International Journal of Business and Economics Research
2022; 11(3): 180-186
http://www.sciencepublishinggroup.com/j/ijber
doi: 10.11648/j.ijber.20221103.20
ISSN: 2328-7543 (Print); ISSN: 2328-756X (Online)

Evaluating Trade Creation and Trade Diversion Effects Between Egypt and COMESA: Evidence from Gravity Model

Mosaad Mohamed Ismail Elgayish, Ahmed Abdelmaksoud Abdelaziz Ali*

Economics Department, Faculty of Politics & Economics, Beni-Suef University, Beni-Suef, Egypt

Email address:

mossad2000@eps.bsu.edu.eg (M. M. I. Elgayish), ahmed.abdelmaksoud@eps.bsu.edu.eg (A. A. A. Ali)

*Corresponding author

To cite this article:

Mosaad Mohamed Ismail Elgayish, Ahmed Abdelmaksoud Abdelaziz Ali. Evaluating Trade Creation and Trade Diversion Effects Between Egypt and COMESA: Evidence from Gravity Model. *International Journal of Business and Economics Research*. Vol. 11, No. 3, 2022, pp. 180-186. doi: 10.11648/j.ijber.20221103.20

Received: June 3, 2022; **Accepted**: June 22, 2022; **Published**: June 29, 2022

Abstract: Egypt has been an active participant in COMESA since its inception. Egypt's trade flows with the members of COMESA have grown steadily since the agreement entered into force. This paper investigates the impact of the COMESA free trade agreement on Egypt's trade flows, focusing mainly on trade creation and trade diversion effects. Present paper employed the augmented gravity model to examine whether the COMESA agreement has created or diverted trade. The model is estimated with panel data for a sample of 52 countries that are COMESA's members and Egypt's main trading partners, spanning a 25-year period from 1994 to 2018 covering the period pre and post the agreement's implementation. The Poisson pseudo-maximum likelihood has been used to estimate the model to address zero trade flows and the presence of heteroscedasticity. To produce unbiased and consistent results, the omitted variables are addressed by controlling for time-variant multilateral resistance factors and unobserved time-invariant country characteristics. The findings show the formation of COMESA has resulted in trade creation between Egypt and members of COMESA. However, there is no evidence that the formation of COMESA has resulted in trade diversion. The results also show that, the conventional gravity model variables (GDPs, geographical distance, official common language, and being the importing country landlocked) are the major determinants of Egypt's trade flows. Based on the foregoing, in order to boost Egypt's trade flows with the COMESA to meet untapped potential, RTA schemes should address issues that impede intra-COMESA trade by improving diverse production, multi-country infrastructure, and policy coordination.

Keywords: Trade Creation, Trade Diversion, COMESA, Gravity Model, Panel Data, PPML

1. Introduction

Regional trade agreements (RTAs) have grown dramatically in the past two decades. Nearly every country in the world belongs to some form of trade bloc, and such agreements account for a considerable portion of global trade. From 1948 to 2000, there were just 97 notifications of RTAs in force, but there were an additional 223 notifications throughout 2000 to 2010. At the moment, this figure stands at 577 RTAs. Furthermore, there are 354 trade agreements in force. The ultimate goal of any country that has signed a RTA is to promote trade in order to generate employment, investment, and increase productive capacity in their own economies. There are several phases of RTAs, including preferential trade agreements (PTA), free trade area (FTA), customs union, common market, and monetary union. They all, however, have one main objective: lowering trade barriers among member-states. At their most basic level, they simply eliminate tariffs on intra-bloc trade in commodities, but many go farther to eliminate nontariff barriers and expand trade and investment liberalization. At their core level, they have the goal of economic union, which entails the development of unified economic policies [1]. The Economic Commission for Africa (ECA) has stated that regional integration will enable the further diversification of Africa's economies and stimulate their industrialization [2]. African leaders have also realized the importance of regional integration as a way for Africa to overcome its economic vulnerabilities. In 1991, African leaders signed the Abuja

Treaty, which encapsulates those ideas and affords a broad foundation for the process of economic integration in Africa. Most of Africa's current regional agreements have arisen out of that treaty, and the Common Market for Eastern and Southern Africa (COMESA) is the most important of those agreements [3].

