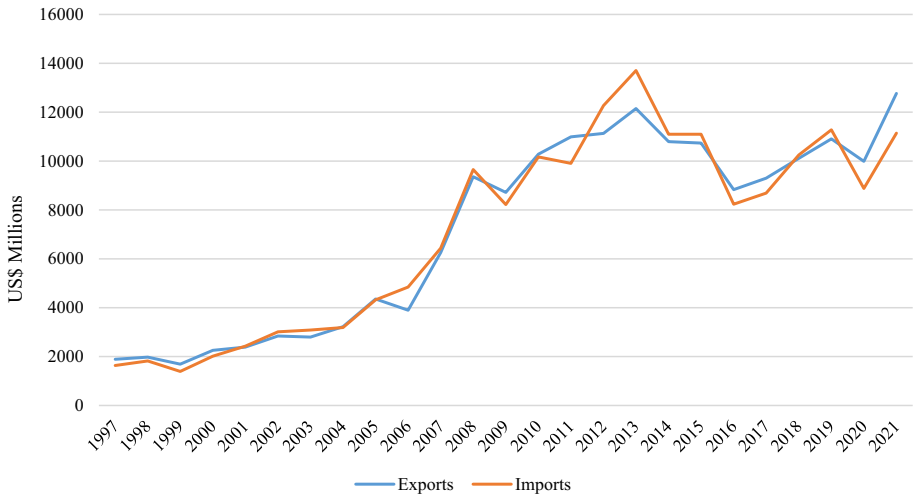

Fig. 2 COMESA's merchandise export and import performance (1997–2021). *Source*: Authors' illustration using COMSTAT (2023) data

The eligibility of the products under the ROO is guided by five criteria. These include that: (1) the goods should be wholly produced in a COMESA member-state; (2) the cost, insurance and freight (CIF) value of the non-originating material should not exceed 60% of the ex-work price of the goods; (3) goods must attain the value added of at least 35% of the ex-factoring cost of the goods; (4) goods should fulfil the change in tariff heading (CTH) rule; and (5) the goods must have importance to the economic development of the member-states and should contain not less than 25% of value added (COMESA 2018).

COMESA's trade performance over the period 1997–2021 shows that export and import performance within the COMESA region have generally been on an upward trend (see Fig. 2). In this regard, intra-COMESA exports increased from US$1.9 billion in 1997 to US$12.8 billion in 2021, whereas intra-COMESA imports increased from US$1.6 billion in 1997 to US$11.1 billion in 2021 (COMSTAT 2023). These increases may be attributable to an improvement in the trade of manufactures, fuels, ore, metals, and food within the COMESA region along with the consolidation of member production and export competencies.

Figure 3 shows export performance of COMESA member-states over the period 1997–2021. At the country level, intra-COMESA export performance is heterogeneous and is mainly driven by manufactured products. Over the same period, Egypt, Kenya, and Zambia recorded a significant improvement in exports to other COMESA countries, whereas Eritrea, Somalia and Zimbabwe remained relatively stable. This is expected for Somalia and Eritrea, which are yet to join the FTA. However, although export performance increased at a steady state, it was still below the full potential of the COMESA region.

It is interesting to note that only seven countries account for approximately 85% of intra-COMESA trade. These countries include Egypt, Libya, Tunisia, the Democratic Republic of Congo, Zambia and Zimbabwe (COMESA 2021). In addition, COMESA (2021) noted that productively, COMESA countries were operating below their

