Analyzing the trade creation and diversion impacts of regional trade agreements in Africa

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Abstract

Regional trade agreements (RTAs) have been expanding globally, and Africa is no exception. RTAs are considered a crucial strategy for transforming Africa's fragmented small economies. As a result, of numerous multilateral trade agreements in different regions of Africa. This study explores the trade creation and trade diversion effects associated with regional trade agreements (RTAs) in Africa. By employing gravity models, it analyzes trade data from 42 African countries across 11 RTAs, utilizing an updated bilateral trade dataset developed from the IMF's Direction of Trade Statistics. The research evaluates the impact of RTAs on trade between member countries by comparing parameter estimates from different models and applying ordinary least squares (OLS) regression techniques. The results reveal that the establishment of these RTAs. It utilizes gravity models to analyze trade data from 42 African countries and 11 RTAs, building A revised bilateral trade dataset compiled using the IMF's Direction of Trade Statistics. The study compares and analyzes parameter estimates from various models that assess the impact of RTAs on partner trade, using ordinary least squares (OLS) regression. Findings from the research show that even though the formation of these RTAs has contributed to increased trade in the African region, trade among the different agreements remains relatively low.

Keywords: Regional trade agreements, Trade creation, Trade diversion, Gravity equations, JEL Classification: C23, F14

Introduction

Regional trade agreements (RTAs) have become a key component in the global trading systems, and Africa cannot afford to be left out. These agreements offer African countries the opportunity

to fasten the growth of their small, fragmented economies. Through esxpansion of their markets and creating a broader economic space, RTAs enable the African nations to harness economies of scale in production and trade, ultimately enhancing their national welfare. In terms of the economy, RTAs foster increased competition in international trade while facilitating access to foreign technology, investment, and ideas. Recognizing these benefits, majority of African leaders have prioritized RTAs as a pathway to sustainable development and a step toward forming a continental economic community, as envisioned in the Treaty which Established the African Economic Community (AEC) in 1991 together with the Constitutive Act of the African Union in 2000.

Despite the potential advantages, Africa has not experienced the same level of trade growth from regional integration as other regions. Over the past three decades, the share of Africa in global trade has deteriorated significantly, it declined from approximately 6% to about 3 percent of global imports and exports according to UNECA (2008). This trend highlights Africa's growing marginalization in global trade. The situation is even more disturbing when examining intra-African trade, which, according to the African Union, constitutes only about 13%, compared to 30% in ASEAN countries (African Union, 2012). By contrast, intra-regional trade in Europe and North America is significantly higher, at approximately 60% and 40%, respectively. This disparity has negatively impacted Africa's economic growth and development. African exports remain heavily dependent on external markets, shaped by historical ties to other regions. More than 80% of these exports are sent beyond the continent, with the European Union and the United States making up the majority (over 50%) of this trade.

As noted above, African leaders have consistently acknowledged the importance of fostering stronger regional integration to address the continent's fragmentation, which has limited its ability to fully benefit from economies of scale and constituted a major constraint to its economic development. Ndulo (1992) explains that Africa's economic integration was a key focus of significant policy frameworks such as the 1980 Lagos Plan of Action, the 1986 Special United Nations Session on Africa, and various other high-level declarations and reports addressing African development strategies. This focus led to the final adoption of the Abuja Treaty in 1991. Notice must be taken of the fact that, the 1980 Plan of Action in Lagos, together with the 1986 United Nations' Special Session on Africa, along with several other significant declarations and reports focused on Africa's development strategies ultimately led to the formal adoption of the Abuja Treaty in 1991 which received widespread support among member states.

The Abuja Treaty laid the foundation for the creation of the proposed African Economic Community (AEC) to promote the economic, social, and cultural integration of Africa. Article 4(2) of the treaty outlines various measures for achieving these objectives. These include trade liberalization by eliminating all non-tariff barriers that exist among the member states to establish a free

trade area, easing and eventually removing qualitative and administrative restrictions, progressing toward a unified trade policy, and gradually eliminating obstacles to the free movement of people, goods, services, and capital, as well as the right to residence and establishment across member states.