Prior to evolving into its present form in 1994, COMESA was formed as a PTA in 1981. The COMESA agreement brings together 21 Member States from the Eastern and Southern African, Central African, and North African sub-regions in order to promote regional integration via trade and the exploitation of human and natural resources for the common good of all residents in the area. These sub-regions' trade liberalization objectives envisioned a transition from a PTA to a FTA and customs union, and then to a common market [4]. The sub-regions, in particular, planned to construct a customs union, which was agreed to be established in June 2009. This will allow all intra-COMESA trade tariffs to be abolished, as well as the adoption of a uniform external tariff and rule of origin. However, member countries have not been able to put in place the required procedures for the transition of the FTA to a custom union. In light of the regional and spatial connection, Egypt joined the COMESA Agreement in 1998, and the agreement went into effect in 1999 where Customs exemptions are applied on the basis of the principle of reciprocity of goods accompanied by the COMESA certificate of origin. With respect to tariff reductions, in the year 2000, thirteen countries -including Egypt- achieved a tariff reduction of 100 percent on imports. This thirteen countries FTA has resulted not only in the elimination of customs duties among its members, but also the easing of numerous quantitative restraints and non-tariff barriers. Other COMESA members apply varying degrees of reductions on a reciprocal basis. All Egyptian exports are duty-free in the FTA nations. With the exception of Sudan, Mauritius, and Kenya, which have a negative list of some Egyptian exported products [5].

Egypt has been an active participant in COMESA since its inception. Egypt's trade flows with the members of COMESA have grown steadily since the agreement entered into force. However, there is a lot of untapped potential to boost Egyptian exports to COMESA, evidenced by the fact that the value of untapped export potential to those countries is approximately $1.8 billion. In this context, it is necessary to assess the impact of the COMESA agreement on Egypt's trade flows. Any evaluation of the trade implications of FTAs has always been associated by the notions of trade creation and trade diversion effects. Thus, the main objective of the paper is to investigate the impact of the COMESA FTA on Egypt's trade flows, focusing mainly on trade creation and trade diversion effects. The paper employed the augmented gravity model as a useful tool to examine whether the COMESA agreement has created or diverted trade.

Accordingly, the remainder of the paper is structured as follows. Section II outlines the theoretical and empirical literature related to the case in point. Section III explains the theoretical foundations of the gravity model and estimation methodology. Finally, section IIII outlines the empirical results and discussion.

2. Literature Review

International trade theories explain countries' motivations for economic integration. In the classical trade theory, Ricardo maintains that specialisation based on the comparative advantage increases a country's potential revenue (welfare). The Heckscher-Ohlin (H-O) theory, on the other side, explains international trade in terms of a country's resource endowments, or the relative amounts of capital and labor related to production. As a result, countries with a large labor supply will shift output to labor-intensive production, exporting these items while importing capital-intensive ones, and vice versa [6]. It is widely recognized that RTA enhance intra-trade among their members. According to the literature, trade barrier reductions in an RTA tend to improve wellbeing. The RTA provides more access to larger markets and lower-cost suppliers, resulting in greater economies of scale. Furthermore, greater competition in the RTA encourages companies to be more efficient at providing customers. But along with increased trade agreements, there was an increase in discussions concerning the impact of these agreements on partner countries and other countries. The seminal work of Jacob Viner [7] provides the theoretical ground for such an assessment. Since trade agreements require no tariffs on intra-member trade, but since each country maintains its own tariffs in its dealings with other countries, Viner stated that the influence of FTA on the well-being of partner countries is equivocal. As a result, because an FTA is a combination of liberalization and protectionism, it is not always favorable. Such agreements have both the effects of trade creation and trade diversion. Trade creation, which occurs as a result of reduced tariffs and non-tariff barriers, allows more costly domestic output to be replaced with less expensive production in partner countries, leading to a rise in welfare, which strives to facilitate prosperity and, as a result, a rise in consumer surplus. In contrast, if the partner country's production replaces less costly imports from elsewhere, there is a trade diversion. Hence, prosperity is precarious in this instance. As a result, regional integration is only beneficial to prosperity if trade creation surpasses trade diversion.

