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Currency Union and Regional Trade Integrations in West Africa: The Role of Institutional Quality

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ABSTRACT

This study investigates the effect of currency union on intra-regional trade integrations in West Africa. The empirical analysis also examines the interaction effect of institutional quality on currency union-trade flows nexus in the West African region over the period of 1996-2019.The study employs a Driscoll-Kraay standard error estimator technique on data obtained from the IMF direction of trade statistics and World Bank governance indicators. The study findings suggest that all the gravity variables (Gross domestic product, population, and distance) are in line with a priori expectations; currency union dummy produced a positive association with intra-regional trade integrations; real effective exchange rate appreciation boosts trade performance, and the interaction of currency union and institutional quality produced a positive impact on intra-regional trade flows among the countries in the West African region. Among the disaggregated institutional quality index, the rule of law and political stability have a significant impact on trade flows. The rule of law influenced trade flows positively, while political stability influenced trade flows negatively. The study concludes that the Rose effect of a common currency on trade exists in West Africa and that the level of institutional quality also subscribes to the currency union trade flows relationship.

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1. Introduction

The importance of currency union on the integration of a region cannot be overemphasized. It is believed and hypothesized that currency union will boost the rate of regional trade. Several attempts have been made to form a common currency area in the West African region. Specifically, in July 1991, fifteen countries in the West African region ratified a treaty to establish an economic union that will adopt common economic, financial, social, and cultural policies and creates a monetary union where all countries will adopt a single currency. Although, the French-speaking countries in the West African region adopt the currency of their colonial masters while the English-speaking countries use their national currencies. In an attempt to amalgamate the two sub-regions in the West African region, the Economic Community of West African States (ECOWAS) intends to adopt ECO currency used by all the sixteen countries in the West Africa region by the year 2020[1]. Primary and secondary criteria were set up for all the countries in the region. The primary criteria ensure the convergence of the economies with respect to their response to symmetric shocks, while the secondary ensure the fiscal convergence. However, the number of countries that meet the criteria varies in the existing literature Debrun et al. (2005), Qureshi and Tsangarides (2008), and Harvey and Cushing (2015).

Whether the countries meet the criteria or not, the known fact is that countries willing to join the union who will surrender their central bank's independence and national currencies would be willing to know how the proposed currency would influence their trade with their members' countries in the region. Some studies have examined the effect of currency union on intra-regional trade integrations. The prominent among them are the studies in Europe where the Euro is used as a currency. Since the introduction of the euro as a common currency among 12 European countries in 1999, there has been a disagreement in the field of

1. The term ECO refers to the proposed name for the common currency that the West African Monetary Zone plans to introduce in the framework of the Economic Community of West African States.

international macroeconomics on the estimate of common currency effect on intra-regional trade. Rose (2000), who first examined the real effect of a common currency on intra-regional trade, opined that the euro effect (hereafter, Rose effect) on intra-regional trade within Europe is three times higher than non-Europe. Studies such as Yeyati (2003), Alejandro et al. (2003), and Campbell and Davis (2013), found a positive but reduced estimate of the Rose effect. The study of Ogbuabor et al. (2019) found a negative association between regional integration and economic growth, while Prasad and Songwe (2021) opined that single currency would foster regional integrations in the West African region. Some studies observed that the common currency effect on trade to be insignificance Larch et al. (2018), Berger and Nitsch (2008), and Mika and Zymek (2018) while others believed the relationship to be non-linear in nature. Lastly, some studies also opined that the Rose effect of currency union on trade is overhyped.

On the empirical ground, controlling for the role of institutional quality in the analysis of the impact of currency union on intra-regional trade is a departure from the previous studies. This is done in the current study by incorporating interaction term (variable) extracted from institutional quality variables in a way that is devoid of a multicollinearity problem. Furthermore, this study also differs from previous studies by using a Driscoll-Kraay standard error estimator which is robust to serial correlation, autocorrelation, heteroscedasticity, and cross-sectional dependence. The method also modifies the standard error of pooled and fixed effect to tackle the sectional dependence problem which is peculiar with a panel with large T periods and small N.

The remaining part of this paper is organized as follows: Section 2 reviews the empirical literature, section 3 explains the research methodology, while Sections 4 and 5 discuss the empirical results and conclusion, respectively.