The Abuja Treaty designates sub-regional economic communities, which are themselves regional trade agreements (RTAs), as the foundational pillars for the envisioned African free trade area. Currently, the African continent hosts several operational RTAs recognized by the World Trade Organization (WTO), including: Southern African Customs Union (SACU), Southern African Development Community (SADC), West African Economic and Monetary Union (WAEMU), Economic and Monetary Community of Central Africa (CEMAC), Economic Community of West African States (ECOWAS), Common Market for Eastern and Southern Africa (COMESA), East African Community (EAC). Additionally, there are other RTAs that, while operational, have not been notified to the WTO: Arab Maghreb Union (UMA), The Mano River Union (MRU), the Central African Economic Community (ECCAS), and the Community of Countries around the Great Lakes (CEPGL). These RTAs are anticipated to undergo restructuring, policy harmonization, and coordinated programs to align with the objectives and priorities outlined in the African Economic Community (AEC) Treaty.

The Summit of the African Economic Community (AEC) of June 1997 in Harare approved the agreement governing the relationship between the African Economic Community (AEC) and the numerous Regional Trade Agreements (RTAs). As outlined by Mulat (1998), this protocol aims to enhance the effectiveness of RTAs and harmonize their operations, facilitating progress towards full regional integration under the AEC framework. To achieve the integration goals outlined in the protocol, a shift in theoretical and policy approaches is necessary to redefine how RTAs are conceptualized and executed across Africa. This paper seeks to explore, using empirical evidence, the extent to which RTAs contribute to trade creation and diversion within the continent.

Empirical research on regionalism and economic integration in Africa remains limited and shows slow progress, with most findings indicating a low level of trade among the regions. Intra-regional trade levels are often analyzed using gravity models, which are commonly utilized to estimate potential trade flows between countries. These models typically consider factors such as the economic size of countries and the geographic distance between them. Analyzing real trade flows against model predictions helps identify the potential trade increases that could result from trade agreements. However, as noted earlier, studies examining the effects of Regional Trade Agreements (RTAs) in Africa are relatively scarce. The majority of current studies utilize gravity models for analyzing trade in Sub-Saharan Africa (SSA).

Notable among the studies include the study on intra- Sub Sahara African trade by Foroutan and Pritchett (1993), Chauvin and

Gaulier (2002) examined trade within the Southern African Development Community (SADC), while Coulibaly (2007) analyzed regional trade agreements (RTAs) in developing regions, including ECOWAS and SADC, covering the period from 1960 to 1999. These studies indicate that although intra-African trade is still relatively small, it corresponds with anticipated outcomes based on economic and structural factors, suggesting that the trade potential of an intra-African regional agreement might be constrained. Coulibaly also found that both ECOWAS and SADC had a positive effect on intra-regional trade among their members during the study period. However, for ECOWAS, the positive influence on members' imports from outside the region suggesting no trade diversion decreased over time. As a result, Coulibaly concluded that the overall impact of ECOWAS was ambiguous.

Several studies have employed gravity models to explore the impact of regional trade agreements (RTAs) on trade. For instance, Kanda (2010), IMF (2010), Afesorgbor and van Bergeijk (2011), and Albert (2012) generally concluded that RTAs promote trade, albeit to varying extents. However, the IMF study found no significant improvement in trade within the MENA region.