Empirical evidence assessing these impacts is extremely noteworthy as theoretical evidence indicates that RTAs could be advantageous or harmful depending on the effects of trade creation and trade diversion. Several papers do not assess the welfare effects of RTAs owing to a lack of data. Instead, they do estimate variations in the patterns of trade as a result of RTAs in different ways. Ex post studies evaluate trade flows following the RTA is enforced and simply compare trade levels to an estimated level of trade in the absence of the RTA. Ex ante studies employ patterns of trade and estimated elasticities or general equilibrium models prior to the agreement to determine the projected effect of removing trade impediments with a partner country. Both approaches, however, have already been criticized. a common approach

of projecting trade flows is to use the gravity model to estimate bilateral trade based on the distance between trading partners, their economies' size, and other variables. RTA dummy variables are then used to assess the agreement's impact on trade [8].

Following Tinbergen's fundamental work [9] the gravity model has been widely applied in the empirical literature on examining both the determinants of trade flows among countries and the influence of RTAs on trade flows. Tinbergen used the gravity model to examine trade flows of 42 countries. He demonstrated that trade flows are positively proportional to the two countries' economic mass as measured by GDP and negatively proportional to the distance between them.

Frankel [10] investigated the impact of regional economic communities (RECs) (European Union, ASEAN, Mercosur, Australia-New Zealand) on trade flows. He demonstrates that various trading blocs have a significant influence on trade flows. ASEAN and the Australia-New Zealand Agreement enable member states to increase trade by five times or more. Unexpectedly, given the greater extent of intra-European Union trade in the 1960s and 1970s, the results also demonstrated that the bulk of this trade is explained by other variables than that of the European Community until 1980. He observed a strong increasing tendency in Mercosur's bloc impact. During the period 1965–1975, this regional bloc had no significant impact. Following that, Mercosur members traded seven times as much as they would have done otherwise.

In empirical literature related to the case in point there are opposing viewpoints on trade creation and trade diversion. Yeats [11] used a new empirical technique to assess production efficiency in shifting the patterns of trade. It demonstrates that the fastest-growing products in Mercosur's intra-trade are products in which members lack a comparative advantage and have not demonstrated strong export competitiveness in external markets. Mercosur's discriminatory tariffs against non-members appear to be the main source of these trade changes. And hence, this implies that the agreement resulted in trade diversion. . Geda & Taye [12] examined the opportunities and constraints of African RECs, as well as the determinants of bilateral trade flows. The results demonstrated that the standard gravity model variables adequately explain bilateral trade flows among regional blocs, but the regional integration dummy has an insignificant negative effect, indicating that African RECs (particularly COMESA) fail to enhance intra-regional trade. Edris [13] sought to identify the key factors behind Africa's poor intra-regional trade and the influence of RECs in fostering intra-regional trade, focusing mainly on four African RECs (COMESA, ECOWAS, IGAD, and SADC). The results demonstrated that the conventional gravity model variables adequately explain bilateral trade flows among regional blocs, but the effect of the RECs on trade flows is varied; SADC and ECOWAS have resulted in an increase in intra-trade; COMESA has an implausibly negative effect, implying that intra-trade has not been stimulated; and IGAD has a positive and insignificant effect. indicating that it has had no influence on intra-regional trade.

Selim & Haman [14] examined the effects of trade creation and diversion in the ECCAS Community for the period 2007–2016. The findings suggest that variables such as GDP, population, geographical distance, political stability, and control of corruption are important in determining bilateral trade flows. More crucially, the study indicates that the ECCAS region has not experienced the effects of trade creation or trade diversion. As a result, the ECCAS FTA did not result in increased intra-regional trade or increased trade with non-member states. Nonetheless, the RECs of CEMAC, COMESA, and EAC have resulted in trade creation throughout the aforementioned period. Jacob [15] investigated the effect of the COMESA agreement on Kenyan exports. The empirical findings indicate that the COMESA has a trade-creation effect and there was no evidence of trade diversion. The results also demonstrated that the conventional gravity model variables are important in determining Kenya’s export flows. Henry & Wilfred [16] sought to investigate the determinants of Uganda’s exports using panel data for the period spanning from 1980 to 2012. The findings demonstrated that the formation of COMESA was found to have a significantly positive influence on Uganda’s exports. Furthermore, the conventional gravity model variables were found to be major determinants of Uganda’s exports. To draw essential lessons for the African Continental Free Trade Area (AFCFTA) Woubet & Pegdéwendé [17] assessed the effects of trade creation and diversion of each of the eight RECs recognized by the African Union. The findings showed that the majority of African RECs resulted in more trade creation than trade diversion. Based on these findings, the AFCFTA's success will be determined by its capacity to overcome the barriers to trade creation throughout the continent. Furthermore As a result of FTAs, the communities of EAC and SADC have been particularly successful in not just boosting trade among members but also in increasing exports to the rest of the world. This is crucial for the success of other RECs as well as the AFCFTA. Since trade within RECs and with the rest of the world should be viewed as complimentary rather than substitutable.