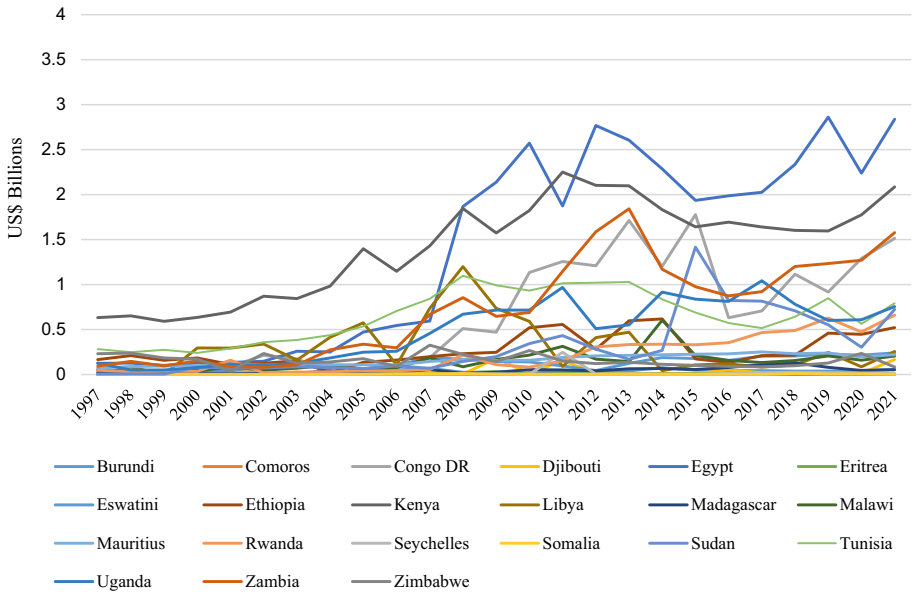

Fig. 3 Export performance by COMESA member-states (1997–2021). *Source*: COMSTAT (2023)

potential in the period 2010–2018 with several reasons suggested concomitantly. Such reasons include redundant information and communication technology, poor institutions, and low levels of human capital.

FTAs are construed to have a positive effect on trade and efficiency. However, within the COMESA region, intra-COMESA exports are below the potential as the benefits of the FTA are not fully exploited (Gondwe 2021; Oiro 2020). Specifically, intra-COMESA trade has the potential of reaching US$101.1 billion through the diversion of all extra-COMESA trade (COMESA 2021). Furthermore, there is a dearth of literature on the relationship between FTAs and trade efficiency in the COMESA. Although Gondwe (2021) finds that the COMESA FTA positively impacted trade within the region, the link between the sources of trade growth was not explored. Thus, examining this link in COMESA is vital in generating export growth for each member-state through improvements in trade efficiency gains.

COMESA (2021) also noted that intra-COMESA trade potential is affected by several factors such as the existence of weak productive capacities, a high prevalence of non-tariff barriers, and slow implementation of the COMESA FTA. The overall effect of the FTA on export efficiency can, therefore, be affected by the presence of non-tariff measures such as the ROO, which is one of the critical tenets of the FTA agreement and regulatory quality. The study will thus explore the intervening effect of the regulatory quality on the impact of the FTA on intra-COMESA trade. In light of this, the main objective of the study is to examine the effect of the COMESA FTA on export efficiency. Explicitly, the study determines the extent of the export efficiency of the COMESA member-states, examines the effect of the COMESA FTA on export efficiency, and explores the effect of the regulatory quality on intra-COMESA trade. The rest of the study is structured as follows: first, theoretical and empirical literature is reviewed; second, data features and the empirical strategy are provided; third, the

results and discussions of this study are presented; and lastly, conclusion and policy implications are provided.

Literature review

Engaging in free trade cannot merely lead directly to economic growth, but also leads to advancements in the level of efficiency and to the promotion of entrepreneurial initiatives aimed towards development of new products and services. In fact, the validation for free trade and the various irrefutable benefits that export specialisation contributes to the productivity of countries have been well documented and extensively discussed in international trade literature. Accordingly, the theoretical footing of the notion of free trade has progressed in conjunction with the development of positive economics and research in international trade.

Theoretical literature

Trade theories ranging from the classical to new trade theories agree that trade liberalization leads to an improvement in economic growth through growth in both the extensive and intensive margins of export growth. The absolute and comparative advantage theories argue that free trade will increase a country's exports of goods in which it has an absolute and comparative advantage (Smith 1776; Ricardo 1817). Trade efficiency is an important source of trade growth (Fan 2021). Trade growth can be decomposed into trade potential growth and trade efficiency growth. Trade potential growth is used to refer to theoretical trade volume that can be achieved when there is no trade resistance construed to be the frontier of trade, whereas trade efficiency measures the extent to which impediments to trade undermines actual trade from reaching its full potential (Fan 2021).