2. Literature Review

The debate on whether currency union improves bilateral trade could be traced to the work of Rose (2000), who used the gravity model to analyse

the trade effect of a common currency for 186 countries. His findings showed that countries that share the same currency trade were three times higher than countries that adopt separate currencies *ceteris paribus*. This finding is often referred to as the trade effect of common currency, which has generated much disagreement among scholars. Notable among the critics of the Rose effect is Nitsch (2002), who used a similar data set and econometric model from Rose (2002). The study also modified the data and accounted for different languages, missing data, preferential trade agreements, and colonies countries. The estimates from the gravity model suggested that the trade effect of a common currency was over-estimated by Rose (2002). Similarly, Glick and Rose (2016) examined the trade effect of the euro currency in Europe and some other common currency areas. The study used annual data between 1948 and 2013. The dynamic fixed effect and pooled panel least-squares of gravity estimates were used to regress the log of bilateral trade against the explanatory variables (currency union indicators). The result showed that adoption of euro has led to about 50 percent increase in the export of goods and services.

Furthermore, Larch et al. (2019) re-assessed the effect of currency union on the bilateral trade of countries using the same data set used by Glick and Rose (2016) to find out whether currency union actually have a significant effect on trade flows among participating countries. They employed a Poisson pseudo-maximum likelihood (PPML) of different sub-samples that consider the fixed effects (export time, importer time, and country pair) for over 200 countries. The study indicated that the main effect of currency unions on trade was small compared to Glick and Rose (2016) results and that the effect becomes statistically insignificant when cluster standard errors are used. Katayama and Melatos (2011) examined the non-linear effect of currency union on intra-regional trade of 137 countries comprising of those joining and exiting a common currency union between 1948 and 1997. It measured trade integration by the volume of trade within the countries and found that nonlinearity was clearly present in the gravity model and that the trade effect of currency union has been reduced to 67.9 percent. The result also showed that

creating a currency union changes the nature of the relationship between the GDPs and bilateral trade of countries.

Ro'i and Sénégas (2012) examined the effect of a common currency and colonial heritage on intra-regional trade of Ocean Island countries. The study used annual data between 1980 and 2009 and utilized gravity model equation with a panel least squares with dummy variables. The study measured regional trade integration with the bilateral trade volumes of countries and found that common currency influences intra-regional trade integration among countries with a common colonial heritage than countries with different former colonizers.

Larch et al. (2018) examined the effect of the adoption of the euro on intra-regional trade and intra-national trade among 43 European countries with annual data between 2000 and 2014. It introduced the intra-national trade[1] variable in the structural gravity model. The study employed PPML and found that the adoption of the euro does not have an economic and significant impact on intra-regional trade and that its real and significant effect is on intra-national trade in the European countries. In contrast, He et al. (2019) examined the effect of currency integration on intra-regional trade integration among most countries with regional trade agreements (RTA) globally. The study measured both intra-regional trade by a relative trade intensity of trade volume within each regional trade agreement and currency integration by the foreign exchange turnover within each RTA between 1960 and 2018. The study suggested a U-shaped relationship between currency integration and intra-regional trade integration. It also found that currency integration only affects intra-regional integration if the number of participating countries is low.

Carpio and Guo (2021) employed a Bayesian estimation method to examine the impact of a common currency on intra-regional trade in Europe. The study relied on annual data from 1980-2004. By accounting for an asymmetric bilateral trade effect and time-varying specific factors,

1. Intra-regional trade refers to the trade which focuses on economic exchange primarily between countries in the same region.

the study found a zero effect of euro on intra-regional trade and a 14.8 percent euro effect on imports from member countries.

Recently, Stoykova (2021) examined whether fixed exchange rate or common currency has a higher impact on bilateral trade. The study used an ordinary least squares method covering the WAEMU, CAEMC, ECCU, and the Central American and Caribbean countries. The OLS estimates revealed that there is a high trade effect of a common currency on bilateral trade, but its impact is less than having a fixed exchange rate regime.

Another contradicting result to most of the previous studies is the work of Kangami and Akinkugbe (2021), which examined the impact of a common currency on the intra-regional trade flows in the Central African monetary community. The study used and annual data from 1980-2013, accounting for a fixed turning point in 1994. The study employed a threshold autoregressive model, and found no evidence of the impact of currency union on intra-regional trade flows in the Central African monetary community.

Tohmo et al. (2021) examined the effect of common currency on high technological exports in European countries. The study employed annual data between 1990-2019 and revealed that common currency positively affects total export among the European countries and has a non-statistical significant impact on high technological exports. The magnitude of the effect of a common currency on trade flows also depends on the monetary regime that exists in a region. This is evident in the study of Saputra (2020), who examined the impact of the choice of monetary regimes on bilateral trade flows of the ASEAN-5 countries with their trading partners in the Asian Pacific region. Specifically, this study compared how inflation targeting and exchange rate targeting affect trade flows. The study used annual data between 1999 and 2014, relying on the estimates of panel pooled OLS. It found that countries that adopt inflation targeting regimes trade with one another more than those that adopt exchange rate targeting regime.