The present paper is affiliated with those papers concerning the analysis of trade creation and trade diversion, but present paper differs from the previous ones in several ways; first, in terms of scope, this paper concerned trade creation and trade diversion between Egypt and COMESA members for a sample of 52 countries that are COMESA's members and Egypt's main trading partners, spanning a 25-year period from 1994 to 2018, covering the period pre and post the agreement's implementation. Second, this paper employed a gravity model by incorporating two dummy variables in order to capture the effects of trade creation and trade diversion following the paper of Christopher Magee [8]. Finally, with regard to estimation technique, as recommended by Silva & Tenreyro [18] the Poisson pseudo-maximum likelihood (PPML) estimation method has been

used to estimate the model to address zero trade flows and the presence of heteroscedasticity.

3. Methodology and Data Framework

3.1. The Gravity Model

The gravity model is widely used in examining international trade patterns. It originally came from Newton's law of universal gravitation. Tinbergen [9] was the first to use the gravity equation in the field of international trade, modelling bilateral flows as positively proportional to the trading partners' economic size as measured by their GDPs and negatively proportional to the distance between them. He conducted the first econometric analysis of trade flows relying on the gravity model, for which only intuitive evidence was provided. Following these contributions, various attempts have been made to establish a theoretical basis for the gravity model by demonstrating that the gravity equation can be derived from a variety of international trade models [19-23]. In its basic form, the gravity model can be formulated as follows:

$$T_{iJ} = \beta_0 \frac{y_i^{\beta_1} y_j^{\beta_2}}{D_{ij}^{\beta_3}} \quad (1)$$

Taking logarithm of equation (1)

$$\text{Log } T_{ij} = \log\beta_0 + \beta_1 \log y_i + \beta_2 \log y_j - \beta_3 \log D_{ij} + \varepsilon_{ij} \quad (2)$$

Where T_{ij} represents bilateral trade flows between countries i and j, y_i and y_j represents economic size of countries i and j as measured by GDPs, and D_{ij} represents the geographical distance between countries i and j. It is common to extend the basic gravity model by including other variables that are assumed to explain the influence of various macroeconomic variables, geographical and cultural factors, and policy issues on trade flows. The equation (2) can therefore be rewritten as follows:

$$\text{Log } T_{ij} = \log \beta_0 + \beta_1 \log y_i + \beta_2 \log y_j - \beta_3 \log D_{ij} + \alpha_5 \delta_{ij} + \varepsilon_{ij} \quad (3)$$

where: δij is a vector for other factors affecting trade flows.

The gravity model has long been the most widely applied approach for estimating the impacts of RTAs. A variety of ways have been proposed to capture the integration effects. The paper follows the paper of Christopher Magee [8] by including two RTA dummy variables that indicate trade creation and diversion effects in terms of export and import. The equation (3) can therefore be rewritten as follows:

$$\text{Log } T_{ijt} = \log \beta_0 + \beta_1 \text{ Log } Y_{it} + \beta_2 \text{ Log } Y_{jt} - \beta_3 \text{ Log } D_{ij} + \beta_4 \text{ Language}_{jt} + \beta_5 \text{ Landlocked}_j + \beta_6 \text{ COMESA } 1_{ijt} + \beta_7 \text{ COMESA } 2_{ijt} + \varepsilon_{ijt} \quad (4)$$