The gravity model, which relates to trade between nations, has become the workhorse of understanding the determinants of bilateral trade. A combination of the gravity model with the stochastic frontier model provides the theoretical framework of analysing the effects of trade agreements on trade efficiency. The stochastic frontier model was developed by Aigner et al. (1977) to estimate production efficiency. This was then extended to trade efficiency by Kalirajan (2007) in examining the effects of FTAs on export performance. Since then, the stochastic frontier gravity model has become the core model for understanding countries' export potential and efficiency. This model is detailed in "Research method" section.

Empirical literature

Several studies have estimated the effects of FTAs on trade efficiency (see Sheng et al. 2015; Anderson and Yotov 2016; Kelkar and Kalirajan 2021; Kaushal 2022; Abdullahi et al. 2022). Notably, a key empirical result in extant literature (e.g., Anderson and Yotov 2016; Hai and Thang 2017; Kumar and Prabhakar 2017; Doan and Xing 2018; Trung et al. 2018; Romyen et al. 2023) is that FTAs positively affect trade efficiency. Doan and Xing (2018), for instance, estimated the effects of the Association of Southeast Asian Nations (ASEAN) FTA on the efficiency of Vietnamese exports over the period 1995–2016. Employing a stochastic gravity model, the study highlighted several findings. Firstly, the study finds that Vietnam's exports were below their potential. Secondly, the study noted

that the ASEAN FTA positively affect export efficiency. Thirdly, the study finds that the rules of origin, a critical tenet of the ASEAN FTA, negatively affects export efficiency in Vietnam.

Similarly, Kaushal (2022) estimated the impact of several regional trade agreements on India's export efficiency utilising a stochastic frontier gravity model. Using data spanning the period 2008–2018, the study shows that India is far from the frontier. However, joining a FTA leads to export growth via an improvement in trade efficiencies. In Ghana, the findings of Boadu et al. (2021), through the application of the stochastic frontier gravity model over the period 2000–2018, found untapped bilateral exports of approximately US$1.1 billion. The main reasons for the observed inefficiencies were poor infrastructure, tariffs and other levies of trading partners, and low private sector investment.

A study by Abdullahi et al. (2022) employed a stochastic frontier analysis on the augmented gravity model to examine the determinants of efficiency of China's agricultural exports over the period 2000–2019. Their results show that the gross domestic product (GDP) of China and that of its trading partners positively influence China's agriculture exports. In addition, the study indicated that having a common border and a common official language with China resulted in an increase in agricultural exports. However, the results found China's per capita GDP to be negatively related with agriculture exports. In terms of agriculture export efficiency, the study established that China has untapped agriculture export potential of 51%. Similarly, Atif et al. (2019) used the stochastic frontier gravity model to investigate the determinants of Pakistan's chemical product exports to 62 trading partners for the period 1995–2015. They found GDP for both Pakistan and its trading partners, preferential trading agreements, colonial links, and common language to be positive and significant.

Anderson and Yotov (2016) also examined the terms of trade and global efficiency effects of regional trade agreements in 40 countries between 1990 and 2002. Using a stochastic gravity frontier model, they showed that regional trade agreements raised the global trade efficiency of manufactured products by 0.9%. In a related study, Kelkar and Kalirajan (2021) examined the extent to which India has achieved its bilateral export potential over the period 2001–2019. However, different from the other studies, this study focused on the effects of the majority government, and human and physical capital. Using the stochastic frontier gravity model, these variables were found to contribute positively to India's export efficiency. The study established some convincing level of efficiency as export efficiency stood at 80%.

