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Research Article

Trade Performance Between Somalia and Some Major Trading Partner Countries in East Africa-Panel Gravity Model

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Abstract

As an element of growth, foreign trade is important for all countries. As the barriers to foreign trade are removed, the openness of countries increases. Some of Somalia's important foreign trade partners are located in East Africa. The object of this study is to dissect the trade performance between Somalia and some major trading partner countries in East Africa for the period of 2010-2020 using panel gravity model. The study can be seen as a precursor since the studies on the subject are scarce and the content of the study is comprehensive. The empirical analyses reveal that Somalia's own gross domestic product (GDP) has no effect on Somalia's foreign trade with East African countries. On the other hand, the gross domestic product (GDP) of other East African Countries with which Somalia has foreign trade has a positive and significant effect on the foreign trade volume at the 99% confidence level. The population variables, it can be said that neither Somalia nor the populations of other partner countries have an effect on the trade volume. The DIST variable, which shows the distance between countries, was found to be significant in the 90% confidence interval.

Keywords: Foreign trade, Panel gravity Model, Somalia, East Africa

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1. Introduction

Foreign trade is one of the complementary elements of development and growth for an economy. It is very important to enter foreign markets to ensure sustainable development. In order to close the welfare gap between developed and developing countries, export-oriented policies started to be proposed and in the 1980s, all countries, with a few exceptions, tried to implement a growth strategy based on foreign trade. In addition, many empirical studies have shown that economies that are more open to foreign trade exhibit better growth performance.

This co-movement between foreign trade and growth has revealed that foreign trade has an important place in the development process of developing countries (Şengönül and Tuncer, 2004; 162).

As a result of this, a rapid increase has been observed in the number of Regional Trade Agreements and Bilateral Trade Agreements in recent years. Neoclassical and later developed endogenous growth theories argue that open economies will grow more easily and faster due to more efficient distribution of resources and externalities. Econometric analyzes also confirm this hypothesis for many developing countries.

The aim of this Study is to dissect the trade performance between Somalia and some major trading partner countries in East Africa for the period of 2010-2020 using panel gravity model. In the first part, Somalia's foreign trade with some major trading partner countries in East Africa is presented in general, in the second part, a review of the relevant existing literature discussing foreign trade gravity models is examined. In the third part, information about the

gravity model is given, the variables used in the study and the data, and the gravity model estimation for Somalia and East African countries is made. In the conclusion part, the estimation results of the model and suggestions are presented.

2. An Overview of Trade Between Somalia and Some Major Trading Partner Countries in East Africa

Somalia, which passed from the transitional government to the official federal government with the elections held on September 10, 2012, has officially started to implement reforms in all areas of the country, especially security, in order to find a peaceful environment that can provide internal development to improve the economy of the country and the standard of living of its citizens. The significant progress achieved in the field of security has resulted in the country opening up to the rest of the world, especially to resume trade with foreign countries.

Although there is no trade in favor of Somalia, East African countries, of which Somalia is also a part, are among the countries with the largest trade volume with Somalia after the Gulf Countries.

In the last 10 years when Somalia was the official federal government, foreign trade with the rest of the world, especially the East African governments, has been increasing.

Table 1. The volume of foreign trade between Somalia and some East African countries (2010-2020, USD)

Years	Kenya	Ethiopia	Tanzania	Uganda	Total Trade Volume
2010	164,952,090	1,394,819	86,06,157	3,720,461	17,867,3527
2011	148,265,240	4,077,023	1,144,642	5,136,750	158,623,655
2012	153,805,702	924,578	1,055,939	14,008,040	169,794,259
2013	173,455,749	2,133,115	585,987	7,795,527	183,970,378
2014	168,545,379	10,878,692	6,733,214	4,479,045	190,636,330
2015	15,491,5461	11,333,422	3,219,719	2,752,841	172,221,443
2016	177,261,752	8,817,815	388,597	3,463,884	189,932,048
2017	191,110,039	10,203,800	11,87,731	1,713,072	204,214,642
2018	157,442,218	6,455,695	746,762	15,05,976	166,150,651
2019	120,360,868	273,283,976	2,375,098	13,412,80	397,361,222
2020	107,428,492	294,853,371	1,574,719	7,52,151	404,608,733