According to Anderson & Van Wincoop [23] multilateral resistance factors must be considered in empirical studies to avoid biased estimates. Since each country trades with several countries across the world, and the prices for its exports fluctuate yearly and depend on the circumstances of all other trading partners, unobserved heterogeneity and any unobserved time-variant factors should be controlled for. If these specific factors are not taken into consideration, the estimations will be severely biased. In this context, the paper specified the model taking into consideration those factors by incorporating both country-fixed effects and year fixed effects to address the bias caused by time-variant factors and unobserved time-invariant factors across countries. Thus, for the purpose of the paper, the gravity model is specified as follows:

$$\text{Log } T_{ijt} = \alpha_{ij} + \alpha_t + \log \beta_0 + \beta_1 \text{ Log } Y_{it} + \beta_2 \text{ Log } Y_{jt} - \beta_3 \text{ Log } D_{ij} + \beta_4 \text{ Language}_{jt} + \beta_5 \text{ Landlocked }_j + \beta_6 \text{ COMESA } 1_{ijt} + \beta_7 \text{ COMESA } 2_{ijt} + \varepsilon_{ijt} \quad (5)$$

Where: j: 1, 2,…, 52 (Egypt's trading partners), i: Egypt, T: 1994, 1995,…, 2018 is the period under consideration. T_{ijt}: is the value of the Egyptian trade flows with trading partner j in year t. Y_{it} and Y_{jt}: are the exporting and importing countries GDPs at current prices in year t, the estimated coefficients for Yi and Y_j are expected to be positive. D_{ij}: The geographical distance between Egypt and trading partner j measured in miles, which capture the transportation costs. Therefore, distance was expected to have a negative effect on trade flows. Language $_{ij}$: A dummy variable that captures the language effects, which takes 1 if the country j shares an official common language with Egypt and 0 otherwise. Landlocked $_j$: A dummy variable that represents whether the importing country is landlocked. It takes 1 if the country j is landlocked and 0 otherwise. COMESA 1_{ijt}: A dummy variable that represents the trade between Egypt and the members of COMESA. Thus, it takes 1 if both countries (importer and exporter) belong to the COMESA agreement in year t, and 0 otherwise. The positive coefficient of COMESA 1_{ijt} indicates that the RTA has enhanced intra-trade between Egypt and other member states, thus there is evidence of trade creation. COMESA 2_{ijt}: A dummy variable that represents the trade between Egypt and the non-members of COMESA. Thus, it takes 1 if one country belongs to the COMESA agreement in year t, and 0 otherwise. The negative coefficient of COMESA 2_{ijt} indicates that trade between Egypt and non-members of COMESA decreased following integration, thus, the trade diversion effect is confirmed. α_{ij} The fixed effects incorporates any unobserved country characteristics that affect trade flows but is time-invariant over the period under consideration. α_t The fixed effects for each year incorporate the time trend in trade as well as any shocks to international trade flows in that year. β_0 constant. μ_{ijt}: error term.

3.2. Data Framework

The paper used panel data for a sample of 52 countries that

are COMESA's members and Egypt's main trading partners, spanning a 25-year period from 1994 to 2018, covering the period pre and post the agreement's implementation. The data for the bilateral trade flows were obtained from the world integrated trade solution (WITS), and the GDP data were obtained from the World Bank. The Centre d'études prospective et d'informations internationals (CEPII) was used to obtain the data on geographical distance, common language, landlocked, and RTA. The descriptive statistics of the variables are provided in table 1.

Table 1. *Summary of descriptive statistics.*

Variables	Mean	Std. Dev	Minimum	Maximum	Observations
Trade flows	397142.8	874915.8	0	1.17E+07	2600
Exporter GDP	11.05994	0.766624	8.504048	13.31412	2600
Importer GDP	11.05994	0.766624	8.504048	13.31412	2600
Distance	3.461714	0.32053	2.693945	4.15471	2600
Language $_{ij}$	0.269231	0.443645	0	1	2600
Landlocked	0.067308	0.250602	0	1	2600
COMESA 1_{ijt}	0.234615	0.42384	0	1	2600
COMESA 2_{ijt}	0.553077	0.497271	0	1	2600

Source: Authors' calculations using Stata 16.