In another study, Sheng et al. (2015) used a Malmquist to investigate the extent of multiproduct energy trade efficiency and its determinants thereof. Using a sample of 40 countries over the period 1995–2008, the study establishes that trade efficiency averaged 0.31 when imperfect substitution between energy products is factored in. Further, the study finds that cross product substitution which is enhanced by market integration and trade policy positively influences trade efficiency. Within the COMESA region, COMESA (2021) applied the International Trade Centre (ITC) approach to examine intra-COMESA trade potential of member-states. The study showed that intra-COMESA trade is below its potential and associated this poor performance to weak productive capacities, existence of non-tariff barriers, and a slow implementation of the COMESA FTA.

While there is a scarcity of literature investigating the effect of a FTA on export efficiency in COMESA, the link between the sources of trade growth within COMESA are also not well-documented. Accordingly, examining this link in COMESA is fundamental in generating export growth for each respective member-state through improvements in trade efficiency gains. This is the gap that this study occupies by determining the extent of the export efficiency of the COMESA member-states, examining the effect of the COMESA FTA on export efficiency, and exploring the effect of the regulatory quality on intra-COMESA trade.

Research method

This section presents the features of the data utilised in this study and the empirical strategy employed to analyse the effects of the COMESA FTA on export efficiency.

Data

This study covers the period 1997–2021 for a sample of 16 countries. The 16 countries constitute the total number of countries that are members of the COMESA FTA. These 16 countries are classified as exporters, while the other five non-FTA COMESA countries and the FTA members are altogether treated as importers. The five non-FTA member-states are used to gauge the efficiency effect on non-members. Table 5 in appendix presents this information. From Table 5, the principle of variable geometry has been operational as witnessed by the different dates at which the countries joined the FTA.

Export data used is aggregate bilateral annual exports drawn from the World Bank (WB)'s World Integrated Trade Solution (WITS) database. To estimate the stochastic frontier gravity model, several variables are employed. Table 1 provides a detailed exposition of the definitions and measurement of the covariates.

Summary statistics of the estimation variables are presented in Table 2. The statistics shows that bilateral annual exports averaged US$20.1 million during the period. In addition, bilateral annual exports ranged between 0 and US$1.7 billion. The value of zero trade indicates that there are countries within the block that are not trading or whose trade is very low. The distance between countries within the COMESA region averaged 3028 km with a minimum of 162 km and a maximum of 8679 km. The per capita GDP for the exporting COMESA countries averaged US$2427, with the lowest figure of US$99.7 and a maximum of US$17 253.5. This indicates that the COMESA region has heterogeneous countries ranging from poor, middle income, and rich countries.

The correlation matrix in Table 6 suggests the absence of issues pertaining to multicollinearity among the variables analysed in the study.

Empirical strategy

This study employs the stochastic frontier specification of the gravity model to examine the effects of the COMESA FTA on COMESA countries' export efficiency. This model has been used in several empirical studies (e.g., Abdullahi et al. 2022; Atif et al. 2019; Dadakas et al. 2020; Yao et al. 2021; Doan and Xing 2018; and Kaushal 2022). Generally, the stochastic frontier gravity model is given as follows.

$$X_{ijt} = f(Y_{it};\beta)exp^{(\varepsilon_{it}-\mu_{it})} \quad (1)$$

Table 1 Variable definition and measurement

Variables	Symbols	Measurement	Sources
Exports	X_{ijt}	Aggregated annual bilateral merchandise export value in current thousand US$	WITS (2023)
Exporter's per capita GDP	ln $GDPPC_{it}$	Log of annual exporter per capita income in current thousand US$	WB (2023)
Importer's per capita GDP	ln $GDPPC_{jt}$	Log of annual importer per capita income in current thousand US$	WB (2023)
Exporter's GDP	ln GDP_{it}	Log of annual exporter GDP at current thousand US$	WB (2023)
Importer's GDP	ln GDP_{jt}	Log of annual importer GDP at current thousand US$	WB (2023)
Distance	ln $Dist_{ij}$	Log of distance between the importer and the exporter	CEPII (2023)
Contiguity	$Border_{ij}$	Dummy: = 1, if the importer and exporter share a common border; = 0, if otherwise	CEPII (2023)
Language	$Lang_{ij}$	Dummy: = 1, if the exporter shares a common official language with the importer; = 0, if otherwise	CEPII (2023)
COMESA_FTA	$COMESA_{fta}$	Is a dummy variable for FTA membership, taking the value 1 if the country is a member of the COMESA FTA agreement and 0, if otherwise	Dummy variable
Regqual	$Regqual_{ij}$	Index measuring the strictness of the rules of origin	WB (2023)
Export Inefficiency	$Expeff_{ijt}$	The extent to which actual exports falls short of the potential exports	Authors' own calculation