Jean-Jacques (2007) utilized a Computable General Equilibrium (CGE) model to examine the impact the Free Trade Area (FTA) formulated by the Southern African Development Community (SADC) has on Madagascar. His findings indicated limited trade impacts within SADC but highlighted a notable increase in trade with South Africa, coupled with trade diversion involving third countries. The study suggested that addressing rigidities affecting factor utilization could enhance the benefits of SADC integration. However, it posited that substantial gains would likely occur only if regional trade liberalization were accompanied by multilateral liberalization, which could mitigate trade diversion costs and extend benefits to all of Madagascar's trade. Wacziarg (2001), however, it was noted that the simulation results served as benchmark estimates only and excluded potential dynamic gains, such as increased policy credibility and infrastructure improvements. Similarly, Khandelwal (2004) emphasized the importance of addressing infrastructure constraints, and protocols signed in 2006 between Madagascar and South Africa aimed to promote investment and develop infrastructure in the region.

Kalaba and Tsedu (2008) utilized statistical techniques to evaluate the performance of intra-SADC trade following the implementation of the Trade Protocol during the period from 2000 to 2006. Their study, which examined intra-SADC export shares and compared them to other regional groups, showed that while total exports grew during this period, intra-SADC trade remained relatively low. The SADC region underperformed compared to other regional blocs, with trade diversion outweighing trade creation. Furthermore, over two-thirds of the region's trade was routed through South Africa.

Mzukisi (2014) assessed regional integration efforts in Africa, noting persistent challenges that have hindered significant economic and

social development. Unlike other regions that have leveraged integration for economic welfare gains, Africa continues to face low GDP growth, limited per capita income, minimal capital inflows, and poor living standards. Structural weaknesses, ineffective implementation of agreements, and economic disparities among member states have further impeded progress. The study underscored the need for stronger coordination and stakeholder commitment and aimed to empirically analyze the effects of trade diversion and creation arising from RTAs in Africa.

Evaluating regional integration in Africa, Mzukisi (2014) acknowledges that Africa's efforts toward regional integration have faced numerous challenges, with limited tangible results in economic and social development. Unlike other regions that have leveraged integration to boost economic welfare, Africa continues to struggle with low GDP growth, insufficient per capita income, minimal capital inflows, and subpar living standards. These issues persist despite the numerous policy frameworks and visionary plans designed to enhance integration. Structural weaknesses, ineffective implementation of agreements, and disparities in economic performance among member states have often hampered progress, underscoring the need for stronger coordination and commitment among stakeholders. This study aims to empirically examine the effects of regional trade agreements that exist in Africa, specifically investigating their influence on trade diversion and trade creation.

The gravity model has been used not only in examining bilateral trade between generalized groups of nations, but also in examining the trade creation and trade diversion effects in particular regions and within particular trading blocs. Carrillo and Li (2002), Koo, Kennedy, and Skipnitchenko (2006), Hilbun, Kennedy, and Dufour (2006).

In this paper gravity equations are used to examine the trade creation/diversion effects of RTAs in Africa. The Gravity Model has been used since the early 1960's to describe bilateral trade flows between nations. Tinbergen (1962) and Pöyhönen (1963) were among the pioneers in applying the Gravity Model to analyze trade patterns. In his study, Tinbergen (1962) proposed a specific relationship to describe trade flows.

$$X_{ij} = A\frac{Y_i^{\alpha}Y_j^{\beta}}{D_{ij}^{\gamma}} \text{ ---------- (1)}$$

whereX_{ij}denotes the total trade volume between country i and country j , Y_i and Y_j represent the GDP of country i and country j respectively D_{ij} signifies the geographic distance between the two countries. Tinbergen highlights that a direct proportional relationship between the predictor variable and the predicted variable is not necessarily assumed. The coefficients α\alphaα, β\betaβ, and γ\gammaγ may take values other than one. These coefficients reflect the elasticity of the GDP of the exporting country (α), the elasticity of the GDP of the importing country (β), and the elasticity associated with the distance between the two trading countries (γ), respectively.