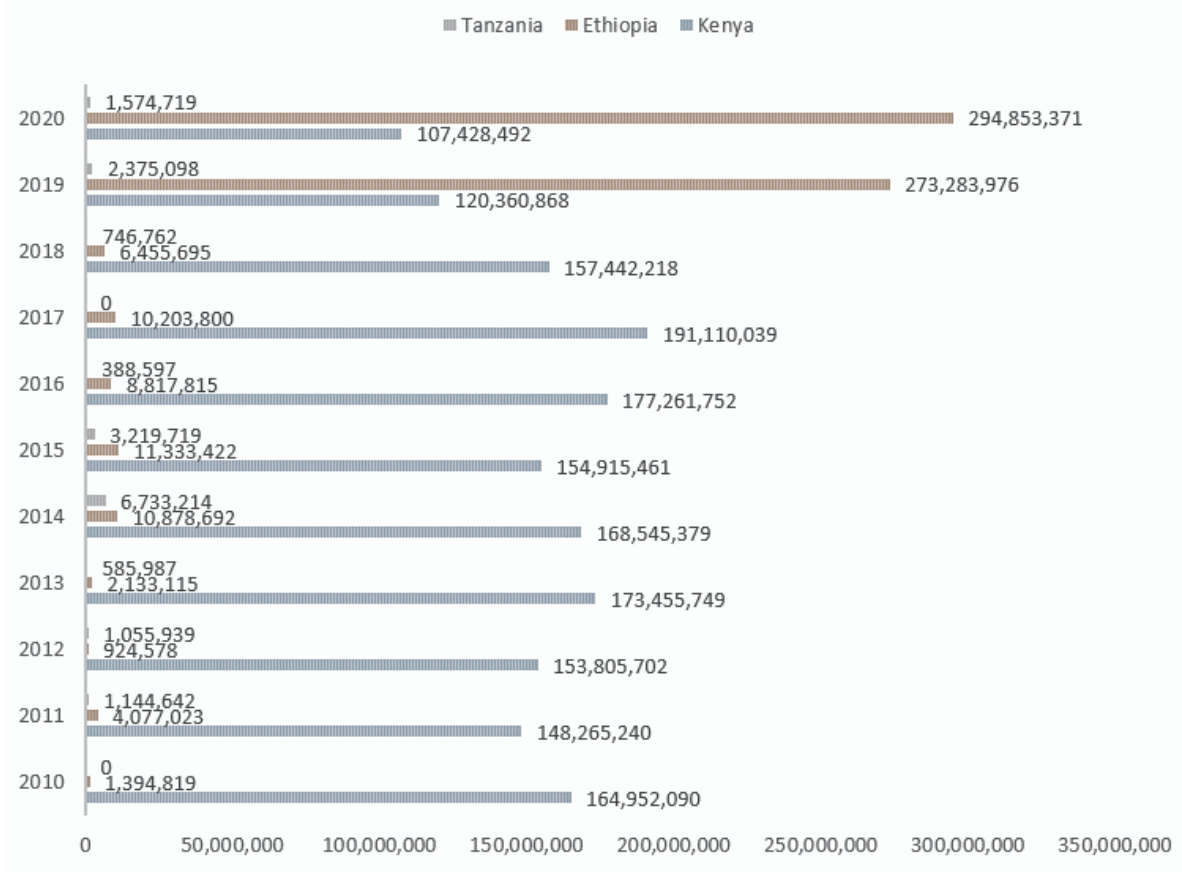
Source: World Bank, WITS, Trading economics

The table above shows the volume of trade between Somalia and four East African countries (Kenya, Ethiopia, Tanzania and Uganda) in the last 11 years.