4. Empirical Results

4.1. Estimation Procedures

The gravity model was initially estimated using the OLS method in several papers. However, the technique has been widely criticized. Silva & Tenreyro [18] indicates several problems with using OLS to estimate the gravity model. First, in the presence of heteroscedasticity, the gravity model estimation using the OLS method based on log-linearized form will result in severely biased estimates. Second, Zero trade flows are another problem that commonly emerges in gravity model estimates. such observations are dropped from the OLS model. As a result the present paper employed the PPML estimation method, as recommended by Silva & Tenreyro [18]. The PPML offers a variety of distinct advantages when it comes to estimate the gravity model. For instance, it can deal with different patterns of heteroscedasticity. Second, the Poisson estimator can naturally include zero trade values. Third, the PPML enables us to include fixed effects in the same way as ordinary OLS. The point is especially significant in gravity modelling since most theory-consistent models demand the inclusion of fixed effects for the exporter and importer. Thus, employing the PPML to estimate the gravity mode is widely justified in the literature [18].

4.2. Diagnostic Tests

The panel data includes both cross-sectional and time series data, so it will be nonstationary if the time series are nonstationary. As a result, before estimating the model, the panel unit root test has been implemented to determine whether the variables are potentially cointegrated [24]. There is a wide range of panel unit root tests. The paper conducted a Levin, Lin, and Chu (LLC) test that assumes that the autoregressive parameters are common across cross sections and uses the null hypothesis that the panels contain unit roots. The findings of the LLC test are shown in Table 2, which indicates that all variables are stationary. The variance inflation factor (VIF) has been performed to check multicollinearity. A VIF value of 5 to 10 indicates that the independent variables are highly correlated [25]. Table 3 exhibits the results of VIF, which indicates that the explanatory variables are not highly correlated.

Table 2. *The results of panel Unit root tests.*

Variables	At level			
	With time trend		Without time trend	
	t. statistics	P.value	t. statistics	P.value
Trade flows	-7.0331	0.9787	-23.5672	0.0000
Log-Exporter GDP	-8.6719	0.0001	-22.5946	0.4001
Log-Importer GDP	-8.6719	0.0001	-22.5946	0.4001

Source: Authors' calculations using Stata 16.

Table 3. *The results of VIF.*

Variables	VIF	1/VIF
Exporter GDP	1.4	0.715249
Importer GDP	1.67	0.600287
Distance	1.45	0.690809
Language $_{ij}$	1.46	0.686298
Landlocked	1.45	0.690872
COMESA 1_{ijt}	1.76	0.567195
COMESA 2_{ijt}	1.97	0.507865

Source: Authors' calculations using Stata 16.

4.3. Estimation Results and Discussion

The ultimate objective of the paper is to investigate trade creation and trade diversion effects between Egypt and COMESA during the period 1994-2018. Table 4 are summarized the main results of the gravity model estimation using PPML.

In general, the gravity model indicates that trade flow is positively proportional to the economic size of the trading partners as expressed in their GDPs and negatively proportional to the distance between these countries. In other words, it is projected that larger country pairs will trade more. And the greater the distance between countries, the less likely they are to trade, owing to the increasing transportation costs associated with distance.

Table 4. *Gravity model estimates using PPML.*

Variable	Model 1	Model 2	Model 3
Exporter GDP	2.103872 (0.0367302)***	2.204233 (0.04612) ***	1.302475 (0.1044451) ***
Importer GDP	1.261669 (0.0327947) ***	1.349709 (0.041921) ***	1.965733 (0.1482661) ***
Distance	-1.87452 (0.0736381) ***	-1.62777 (0.079728) ***	
Language $_{ij}$		0.747177 (0.063234) ***	
Landlocked		-1.08004 (0.109629) ***	
COMESA 1_{ijt}		0.01406 (0.087346)	0.900527 (0.3831912) **
COMESA 2_{ijt}		0.058202 (0.050491)	0.313811 (0.2505159)
Constant	-19.1241 (0.5876629) ***	-22.3767 (0.811826) ***	-24.3879 (2.382758) ***
Obs.	2600	2600	2600
R-Sq	0.791	0.816	0.944
Cross-section dummies	No	No	Yes
Time dummies	No	No	Yes

Source: Authors' calculations using Stata 16.
Standard errors in parentheses. ***, **, *: denote statistical significance at 1%, 5%, and 10%, respectively.