We adapt Tinbergen's equation from (1) and apply a logarithmic transformation, resulting in the following expression:

$$logX_{ijt} = \beta_t + \beta_1 logY_{it}\beta_2 logY_{jt} + \beta_3 logD_{ij} + \varepsilon_{ijt} \quad (2)$$

where, X_{ijt} represent the trade flows originating from country i to j during year t, Y_{it} and Y_{jt} correspond to the annual GDP of countries i and j respectively, and D_{ij} indicates the geographical distance between the two nations, $\beta_0, \beta_1, \beta_2 \; and \; \beta_3$ are unspecified parameters also included, and ε_{ijt} represents a stochastic error term capturing multiplicative disruptions.

Next, we incorporate gravity model covariates that are theorized to affect bilateral trade, leading to our initial estimation equation:

$$log\, X_{ijt} = \beta_t + \beta_1\, log\, Y_{it} + \beta_2\, log\, Y_{jt} + \beta_3\, log\, D_{ij} + \beta_4\, log\, P\, OP_{it} + \beta_5\, log\, P\, OP_{jt} + +\beta_6 Lang_{ij} + \beta_7 Contiguity_{ij} + \beta_8 LL_i + \beta_9 LL_j + \varepsilon_{ijt} \quad (3)$$

where, β_t denotes a detailed set of fixed effects for each year. The variable $Lang_{ij}$ represents a binary indicator that equals 1 if the trading countries i and j speak the same language and 0 if they do not $POP_{it}(POP_{jt})$ denotes the population of the exporting country i and the importing country j in year t.; $Contiguity_{ij}$ is a binary indicator that equals 1 if i and j share a common border and 0 if otherwise; $LL_i(LL_j)$ is also a binary variable equals to 1 if either of the trading countries i or j is landlocked and 0 if neither is. All other variables retain their definitions as provided in Equation (2).

Next, we add the RTA and INTRA-RTA variables to investigate the effect of creating RTAs on trade, thus, our fourth equation (second estimation) is:

$$log\, X_{ijt} = \beta_t + \beta_1\, log\, Y_{it} + \beta_2\, log\, Y_{jt} + \beta_3\, log\, D_{ij} + \beta_4\, log\, P\, OP_{it} + \beta_5\, log\, P\, OP_{jt} + \beta_6 Lang_{ij} + \beta_7 Contiguity_{ij} + \beta_8 LL_i + \beta_9 LL_j + \beta_{10} RTA_{ij} + \beta_{11} INTRA - RTA_{ij} + \varepsilon_{ijt} \quad (4)$$

Where: RTA_{ij} is a dummy variable that equals one if countries i and j belong to the same trade agreement in year t, and zero if they do not. $INTRA - RTA_{ij}$ is also a binary variable that is assigned the value of one if the trading countries i and j, belong to the same trade agreement in year t, and zero if otherwise.

There can be other explanatory variables in the Gravity Model that capture positive benefits from mutual RTA membership (Trade Creation), and potential negative benefits from one party a member of an RTA and the other party not a member (Trade Diversion). Therefore, we now add to equation (3) regional trade agreement variables, first we collapse the standard gravity variables

($\beta_t, Y_{it},$ common language, population size, distance, landlocked countries, contiguity) into ***Xβ,*** to obtain our fifth (third estimation) equation as follows:

$$log\, X_{ijt} = \beta + \beta_1 AMU + \beta_2 ECOWAS + \beta_3 WAEMU + \beta_4 MRU + \beta_5 CEMAC + \beta_6 ECCAS + \beta_7 CEPGL + \beta_8 EAC + \beta_9 SACU + \beta_{10} SADC + \beta_{11} COMESA + \varepsilon_{ijt} \quad (5)$$

From our equation (5), all the RTAs under consideration are represented.

Data Collection Sources and Methods

This study compiles a revised bilateral trade dataset using data obtained from the Direction of Trade Statistics (DOTS, 2016). It includes commodity trade values for the period 1993-2015, focusing on total trade data for goods rather than sector-level or tariff-based details. Consequently, the analysis

examines overall trade flow changes without delving into sectoral variations, as this is outside the scope of the research.