In the last 11 years, trade between Somalia and these four countries has been on the rise, as can be seen from the above table, the trade volume was 17 million dollars in 2010 and 404 million dollars in 2020, showing an increase of 2276%.

In 2020, Ethiopia, with a trade volume of 294 million dollars, is the country with the largest trade volume with Somalia compared to other countries, followed by Kenya with a trade volume of 107 million dollars, Uganda is 7.5 million dollars and according to the countries in the study, the smallest trade volume with Somalia is Tanzania (with 1.5 million dollars).

Figure1. Somalia Foreign Trade Volume with Some East African Countries



Source: World Bank, WITS, Trading economics.

As you can see from the picture above, the volume of trade between Somalia and Ethiopia has increased significantly since 2018, while the volume of trade between Kenya and Somalia has decreased, due to the ban on khat from Kenya and Ethiopia's khat found a big market in Somalia. It should be said that these two states (Kenya and Ethiopia) export Khat to Somalia, and they collect millions of money from the Somali market every day.

3. Literature Review

A significant part of the gravity model literature consists of trade potential forecasting studies. The gravity model has been used successfully as an empirical tool in estimating the global trade potential for many countries.

Abdulaziz (2009) used two separate methodologies the export similarity index and the gravity model approach to evaluate Ethiopia's export potential to the Middle East. Saudi Arabia, the United Arab Emirates, Yemen, and Israel demonstrated the maximum potential of the combined results of the two tactics.

Alemayehu (2009) looked at the type of intra-African trade potential and, consequently, the chances of furthering regional economic union. His study made use of the panel data frame and the gravity model. A panel data set of African nations and their top trading partners from 2000 to 2006 was used to estimate the model. The potential for intra-African commerce was simulated using the predicted model coefficients. The results of his study indicated that there was room for intra-African commerce (weighted average of around 63% for Central and Western Africa and about 60% for Eastern and Southern Africa).

Hussein (2008) examined how Ethiopia's exports are affected by COMESA participation as well as other variables. The analysis accounts for the flow of exports made each year to twenty destinations between 1981 and 2006. In order to estimate the gravity model, he employed a Tobit specification with random effects. The findings of the estimation show that the majority of conventional factors are significant, but the influence of COMESA membership on export creation or diversion was insignificant. The latter result appears to support what Alemayehu and Haile (2007) discovered, namely that regional groups in Africa had little impact on the flow of bilateral commerce.

Matias (2010) calculated using a stochastic gravity model that included random disturbance and inefficiency components. The trade potential and efficiency of China with 52 African nations were then determined using the estimated model. As a result, just 13% of China's export potential to African nations has really been achieved. China's trade efficiency was lowest with Seychelles, Sao Tome & Principe, Comoros, Central African Republic, Chad, and Equatorial Guinea as partners (high export potential).

Mulugeta (2009) used a gravity technique to investigate the variables influencing Ethiopia's export and import flows. On the basis of a panel dataset of the biggest trading partners, estimation was done using a fixed effects model. Infrastructure, institutional traits, income, and distance variables were among the key determinants, the study found.

Yishak (2009) analyzed the supply and demand side factors that were responsible for the country's dismal export performance. Using an aggregate panel data with two stage least squares (random effects) model, it was found that supply-side factors such as domestic income, internal infrastructure, and institutional quality had a significant impact on Ethiopian exports. The demand-side factors of distance and foreign income were also statistically significant at standard levels.

Kalbasi (2001) investigated Iran's trade volume and direction in a sample of 76 countries. Countries are divided into two parts as developed and developing ones and it is investigated whether the level of development has any effect on the bilateral trade flow.

Christie (2002) estimated the trade volume between OECD countries and Southeast European countries by using the cross-sectional data for the period 1996-99 with the help of a classical gravity model estimated by the EKK method. The most important finding of the study is that there is a tripartite grouping in the region and the trade between countries is either very low or very high, therefore it has begun to lose its homogeneity in terms of international trade flows.