Some of the key determinants of intra-regional trade suggested by the gravity model are the income level, distance, and countries' gross domestic products. However, different studies have tested how these variables and others have influenced the trade pattern of countries over the years. For instance, Arribas, Bensassi, and Tortosa-ausina (2020) analysed how the degree of openness, interconnectedness, and distance influences the trade integration in the European union, relying on annual data between 1967 and 2017. Using different indexes for trade integration, degree of openness, and interconnectedness, the study found that trade integration is heterogeneous in the European Union and that interconnectedness and openness among countries within the EU have a positive impact on the degree of trade integration. Distance corrected version index shows that countries within the region prefer to trade with their neighbouring countries.

One of the determinants of intra-regional trade is the spoken language of countries, which is assumed to be positively related to trade. Egger and Lassmann (2012) found that language increases trade flows by 44 percent on average. Similarly, Melitz (2008) found a positive association between spoken language and trade flows, while Lohmann (2011) found a negative association between language barriers and trade flows.

While examining the effect of the real exchange rate on intra-regional trade flows in Turkey with Germany, Tunaer (2016) employed a cointegration and error correction model and found the existence of the J-curve effect. However, there was no relationship between the real exchange rate and trade flows. In contrast, Serenis and Tsounis (2014) found a negative association between exchange rate fluctuation and trade flows in Africa. Similarly, relying on the Autoregressive Distributive Lag (ARDL) model estimates and data between 1989 and 2014 for 79 industries that trade between Korea and the US, Bahmani-Oskooee, and Baek (2016) found an asymmetric effect of real exchange rate on bilateral trade flows.

The literature on the effect of institution quality has been discussed recently. For instance, Maruta (2019) discovered the effect of trade aid on

trade flows when interacted with institutional quality. However, their study failed to capture other institutional quality indexes other than government effectiveness. Similarly, Álvarez et al. (2018) employed all the six governance quality indexes to examine the effect of institutional variables on trade flows of 186 countries in the world. The study relied on the estimates of Pseudo-Maximum likelihood methods and found a significant impact of institutional quality on trade flows.

This study intends to examine the effect of currency on intra-regional trade flows in West Africa, which has not been properly explored. There is no consensus on the common currency effect on trade flows and no study has explored the interaction effect of governance indicators and currency union on intra-regional trade flows. This study differs from the previous study as it intends to examine the interaction effect of the role of aggregated and disaggregated institutional quality on common currency intra-regional trade flows using a pooled OLS and fixed-effects model with Driscol-Kraay standard error that accounts for cross-sectional dependence of countries in the West African region.

3. Methodology

3.1 Theoretical Methodology

The most common theory that explains the determinants of trade flow is the gravity theory and Linder's hypothesis. The gravity model of trade was developed by Tinbergen (1962), and it has been used to increase the understanding of inter-regional and international flows. The theory explains how countries' gross domestic products (size) positively influence the trade flows between them while distance inversely influences the trade flows between them. Also, Linder (1961) hypothesized that countries' per capita income is a major determinant of bilateral trade flows. The mathematical specification of the gravity model is as follows:

$$x_{ij} = \alpha_0 + \alpha_1 y_i + \alpha_2 y_j + \alpha_3 n_i + \alpha_4 n_j + \alpha_5 d_{i,j} + \alpha_6 p_{ij} + e_{ij} \quad (1)$$

where x_{ij} represents the trade flows, y_i and y_j represent the gross domestic products of countries i and j, n_{ij} represents the population of

countries i and j, d is the distance, and pij represents the dummy variable that shows countries belong to the same free trade zone or not.