To evaluate the impact of Regional Trade Agreements (RTAs), a dataset covering all bilateral and regional RTAs in force among African countries was created. Dummy variables were assigned to each country-pair annually, with a value of 1 indicating the presence of an RTA and 0 otherwise. Additionally, other factors hypothesized to influence trade were included as control variables. These controls, aimed at isolating the impact of RTAs, include variables such as economic size (measured by GDP), population, the geographical distance between trade partners, shared borders, common language, and other structural factors that are independent of RTA membership.

The data on Gross Domestic Product (GDP) in Unites States dollars and population figures were obtained from the World Bank's World Development Indicators. Variables for the standard gravity equation—such as distance, shared borders, whether they speak common language, and their landlocked status—were sourced from the geo-distance dataset by the Centre d'Études Prospectives et d'Informations Internationales (CEPII). The analysis encompassed eleven regional trade agreements (RTAs), with details regarding their initiation dates and member countries over time presented in Table I.

Table I: Regional Trade Agreements Analyzed, Dates of Implementation, and Membership Changes Over Time.

NAME OF RTA	ACRONYM/YEAR	MEMBERSHIP
Central African Monetary and Economic Community	CEMAC (1964/1998)	Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, Gabon
Common Market for Eastern and Southern Africa	COMESA (1981/1994)	Angola, Burundi, Comoros, Democratic Republic of Congo, Egypt, Djibouti, Eritrea, Kenya, Madagascar, Ethiopia, Malawi, Mauritius, Namibia, Rwanda, Sudan, Eswatini, Uganda, Zambia, Seychelles, and Zimbabwe.
The Economic Community of West African States	ECOWAS (1976)	Togo, Ghana, Niger, Senegal, Sierra Leone, Guinea, Burkina Faso, Côte d'Ivoire, Liberia, Mauritania, The Gambia, Mali, Guinea-Bissau, Benin, Nigeria, Cape Verde.
Southern African Development Community	SADC (1980/1992)	Botswana, Angola. Lesotho, Seychelles, Zimbabwe, Mozambique, Mauritius, Namibia, Tanzania, Zambia, Malawi, Eswatini, Democratic Republic of the Congo, South Africa
West African Economic and Monetary Union	WAEMU (1972/1994)	Niger, Benin, Mali, Burkina Faso, Senegal, Cóte d`Ivoire, Mauritania

 https://doi.org/10.59568/IJEBM-2024-1-1-14

Arab Maghreb Union	AMU (1989)	Algeria, Libya, Mauritania, Morocco, Tunisia
Mano River Union	MRU (1973)	Guinea, Liberia, Sierra Leone
The Economic Community of Central African States	ECCAS (1983)	Burundi, Cameroon, Central African Republic, Chad, Democratic Republic of Congo, the Republic of Congo, the Equatorial Guinea, Gabon, Rwanda, Angola and Sao Tome and Principe
East African Community	EAC (1999)	Kenya, Uganda, Tanzania
Economic Community of the Great Lakes Countries	CEPGL (1976)	Rwanda, Burundi, Dem. Rep. of Congo
Southern African Customs Union	SACU (1969)	Lesotho, Namibia, South Africa, Botswana, Swaziland

Source: Compilation by the Authors

Method of Data Analysis

Linear equations are often preferred in analysis due to their simplicity and the ease of application of ordinary least squares (OLS) estimation. The gravity model, given its multiplicative formulation expresses the relationship between variables as a product of their respective factors., we transformed the variables in equation (1) by taking their natural logarithms. This conversion simplifies the equation into a log-linear form, making it suitable for estimation using the OLS regression technique, which is typically less complex than non-linear methods. The resulting model is presented in equation (2).