Rahman (2003) concludes that Bangladesh's foreign trade is positively affected by the economic size, per capita GNP and trade openness of the countries it trades with, negatively by the transportation costs, but not by the exchange rate.

Doğan and Tunç (2015), in their study of the trade between 53 African countries and Turkey for the period 1995-2014 using the gravity model with panel data, found that the neighborhood does not have a significant effect on foreign trade, and distance gradually loses its importance. Trade and visa application has an effect on foreign trade. They showed that the GDP of the trading country has a positive effect on trade.

Cernat (2001) assesses regional trade arrangement in South-South RTAs (AFTA, CARICOM, COMESA, ECOWAS, MERICOSUR and SADC) and establishes that contrary to the feared negative impacts they are not more trade diverting than other RTAs. Buigut (2012) estimates the trade effect of the EAC customs union on each individual member and concludes that the customs union has generated disproportionate impact of intra bloc exports and imports for individual members.

Robinson et al (1999) suggest that the impact depends on the export capacity of the partner country and whether the partner country faces constant costs. Panagariya (1998) argues that an RTA can be net trade-creating in one sector and net trade-diverting in another sector. What is common in these studies is that they analyse macro-economic, welfare and sectoral impacts and very limited analysis on trade creation and diversion.

4. Gravity Model Approach

4.1. Panel Data Analysis: Definition and Scope

Panel data analysis can be defined as a method for estimating economic relations using cross-section series with time dimension (ERK, 2015). The series showing the distribution of the changes in the values of the variables over a certain time period such as day, month and year are called time series data. The data taken by different variables in a single time period is called cross-sectional data. The main goal here is to include the dataset or dataset structure obtained by combining time series and cross section series. Therefore, it is to create a data set with both time and cross-sectional dimensions, which is called panel data analysis (BALTAGI, 2008).

4.2. Gravity Model

The gravity model was first applied to international trade in the early 1960s. The basis of the model is based on the Law of Universal Gravity developed by Newnto in the 17th century in the field of physics, and it takes its name from here. Newton's idea of gravity between objects started to be widely used not only in physics but also in social sciences with the 20th century.

The gravity model performed well in analyzing international trade flows in the early 1960s, but strong theoretical foundations were not produced until the late 1970s. This led to a lot of work to modify the original Newtonian equation of gravity. It has become clear from the work of Anderson (1979) and Bergstrand (1985, 1989) that the equation of gravity is a good representation, regardless of the structure of product markets. Bergstrand (1985, 1989) included population size, while Oguledo and Macphee (1994) included price variables.

Gravity model; It can be applied to explain trade, capital, investment and migration movements between countries and many other social factors. However, it is seen that it is used extensively in mutual trade flows. Tinbergen (1962: 263) defined the simple gravitational model that explains trade flows as "an endorsement relationship in which prices are not specified" and put forward a general logical basis. According to him, trade; It is determined by the supply potential (GDP of the exporting country), the demand potential (GDP of the importing country) and the transportation costs (distance). As an equation, the simple/standard gravity model can be expressed as:

$$\mathrm{Trade_{ij}} = \mathrm{A}\frac{\mathrm{GDP_i GDP_j}}{\mathrm{Dist}^2}$$

From the model, Trade_{ij} represents the value of trade between the two countries, i country 1 and j country 2. $\mathrm{GDP_i GDP_j}$ Represents GDP for countries 1 and 2, and this expression determines the economic size of the two countries. The expression $Dist^2$ represents the distance between two countries.