CEPII Centre d'Études Prospectives et d'Informations Internationales, *COMESA* Common Market for Eastern and Southern Africa, *GDP* gross domestic product, *FTA* free trade agreement, *WITS* World Integrated Trade Solution, *WDI* World Development Indicators, *i* exporting country, *j* importing country, *t* time

Table 2 Summary statistics

Variable	Obs	Mean	Std. Dev	Min	Max
X_{ijt}	8525	20,128,709	92,349,489	0	1.704e+09
ln GDP_{it}	8525	2.813e+10	5.183e+10	3.511e+08	4.041e+11
ln GDP_{jt}	8525	2.812e+10	5.184e+10	3.511e+08	4.041e+11
ln $GDPPC_{it}$	8525	2427.858	3418.405	99.757	17,253.506
ln $GDPPC_{jt}$	8525	2446.625	3430.838	99.757	17,253.506
$Regqual_{ij}$	8525	29.184	19.983	0.481	86.058
$Dist_{ij}$	8525	3028.671	1688.491	162.18	8679
$Border_{ij}$	8525	0.094	0.292	0	1
$Lang_{ij}$	8525	0.537	0.499	0	1
$COMESA_{fta}$	8525	0.61	0.488	0	1

X_{ijt} are the bilateral exports between the selected COMESA countries in period t. Y_{it} is a vector of factors affecting bilateral exports in the presence of natural barriers. β represents the parameters being estimated. The error terms are denoted by ε_{it} and μ_{it}. μ_{it}, the non-negative error term, captures export inefficiency arising from

man-made resistances such as tariffs and non-tariff measures. ε_{it} is a white noise error term, assumed to follow a normal distribution with a mean of zero and variance of σ_{ε}^2. In line with Eq. 1, the export frontier will be estimated using the following export frontier specified in Eq. 2.

$$\ln X_{ijt} = \beta_0 + \beta_1 \ln gdp_{it} + \beta_2 \ln gdp_{jt} + \beta_3 \ln dist_{ij} + \varepsilon_{it} - \mu_{it} \tag{2}$$

where InX_{ijt} is the natural logarithm of bilateral export value between the exporting country i and the importing country j in period t. $\ln gdp_{it}$ and $\ln gdp_{jt}$ denotes the natural logarithm of gross domestic product for the exporting country and importing country in period t. $\ln dist_{ij}$ is the natural logarithms of the distance between two trading partners. The errors terms ε_{it} and μ_{it} are as defined above.

Drawing from the results of Eq. 2, export efficiency $\left(Expeff\right)$ can be calculated as in Eq. 3:

$$Expeff = \frac{\exp\left(\ln X_{ijt}\right)}{\exp\left((Y_{it};\beta) + \varepsilon_{it}\right)} = \frac{f(Y_{it};\beta)\exp\left(\varepsilon_{it} - \mu_{it}\right)}{f(Y_{it};\beta)\exp\left(\varepsilon_{it}\right)} = \exp\left(-\mu_{it}\right) \tag{3}$$

The variables presented in Eq. 3 are as defined in Eq. 2 except that $f(Y_{it};\beta)$ is a function of factors affecting exports. $\exp\left(-\mu_{it}\right)$ is the exponents of the one-sided error term. The variable definitions are as indicated in Eq. 1. Following Eq. 3, an export inefficiency model will be estimated using the specification in Eq. 4.