3.2 Model Specification

In exploring the effect of a common currency on intra-regional trade flows in the West African region, this study employed a modified gravity model following the studies by Rose (2000) and Glick and Rose (2016). Our model is specified below:

$$LITF_{ijt} = \beta_0 + \beta_1 LRGDP_{ijt} + \beta_2 LPOP_{ijt} + \beta_3 LDistance_{ij} + \beta_4 Language_{ij} + \beta_5 FTA_{ij} + \beta_6 LREER_{it} + \beta_7 INST_{it} + \beta_8 Openness_{it} + \gamma CUR_{ij} + \varepsilon_{it} \quad (2)$$

$$LITF_{ijt} = \beta_0 + \beta_1 LRGDP_{ijt} + \beta_2 LPOP_{ijt} + \beta_3 LDistance_{ij} + \beta_4 Language_{ij} + \beta_5 FTA_{ij} + \beta_6 LREER_{it} + \beta_7 INST_{it} + \beta_8 CU\_INST_{it} + \beta_9 Openness_{it} + \gamma CUR_{ij} + \varepsilon_{it} \quad (3)$$

$$LITF_{ijt} = \beta_0 + \beta_1 LRGDP_{ijt} + \beta_2 LPOP_{ijt} + \beta_3 LDistance_{ij} + \beta_4 Language_{ij} + \beta_5 FTA_{ij} + \beta_6 LREER_{it} + \beta_7 INST_{it} + \beta_8 Z_{it} + \beta_9 Openness_{it} + \gamma CUR_{ij} + \varepsilon_{it} \quad (4)$$

The influence of common currency on intra-regional trade is explored in equation (2). The joint effect (interaction) of a common currency and institutional quality on intra-regional trade is analyzed in equation (3), while the effect of disaggregated institutional quality on intra-regional trade flows is analyzed in equation (4). LITF is the natural log of intra-regional trade flows proxied by the export of countries i to j in West Africa. $LRGDP_{ijt}$ is the natural log of the real gross domestic products of countries i and j at time t, $LPOP_{ijt}$ is the natural log of population of countries i and j. LDistance is the geographical distance countries, LREER is the real effective exchange rates of the countries, INST is the institutional quality index, openness is the degree of openness measured by the ratio of total trade over GDP, while CUR is the currency union dummy. ε_{it} captures the effect of the variables that are not included in the model. In equation 2, CU_INST captures the interaction effect of the

common currency and institutional quality effect on intra-regional trade in the West African region while Z_{it} in equation (3) represents the set of disaggregated institutional quality variables (government effectiveness, control of corruption, the rule of law, political stability, regulatory quality, and voice and accountability).

Table 1. Description of Variables and a Priori Expectations

Variables	Description	Expected sign
ITF	Export of countries to their counterparts within West Africa	-
$RGDP_{ij}$	Real GDP of countries i and j	Positive
Distance	Geographical distance of county i to the capitals of j	Negative
Language	Dummy variable that takes 1 if both countries speak the same language and 0 if otherwise.	Positive
Openness	Addition of export and import divided by GDP	Positive
REER	Nominal effective exchange rate divided by a price deflator	Positive/Negative
RTA	Regional trade agreements notified to the GATT/WTO and in force by country/territory	Positive
POP	Population of countries in West Africa	Positive
CUR	Currency union dummy that takes 1 if both countries spend the same currency and 0 if otherwise	Positive
INST	Institutional quality index computed using Principal Component Analysis (PCA)	Positive/Negative
GE	Captures the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures	Positive/Negative
PS	Perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism.	Positive/Negative
CORR	Captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption	Positive/Negative
RQ	Captures perceptions of the ability of the government to formulate and implement sound policies and regulations	Positive/Negative
ROL	Captures the perception of the extent to which agents abide by the rules	Positive/Negative
VA	Captures the perceptions of the extent at which citizens are able to participate in selecting their leaders.	Positive/Negative

Source: Research finding.

The data on real gross domestic product, trade openness and Population are sourced from World Development Indicators (2020), intra-regional trade flows is computed from the International Monetary Fund (IMF) Direction of Trade Statistics, real effective exchange rate is sourced from CEPI, regional trade agreement is sourced from COMTRADE, and all institutional quality index are sourced from Worldwide governance indicators. The range of the data is between 1996 and 2019.

3.3 Panel Unit Root Test

In order to examine the stationarity level and the order of integrations of the variables used in this study, Im et al. (2003), Levin et al. (2002), Breitung (2000), and Pesaran (2004) were employed. The latter was employed majorly because of the presence of cross-sectional dependence in the West African region. One distinct feature of the Pesaran (2004) unit root test from the first-generation unit root tests is its ability to tackle the cross-sectional dependence problem.

3.4 Driscoll-Kraay Estimator

This paper relied on the estimates of Driscoll-Kraay standard error estimator, which is robust to serial correlation, autocorrelation, heteroscedasticity, and cross-sectional dependence (Hoechle, 2007). It modifies the standard error of pooled and fixed effect to tackle the sectional dependence problem, which is peculiar with a panel with large T periods and small N. Cross-sectional dependence could make an estimation result to be biased. Another distinct feature of this technique is its ability to accommodate an unbalanced panel (Hoechle, 2007).