To enhance the model, we introduced several dummy variables in equation (3) to account for factors hypothesized to influence trade, such as trade costs (distance, adjacency, landlocked status, shared language, etc.). A random effects approach was employed to estimate these models. The gravity model framework was employed to analyze trade diversion using an ex-post assessment of trade flows. The results demonstrated that a positive and statistically significant coefficient for intraregional trade agreements (RTAs) suggests the presence of trade creation, whereas a negative and significant coefficient for trade with countries outside the RTA indicates trade diversion.

In our analysis, instances of zero trade values were considered to be randomly distributed, potentially arising from missing data or rounding inaccuracies. Since these zeros do not provide meaningful information, they were excluded from the sample to streamline the analysis. Observations with zero trade were truncated to ensure a more accurate estimation process. The parameter estimates from various models, which quantify the impact of RTAs on trade between partners, were compared using the OLS method. All computations and statistical analysis were performed using Stata 10 software.

Results of the Analysis

Table II presents the econometric findings derived from the first estimation equation (3). The results indicate that larger countries engage in more trade on average, as evidenced by the GDP coefficients. For

 https://doi.org/10.59568/IJEBM-2024-1-1-14

instance, the coefficient for the GDP of the importing country is 0.6771832, suggesting that a 1% increase in GDP leads to a 0.677% rise in imports. Similarly, the coefficient for the GDP of the exporting country is 0.6591014, implying that a 1% GDP growth results in a 0.659% increase in exports. This is consistent with the notion that countries with larger economies tend to have greater production and consumption capacities, enhancing their ability to export and import.

Distance acts as a barrier to trade, as shown by its negative coefficient (-2.866638). This indicates that as the geographical distance between trading partners increases, trade activity decreases. The reduced trade is attributed to higher transportation costs and limited business knowledge about distant markets. Distance acts as a measure of trade resistance, while a shared common language promotes bilateral trade, as reflected in the positive coefficient (0.6168449) for the common language variable. A shared language facilitates communication, reduces cultural barriers, and enhances implicit knowledge, thereby encouraging trade between countries.

Population size does not have a uniform impact on trade. While the coefficients for importer and exporter populations (0.372327 and -2.27348, respectively) suggest a mixed effect, a larger population generally stimulates trade by driving higher demand. However, the results imply that this effect may not be significant in all cases.

Contiguity, or sharing a common border, positively influences trade, as reflected in its coefficient (0.7835115). Neighboring countries benefit from reduced transportation barriers and logistical challenges, making trade easier and more frequent. On the other hand, landlocked countries face significant trade disadvantages. The negative coefficient (-1.841731) for landlocked exporter countries highlights the challenges they encounter, such as limited access to international markets and higher transportation and insurance costs. Landlocked countries face higher average trade costs around 9% more compared to maritime nations and typically export considerably less per capita than their coastal counterparts (Faye et al., 2004).

Table 1I: Empirical Results for the Gravity Model Equation 3

Variable	Estimate	S.E.	z-value	p-value
$lg\ d\ p_i$	.6771832	.2453104	2.76	0.006
$lg\ d\ p_j$	.6591014	.2519469	2.62	0.009
$ldist_{it}$	-2.866638	.8516467	-3.37	0.001
$lpop_i$	.372327	.369421	1.01	0.314
$lpop_j$	-2.27348	1.506835	-1.51	0.131
$contig_{ij}$	.7835115	2.250342	0.35	0.728
$comlag_{ij}$	.6168449	1.420644	0.43	0.664
ll_j	-1.841731	1.082118	-1.70	0.089

 https://doi.org/10.59568/IJEBM-2024-1-1-14 Website: https://ijebm.kiu.ac.ug

R^2	**0.4148**
Number of obs	**474**
sigma_u	**1.9666486**
sigma_e	**1.525849**

Source: Authors' computation using Stata 10

Effects of RTA and INTRA-RTA Trade in Africa

Table III shows the results of equation (4). Formation of Regional Trade Agreements in Africa does not boost trade. However, there is increase in intra-regional trade. The results in Table II indicate that formation of RTAs reduces trade by: $(e^{-3885794} - 1)100$ or -32.2%, whereas the establishment of Regional Trade Agreements (RTAs) has led to a 51.32% rise in trade within the respective regions (intra-regional trade).