$$Expeff_{ijt} = \alpha_0 + \alpha_1 comesa_{fta} + \alpha_2 comesafta_{regqual} + \alpha_3 border_{ij} + \alpha_4 lang_{ij} + \alpha_5 regqual_{it} + \xi_{ijt} \tag{4}$$

Expeff represents export inefficiency, $comesa_{fta}$ is a dummy for the COMESA FTA and $comesafta_{regqual}$ is a multiplicative dummy of regulatory quality and participation in the COMESA FTA. $border_{ij}$ is a dummy variable for common border and takes the value of 1, if the trading partners share a common border, and 0, if otherwise. $lang_{ij}$ represents a dummy variable for a common official language. It is equal to 1, if the country uses the same common official language, and 0, if otherwise. *regqual* is a measure of regulatory quality of country i in period t. ξ_{ijt} is a white noise error term.

So far, the estimation approach explained is a two-step approach where the gravity model is estimated in the first step with the export efficiency measures estimated. This is then followed by regressing the efficiency measures on the suggested covariates. However, this approach has attracted several criticisms in literature. The two stage procedure is criticised for the lack of consistency in the assumption relating to the distribution of inefficiencies (Paul and Shankar 2018; Wang and Schimdt 2002). The inefficiencies obtained in the first step are assumed to be independently and identically distributed yet in the second stage the inefficiencies are related with covariates suggesting that they are not identically distributed (Battese and Coelli 1995). Thus, the one step approach, which deals with these problems is used in studies where the gravity model and the inefficiency model are simultaneously estimated. This study uses the Battese and Coelli (1995) random effects time variant inefficiency model.

Results and discussions

The aim of the study was to establish the export efficiency in COMESA and the effect of the COMESA FTA on export efficiency of selected COMESA countries. The section begins by the presentation of the mean export efficiency to mark the extent at which COMESA countries' bilateral exports are from their potential. This is then followed by the presentation of the results on the effects of the COMESA FTA on export efficiency.

The results in Table 3 shows that export efficiency averaged 8.2% between the period 1997–2021 with a minimum value of zero and a maximum of 68.8%. Separating for the period of COMESA FTA membership, the results indicates that export efficiency is very low, something that is worrisome for the region. This result is consistent with the concerns raised by COMESA (COMESA 2021) when it argued that COMESA countries are trading below their potential.

The baseline and the robustness-check model results of the one-step stochastic frontier gravity model are presented in Table 4. From the results presented in Column 1, the GDP of both the exporter and the importer leads to an increase in exports. For instance, a 1% increase in GDP of the exporter leads to a 1.02% increase in bilateral exports. Similarly, a 1% increase in GDP of the importer generates a 0.7% increase in exports. This is consistent with the findings by Dadakas et al. (2020) and Yao et al. (2021) who suggested that the GDP of origin and destination country improves bilateral trade. On the contrary, distance was found to have a negative effect on bilateral exports with a 1% increase in distance resulting in a 2.2% decrease in exports. These results are consistent with the findings by Kaushal (2022) who revealed that distance adversely affect bilateral trade. A robustness check was performed using per capita GDP variables in the stochastic frontier models. As in the baseline model, the results shows that both the GDP per capita for both the exporter and importer have a positive effect on bilateral exports.

The inefficiency model was estimated, and the results are also reported in Table 4. The variables used included border, language, regulatory quality, and the dummy variable for the COMESA FTA as indicated in Eq. 4. Having a common border and a common official language has a positive effect on efficiency. This suggests that countries that share a common border trade more with each other than those that do not. Similarly, those countries that have a common official language are likely to trade more than those without. Turning to the effect of the COMESA FTA, which is the main concern of the study, the results indicate that membership to the FTA result in an increase in bilateral exports. In other words, export inefficiency is reduced when countries become members of a regional grouping. This result validates the findings by Anderson and Yotov (2016) and Kaushal (2022) suggesting that regional trade agreements raise efficiency.