In this study the gravity model established to examine Somali's trade volume with some East African countries and estimated using the panel data method and annual data covering the period 2010-2020.

$$\mathrm{EX_{ijt}} = \beta_0 \frac{(\mathrm{GDP_{it}})*(\mathrm{GDP_{jt}})}{\mathrm{Dist_{ij}}} \varepsilon_{ijt} \quad (1)$$

In Equation 1, $\mathrm{EX_{ij}}$; foreign trade between i and j countries, $\mathrm{GDP_i}$; GDP of country i, $\mathrm{GDP_j}$; GDP of country j, Dist_{ij}; The distance between countries i and j and $\beta 0$ represent the constant term.

4.2.1. The Log Transformation of the Model

In panel gravity models, the Least Squares (LCS) technique, which is made by taking the natural logarithm of the data, is among the most used models when estimating, because it increases the suitability of the data set and reduces the variability of the variables used in the model. The basic gravity equation to be used in the model is as follows in log-linear form.

$$\mathrm{LogVOLUME_{ijt}} = \mathrm{Log}\beta_0 + a_1 \mathrm{logS\_GDP_{it}} + a_2 \mathrm{logP\_GDP_{Jt}} + a_3 \mathrm{logS\_POP_{it}} + a_4 \mathrm{logP\_POP_{Jt}} + a_5 \mathrm{logDist_{Ij}} + \log\varepsilon_{ijt} \quad (2)$$

In Equation 2, $\mathrm{VOLUME_{ijt}}$; Somali's trade volume with Some East African countries, $\mathrm{S\_GDP_{it}}$; Somali's GDP, $\mathrm{P\_GDP_{jt}}$; GDP$_s$ of Some East African countries, Dist_{ij} is the distance between the capital of Somalia and the capitals of Some East African countries and $\boldsymbol{\varepsilon_{ij}}$ Indicates the error term.

Table 2. Definition of Variables used in the Study

Variables	Definition of Variables
VOLUME	Somali's Foreign trade volume with Some East African countries.
S_GDP	Somalia's gross domestic product
P_GDP	Other partner countries.
S_POP	Population of Somalia
P_POP	Population of other partner countries

DIST	Distance between Somalia and partner countries
ε_{ij}	Indicates the error term.

5. Analysis Results

In the study, the foreign trade relationship between Somalia and East African countries was analyzed with panel gravity models. In this context, for the period 2010-2020

Due to the existence of the time-invariant distance variable in the established model, the panel data model could not be established as fixed-effect, and a random -effect panel data model was used.

In this direction, firstly, the stationarity of the series was investigated. Since the unit root test to be used in investigating the stationarity of the series differs depending on whether there is a cross-sectional dependence or not, the existence of a cross-section dependence was first tested in order to determine the appropriate unit root test.

Table 3. Cross Section Dependency Test

VOLUME	Coefficient	Std. Error	t statistic	p -value
S_GDP	-0.01	0.01	-0.46	0.65
P_GDP	0.00	0.00	6.42	0.00
S_POP	-29.16	16.94	-1.72	0.09
P_POP	-0.86	0.41	-2.13	0.03
DIST	3854.65	2432.93	1.58	0.11
still	27400000.00	170000000.00	1.61	0.11
R2 –	0.61			
Wald Test	59.55			0.00
Pesaran 2004 Cross Section Dependency Test	-1.43			0.15
Number of observations	44			
N	4			
T	11th			

Table null hypothesis that there is no cross-section dependency in the model was not rejected at the 95% confidence interval, and it was decided that there was no cross-section dependency in the model. Therefore, for the stationarity of the series, one of the first generation panel unit root tests, Im, Pesaran Shin 2003 Panel Unit Root Test was applied.

Table 4. Panel Unit Root Test

	Fixed		Steady- Trending	
	test statistic	p -value	test statistic	p -value
VOLUME	-2.54	0.01	-0.52	0.30
S_GDP	-5.34	0.00	-19.28	0.00
P_GDP	2.76	1.00	-6.49	0.00
S_POP	14.93	1.00	-0.13	0.45
D_S_POP	-0.31	0.38	-9.32	0.00
P_POP	19.78	1.00	-1.79	0.04

Table , it can be said that the series excluding the population of Somalia are stationary, and the population of Somalia is integrated at the first level. For this reason, the random effect model was estimated by taking the first order difference of this variable (D_S_POP).