In model 1, our estimation follows equation (2) the variables used in the estimations are those used in classic gravity model estimations. The signs and significance of the traditional gravity model explanatory variables are consistent with the theoretical assumptions. Both the exporter's and importer's GDP had a significantly positive effect on trade flows at the 1% level of significance. 1% increase in exporter GDP and importer GDP will result in 2.16% and 1.12% increase in Egypt's trade flows to trading partner j respectively. On the other side, geographical distance had a significantly negative effect on trade flows at the 1% level of significance. 1% increase in geographical distance between Egypt and importing country will result in 1.87% decrease in Egypt's trade flows to trading partner j.

In model 2, our estimation follows equation (4). After demonstrating the applicability of the basic gravity model in explaining trade flows, the paper augmented the model by incorporating the variables of trade creation and trade diversion effects as well as other variables that are related to trade cost, particularly official common language, and whether the importing country is landlocked. In that case the estimated coefficients of the exporter's and importer's GDP, and geographical distance are almost unchanged relative to their estimated in the basic gravity model. Consistent with theoretical assumptions, The impact of the official common language on trade flows was observed to be positive and statistically significant at the 1% level. Hence, having a common official language enhances bilateral trade between Egypt and its trading partners.

The effect of the geographical disadvantage of the importer on trade flows was observed to be negative and statistically significant at the 1% level. Indicating that the landlocked importing country will hinder Egypt's trade flows to that country. The estimated coefficients of COMESA 1_{ijt} and COMESA 2_{ijt} exert a positive but not statistically significant. These inconsistent results could be attributable to uncontrolled for the time-variant factors and unobserved time-invariant country characteristics.

In model 3, our estimation follows equation (5). It is worth noting that the incorporating of the country fixed effects comes at the expense of being unable to estimate the effect of time-invariant variables like distance, common language, and being landlocked. Finally, model 3 represents the estimates considering the time-variant factors and unobserved time-invariant country characteristics. Thus the estimates of model 3 provide unbiased results for COMESA 1_{ijt} and COMESA 2_{ijt}. Now, the estimated coefficients of COMESA 1_{ijt} is positive and statistically significant at the 5% level, which indicates that the formation of COMESA has resulted in trade creation between Egypt and COMESA members. The magnitude of the coefficient of COMESA 1 is equal to 0.90, indicating that the average treatment effect between Egypt and members of COMESA is 146% $\{(\exp^{0.90}-1)*100\}$higher than expected trade flows from normal levels. The dummy of COMESA 2ijt that represent bilateral trade flows between Egypt and non-members of COMESA exert a positive but not statistically significant, indicating that there is no evidence that the formation of COMESA has resulted in trade diversion. In other words, the formation of COMESA did not result in a decrease in trade flows between Egypt and other non-COMESA countries.

5. Conclusion

The paper investigates the impact of the COMESA free trade agreement on Egypt's trade flows, focusing mainly on trade creation and trade diversion effects. The paper employed the augmented gravity model to examine whether the COMESA agreement has created or diverted trade. The model is estimated with panel data for a sample of 52 countries that are COMESA's members and Egypt's main trading partners, spanning a 25-year period from 1994 to 2018 covering the period pre and post the agreement's implementation. The PPML has been used to address zero trade flows and the presence of heteroscedasticity. To produce unbiased and consistent results, we addressed the omitted variables by controlling for time-variant multilateral resistance factors and unobserved time-invariant country characteristics. According to the result the formation of COMESA has resulted in trade creation between Egypt and members of COMESA. On other hand, there is no evidence that the formation of COMESA has resulted in trade diversion. In other words, the formation of COMESA did not result in a decrease in trade flows between Egypt and other

non-COMESA countries. This results in line with what was advocated in the studies of [17, 14].

The results also show that, the conventional gravity model variables (GDPs, geographical distance, official common language, and landlocked) are the major determinants of Egypt's trade flows. The impact of both the exporter's GDP (production capacity) and the importer's GDP (absorption capacity) on trade flows was observed to be positive and highly statistically significant. This results are consistent with the theoretical assumptions of the gravity model. On the other hand, the geographical distance and being the importing country landlocked had a negative and highly statistically significant impact on Egypt's trade flows implying that the geographical barriers in conjunction with the lack of infrastructure is the main hindrances to Egypt's trade flows with COMESA. Finally the official common language had a positive and highly statistically significant impact on bilateral trade between Egypt and its trading partners. Hence the absence of a shared language constitutes a linguistic barrier which can imped trade flows.