Table 3 Export efficiency in COMESA

$COMESA_{fta}$	N	Mean	SD	Min	Max
0	3327	0.088	0.149	0	0.683
1	5198	0.078	0.123	0	0.688
Total	8525	0.082	0.133	0	0.688

Table 4 Results of the stochastic frontier gravity model

Dependent variable ln(exports)	Baseline model			Robustness		
	1	2	3	4	5	6
Stochastic frontier						
ln GDP_{it}	1.024***	1.019***	0.953***			
	(0.035)	(0.035)	(0.033)			
ln GDP_{jt}	0.721***	0.719***	0.694***			
	(0.027)	(0.027)	(0.026)			
ln $Dist_{ij}$	− 2.17***	− 2.166***	− 2.018***	− 1.538***	− 1.545***	− 1.512***
	(0.078)	(0.077)	(0.072)	(0.078)	(0.077)	(0.076)
ln $GDPPC_{it}$				0.135***	0.151***	0.292***
				(0.045)	(0.045)	(0.043)
ln $GDPPC_{jt}$				0.291***	0.284***	0.228***
				(0.039)	(0.039)	(0.039)
Constant	− 6.326***	− 6.213***	− 5.256***	27.193***	27.165***	26.265***
	(0.932)	(0.93)	(0.899)	(0.631)	(0.629)	(0.612)
Inefficiency model						
$Border_{ij}$	− 15.98***	− 16.003***	− 17.701***	− 23.901***	− 23.942***	− 25.195***
	(1.131)	(1.132)	(1.249)	(1.364)	(1.372)	(1.479)
$Lang_{ij}$	− 2.803***	− 2.784***	− 3.639***	− 0.87***	− 0.84***	− 1.424***
	(0.268)	(0.269)	(0.294)	(0.269)	(0.27)	(0.279)
$COMESA_{fta}$	− 1.082***	− 0.272		− 2.047***	− 0.564	
	(0.262)	(0.428)		(0.27)	(0.457)	
$Regqual_{ij}$	− 0.162***	− 0.144***		− 0.143***	− 0.111***	
	(0.008)	(0.011)		(0.008)	(0.011)	
$COMESA_{fta*regqual}$		− 0.033**	− 0.12***		− 0.057***	− 0.123***
		(0.014)	(0.008)		(0.014)	(0.008)
Constant	10.64***	10.145***	7.338***	11.803***	10.865***	8.412***
	(0.308)	(0.378)	(0.316)	(0.36)	(0.443)	(0.343)
Observations	8525	8525	8525	8525	8525	8525
Chi^2	1610.002	1613.797	1731.785	425.152	428.708	426.136
Likelihood ratio	− 25,432.31	− 25,429.44	− 25,576.66	− 26,514.79	− 26,506.63	− 26,580.23

Standard errors are in parentheses

*** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.1$

Table 4 shows that regulatory quality reduces (increases) the level of export inefficiency (efficiency). For instance, a 1% increase in regulatory quality leads to a 0.16% reduction in inefficiency (see Column 1). The coefficient of regulatory quality is statistically significant at the 5% level. Examining the multiplicative effect of the COMESA FTA and regulatory quality, the study shows that when combined, the COMESA-FTA and regulatory quality has an export efficiency supporting effect. As countries are joining the COMESA FTA, they need also to improve on regulatory quality to tap the full benefits of the FTA. These results are consistent across all specifications.

Conclusion and recommendations for policy and future research

This study examined the effects of the COMESA FTA on bilateral export performance of the member-states. Firstly, the study determined the extent of export efficiency of the COMESA member-states. Secondly, the study examined the effect of the FTA on export efficiency. Finally, the intervening effect of regulatory quality was determined.

This study concludes that the aggregate level of efficiency among COMESA countries is very low, averaging 8%. This indicates that COMESA countries are trading below their potential with each other. It also reveals that the COMESA FTA fosters export efficiency of the member-states. Moreover, issues of governance, as measured by regulatory quality, are important for promoting trade between countries. Specifically, regulatory quality is an important factor in promoting trade between countries.