Table 5. Model Results

VOLUME	Standard Model		Driscoll Kraay Standard Error	
	Coefficient	p -value	Coefficient	p -value
S_GDP	-0.0032	0.95	-0.00315	0.95
P_GDP	0.00464	0.00	0.00464	0.00
D_S_POP	-896.51	0.45	-896.51	0.37
P_POP	-0.85	0.05	-0.85	0.37
DIST	4801.10	0.07	4801.10	0.10
still	187000000	0.34	187000000	0.17
R2 –	0.62		0.62	
Wald Test	54.40	0.00	1546.17	0.00
Lr Test	95.96	0.00		
Wooldridge Test	78.97	0.00		
Pesaran 2004 Cross Section Dependency Test	-1.07	0.28		

Table the standard and corrected model results. First, the classical standard error model was established and appropriate tests were carried out for the model. In this context, it was tested with the LR Test whether there was varying variance in the model and it was decided that there was a problem with varying variance in the model. Afterwards, whether there is an autocorrelation problem in the model was tested with the Wooldridge Test and it was decided that there was an autocorrelation problem in the model. Finally, the cross-section dependency problem in the model was tested with the Pesaran 2004 Cross-section Dependency Test and it was concluded that there was no cross-section dependency in the model. For this reason, Driscoll has been used to solve the variance and autocorrelation problems in the model. The model was re-estimated using Kraay Standard Errors.

According to the adjusted model results, Somalia's own gross domestic product has no effect on Somalia's foreign trade with East African countries. On the other hand, the gross domestic product of other East African Countries with which Somalia has foreign trade has a positive and significant effect on the foreign trade volume at the 99% confidence level. Accordingly, it can be said that a one-unit increase in the gross domestic product of other partner countries will increase the foreign trade volume by 0.00464 units.

Considering the population variables, it can be said that neither Somalia nor the populations of other partner countries have an effect on the trade volume. The DIST variable, which shows the distance between countries, was found to be significant in the 90% confidence interval. However, the coefficient of this variable was estimated as positive, not in accordance with the expectations. In other words, one unit increase in the distance between countries causes an increase of 4801.10 units in the foreign trade volume.

6. Conclusion and Recommendations

Foreign trade is one of the complementary elements of development and growth for an economy. It is very important to enter foreign markets in order to industrialize and ensure sustainable development. The highlights of the empirical results of the Gravity Model study can be summarized as follows:

- ✓ Somalia's own gross domestic product has no effect on Somalia's foreign trade with East African countries.
- ✓ The gross domestic product of other East African Countries with which Somalia has a positive and significant effect on the foreign trade volume at the 99% confidence level. Accordingly, it can be said that a one-unit increase in the gross domestic product of other partner countries will increase the foreign trade volume by 0.00464 units.
- ✓ Considering the population variables, it can be said that neither Somalia nor the populations of other partner countries have an effect on the trade volume.
- ✓ The DIST variable, which shows the distance between countries, was found to be significant in the 90% confidence interval. In other words, one unit increase in the distance between countries causes an increase of 4801.10 units in the foreign trade volume.

The results of the research show that Somalia's foreign trade with East African countries does not have an impact on the country's economic growth, and the reason is that Somalia exports very little to East African countries while it imports a lot from those countries, which means that Somalia has a foreign trade deficit with these countries.

Therefore, in order to reduce the trade deficit between Somalia and these countries, the Somali government should increase its domestic production and at the same time strengthen its trade relations with East African countries to increase the services and goods exported to these countries. It may also make sense for Somalia to directly participate in the East African community to which it is a candidate so that its products and services can find markets, but if this is not done and integrated into community Somalia's trade deficit between these countries will continue to widen.

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