Based on the foregoing, in order to boost Egyptian trade flows with the COMESA to meet untapped potential, RTA schemes should address issues that impede intra-COMESA trade by improving diverse production, multi-country infrastructure, and policy coordination that promotes integration and fosters intra-COMESA trade.

Finally, Although the paper's objectives were met, the results can be enhanced further. The lack of data for some countries hampered our ability to use a large data set consisting of country pair data. Thus, these data limitations necessitate further study with a longer period of time and a broader cross-sections to validate the robustness of our results and improve their generalization.

References

[1] World Bank. (2000). Trade Blocs. New York: Oxford University Press.

[2] Economic Commission for Africa. (2001). Transforming Africa's Economies. Addis Ababa Ethiopia: Economic Commission for Africa.

[3] Ncube, M., Faye, I., & Chouchane, A. V. (2015). Regional Integration and Trade in Africa. African Development Bank.

[4] COMESA. (2018). COMESA in Brief "Growing Together, for Prosperity". Lusaka, ZAMBIA: COMESA.

[5] Afifi., T. M. (2007). The Challenge of Implementing the Overlapping Regional Trade Agreements in Egypt. Doctoral Thesis. Friedrich-Alexander-Universität Erlangen-Nürnberg, 31-36-37.

[6] Jeyarajah, S. (2019). A Survey of the Evolution of International Trade Theories. IOSR Journal of Economics and Finance, 10, 67.

[7] Viner, J. (1950). The Customs Union Issues. New York: Oxford University Press.

[8] Magee, C. (2008). New measures of trade creation and trade diversion. Journal of International Economics, 75, 349-362.

[9] Tinbergen, J. (1962). Shaping the World Economy: Suggestions for an International Economic Policy. The Twentieth Century Fund.

[10] Frankel, J. (1997). Regional Trade Blocs in the World Economic System. The institute for international economics.

[11] Yeats, A. (1998). Does Mercosur's Trade Performance Raise Concerns about the Effects of Regional Trade Arrangements? The World Bank Economic Review, 12, 1-28.

[12] Geda, A., & Taye, H. K. (2008). Regional Economic Integration in Africa: A Review of Problems and Prospects with a Case Study of COMESA. Journal of African Economies, 17, 357-394.

[13] Seid, E. H. (2013). Regional Integration and Trade in Africa: Augmented Gravity Model Approach. The Horn Economic and Social Policy Institute. Working Paper No. 13/3.

[14] nançli, S., & Addi, H. M. (2019). Trade Creation and Trade Diversion Effects in the Economic Community in Central African States. African Development Review, 31, 307-317.

[15] Musila, J. W. (2004). The common market for Eastern and Southern Africa and Kenya's export trade. International Journal of Social Economics, 31, 67-77.

[16] Karukuza, H. T. (2015). Determinants of Uganda's Export Performance; A Gravity Model Approach. International Journal of Business and Economics Research.

[17] Kassa, W., & Sawadogo, P. N. (2021). Trade Creation and Trade Diversion in African RECs: Drawing Lessons for AFCFTA. World Bank Policy Research Working Paper No: 9761.

[18] Silva, S., & Tenreyro, S. (2006). The Log of Gravity. The Review of Economics and Statistics, 653.

[19] Anderson, J. (1979). A Theoretical Foundation for Gravity Equation. The American Economic Review, 69, 106.

[20] Bergstrand, J. (1985). The gravity equation in international trade: some microeconomic foundations and empirical evidence. The Review of Economics and Statistics, 67, 474.

[21] Bergstrand, J. (1989). The Generalized Gravity Equation, Monopolistic Competition, and the Factor Proportions Theory in International Trade. The Review of Economics and Statistics, 71, 152.

[22] McCallum, J. (1995). National Borders Matter: Canada-U.S. Regional Trade Patterns. The American Economic Review.

[23] Anderson, J., & Van Wincoop, E. (2003). Gravity With Gravitas: A Solution to the Border Puzzle. American Economic Review, 93, 170-192.

[24] Beenstock, M., & Felsenstein, D. (2019). The Econometric Analysis of Non-Stationary Spatial Panel Data. Advances in Spatial Science. Springer.

[25] Shrestha, N. (2020). Detecting Multicollinearity in Regression Analysis. American Journal of Applied Mathematics and Statistics, 8, 39, 40.