This study has some important policy recommendations regarding the COMESA FTA and export efficiency. COMESA member-states that are not yet members of the COMESA FTA should consider joining it to ensure that they increase their exports with other member-states to their full potential. In addition, COMESA member-states should make efforts to improve regulatory quality as this has a significant effect on export performance. In terms of future research endeavours, effort can be directed on assessing whether the transformation of COMESA into a CU in 2009 had an effect on export efficiency within the regional bloc, since a CU is a higher level of integration than a FTA.

Appendix

See Table 5 and 6.

Table 5 Countries covered in the study

Country	Membership year
COMESA FTA members	
Djibouti	2000
Egypt	2000
Kenya	2000
Madagascar	2000
Malawi	2000
Mauritius	2000
Sudan	2000
Zambia	2000
Zimbabwe	2000
Burundi	2004
Rwanda	2004
Comoros	2006
Libya	2006
Seychelles	2009
Uganda	2014
Tunisia	2019
COMESA non-FTA members	
Eritrea, Eswatini, Ethiopia, Democratic Republic of Congo, and Somalia	

Exporters (COMESA FTA members); importers (COMESA FTA members and non-members)

Table 6 Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) X_{ijt}	1.000										
(2) ln $Dist_{ij}$	−0.195	1.000									
(3) $Border_{ij}$	0.426	−0.386	1.000								
(4) $Lang_{ij}$	0.040	−0.214	0.138	1.000							
(5) $COMESA_{fta}$	0.042	−0.059	−0.027	−0.025	1.000						
(6) $Regqual_{ij}$	0.017	0.120	−0.134	0.186	0.035	1.000					
(7) ln GDP_{it}	0.216	0.200	0.082	−0.153	0.080	−0.033	1.000				
(8) ln $GDPPC_{it}$	0.074	0.288	−0.099	0.122	0.127	0.430	0.242	1.000			
(9) ln $GDPPC_{jt}$	0.067	0.294	−0.104	0.093	0.139	0.000	0.137	0.133	1.000		
(10) $COMESA_{fta*regqual}$	0.051	0.017	−0.073	0.095	0.687	0.621	0.060	0.297	0.087	1.000	
(11) ln GDP_{j}	0.181	0.166	0.101	−0.187	0.144	−0.077	0.070	0.114	0.179	0.050	1.000

Abbreviations

ASEAN	Association of Southeast Asian Nations
CEPII	Centre d'Études Prospectives et d'Informations Internationales
CIF	Cost, insurance and freight
COMESA	Common Market for Eastern and Southern Africa
CTH	Change in tariff heading
FTA	Free trade area
FTZ	Free trade zone
GDP	Gross domestic product
ITC	International Trade Centre
ROO	Rules of origin
WB	World Bank
WDI	World Development Indicators
WITS	World Integrated Trade Solution
WTO	World Trade Organization

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Conceptualization, SM and GM; methodology, SM.; validation, SM and GM; formal analysis, SM; resources, GM; data curation, SM; writing—original draft preparation, SM and GM; writing—review and editing, SM and GM; project administration, GM. All authors read and approved the final manuscript.

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Declarations

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Publisher's Note

Stein Masunda is a Lecturer at the Department of Agricultural Economics and Development (DAED) of the Faculty of Business Sciences (FBS), Midlands State University, Zimbabwe. He is also a Doctoral Candidate in the Faculty of Economic and Management Sciences (FEMS) at the North-West University, Potchefstroom Campus, South Africa. His research interest is on trade policy, export growth, trade dynamics and econometric modelling.

Gabriel Mhonyera is a Postdoctoral Research Fellow at the School of Public Management, Governance and Public Policy (SPMGPP) of the College of Business and Economics (CBE), University of Johannesburg, South Africa. Through the application of quantitative and qualitative research methods, his research interest focuses on: trade policy, export promotion, foreign direct investment, and regional trade and economic integration in Africa.