Table 1II: Empirical Results for the Gravity Model Equation 4

Variable	Estimate	S.E.	z-value	p-value
$lgdp_i$	.6771832	.2453104	2.76	0.006
$lgdp_j$	.6591014	.2519469	2.62	0.009
$ldist_{it}$	-2.866638	.8516467	-3.37	0.001
$lpop_i$	.372327	.369421	1.01	0.314
$lpop_j$	-2.27348	1.506835	-1.51	0.131
$contig_{ij}$	.7835115	2.250342	0.35	0.728
$comlag_{ij}$	.6168449	1.420644	0.43	0.664
ll_j	-1.841731	1.082118	-1.70	0.089
rta	-.3885794	.938133	-0.41	0.679
$intra - rta$	.4142367	.8522062	0.49	0.627
R^2		**0.4148**		
Number of obs		**474**		
sigma_u		**1.9666486**		
sigma_e		**1.525849**		

Source: Authors' computation using Stata 10

The findings in Table III indicate that while trade between members of RTAs has increased, the agreements themselves do not necessarily enhance overall trade among member states. However, the impact of RTAs on trade flows likely differs significantly across individual regional trade agreements. To explore this, Equation 5 is analyzed, allowing each regional bloc to have a unique coefficient. The corresponding results are presented in Table IV.

This specification assigns a specific coefficient to each RTA, which is advantageous given the variation in RTA dummy variables across the study period (1994–2015). Due to this approach, the baseline gravity model is used

 https://doi.org/10.59568/IJEBM-2024-1-1-14 Website: https://ijebm.kiu.ac.ug

without fixed effects, as gravity models without controls for unobserved heterogeneity often overstate the effects of policy variables such as RTA membership (Egger, et. al.1997; Mátyás, et al. 2000). Additionally, the random-effects estimator is employed for greater efficiency.

As shown in Table IV, the formation of regional blocs has generally enhanced trade among member states in most RTAs, with the exceptions of MRU, ECCAS, and COMESA, which exhibit trade diversion effects. In contrast, AMU, ECOWAS, WAEMU, CEMAC, EAC, SACU, and SADC demonstrate varying degrees of trade creation, as reflected in their coefficients.

Table 1V: Empirical Results for the Gravity Model Equation 5

Variable	Estimate	S.E.	z-value	p-value
$lgdp_i$	.5025303	.2453104	2.76	0.006
$lgdp_j$	.7593067	.2519469	2.62	0.009
$ldist_{it}$	-1.637278	.8516467	-3.37	0.001
$lpop_i$	.5020578	.369421	1.01	0.314
$lpop_j$	-2.536139	1.506835	-1.51	0.131
$contig_{ij}$	1.24818	2.250342	0.35	0.728
$comlag_{ij}$	.0359062	1.420644	0.43	0.664
ll_j	-1.959868	1.481607	-1.32	0.186
amu	1.44357	2.528372	0.57	0.568
$ecowas$	.9764896	2.383053	0.41	0.682
$waemu$	.6929065	1.634086	0.42	0.672
mru	-2.181679	2.632136	-0.83	0.407
$cemac$	4.104953	4.939939	0.83	0.406
$eccas$	-1.542251	2.893229	-0.53	0.594
eac	1.01521	1.70107	0.60	0.551
$sacu$	3.763525	2.858467	1.32	0.188
$sadc$	1.995131	1.765152	1.13	0.258
$comesa$	-.5413216	1.878308	-0.29	0.773
R^2		**0.5178**		
Number of obs		**474**		
sigma_u		**2.2439866**		
sigma_e		**1.525849**		

Source: Author's computation using Stata 10

 https://doi.org/10.59568/IJEBM-2024-1-1-14

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