Given the following linear regression model:

$$Y_{it} = X'_{it}\theta + \varepsilon_{it}, \text{ i =1,…, N, t =1,…, T} \quad (5)$$

where Y_{it} represents the dependent variable, and *Xit* is a (K+1)*1 vector of the explanatory variable where the first element is equal to 1, θ is a (K+1)*1 vector of unknown coefficients. All observations of the dependent and the explanatory variables can be stacked as follows:

$$\text{Y} = ([y_1 t_{11} \dots y_1 T, y_2 t_{21} \dots y_N T_N] \text{ and X} = [X_1 t_{11} \dots X_1 T, X_2 t_{21} \dots X_N T_N]' \quad (6)$$

The above information allows the panel to be unbalanced since for individual *i* only a subset $t_{i1}, \dots, T_i$, with $1 \leq t_{i1} \leq T_i \leq T$ of all T observation may be available (Hoechle). It is assumed that there is strong exogeniety among the explanatory variables. The above assumptions suggest that this method is a reliable estimator.

4. Results and Discussion

The descriptive statistics of all the data used in this study are presented in Table 2. It summarises the data in terms of mean, standard deviation, minimum, maximum, and the total number of observations. The table also presents the summaries of the variations in the panel, cross-sectional and time series in terms of overall, within, and between, respectively. Distance has the highest mean value, followed by the natural log of real GDP of countries i and j. At the disaggregated level, all the governance indicators excluding government effectiveness have negative mean values, while the aggregated institutional quality indicator and other variables produced positive mean values. In addition, the standard deviations of all the variables give an accurate and comprehensive estimate of variations from mean values because an outlier can largely overstate the range of observations. All the dummy variables (CU and language) produced zero deviations, while other variables have positive standard deviations from their mean values. The minimum and maximum values explain the lowest and highest values of all the variables used in this study. Distance produced the highest values among all the variables used in this study.

Table 2. Descriptive Analysis

Variables		Mean	Std. Dev.	Min	Max	Observations
LITF	overall	4.954433	1.559156	1.019048	8.097358	N = 368
	between		1.413082	1.99069	7.102874	n = 16
	within		0..7442209	1.643613	7.020486	T = 23
LRGDP	overall	49.28089	1.602112	45.46324	7.020486	T = 23
	between		1.492645	47.26403	53.14121	n = 16
	within		0.6874356	47.27455	50.45891	T = 24
Distance	overall	26135.81	3935.372	20110	35979	N = 384
	between		4059.139	20110	35979	n = 16
	within		7.25e-12	26135.81	26135.81	T = 24
language	overall	7.1875	2.60673	0	9	N = 384
	between		2.688711	9	9	n = 16
	within		0	7.1875	7.1875	T = 24
LREER	overall	4.02241	2.442728	-2.671394	8.218753	N = 284
	between		2.562691	-.8888556	7.351767	n = 12
	within		0.4098488	2.239872	5.477158	T= 24
RTA	overall	1.8125	0.9511571	0	4	N = 384
	between		0.9810708	0	4	N = 16
	within		0	1.8125	1.8125	T = 24
CUR	overall	0.5625	0.4967256	0	1	N = 384
	between		0.5123475	0	1	N = 16

Variables		Mean	Std. Dev.	Min	Max	Observations
	within		0	0.5625	0.5625	T = 24
POP	overall	1.83e+07	3.57e+07	395533	2.01e+08	N = 384
	between		3.61e+07	476449.1	1.51e+08	n = 16
	within		7161876	-2.22e+07	6.81e+07	T = 24
openness	overall	189.5156	110.9687	1	381	N = 384
	between		70.35191	70.04167	290.125	n = 16
	within		87.53221	-87.56771	429.224	T = 24
GE	overall	168.0655	96.57252	1	334	N = 336
	between		74.74408	64.2381	278.5238	n = 16
	within		63.8209	-80.50595	421.3988	T = 21
VA	overall	-0.3859539	0.6042045	-1.553702	0.9984295	N = 336
	between		0.5571569	-1.058272	0.8601181	n = 16
	within		0.2705033	-1.438531	0.3510895	T = 21
ROL	overall	-0.6674994	0.5457902	-2.008507	1.044188	N = 336
	between		0.5197615	-1.360834	0.5446911	n = 16
	within		0.209436	-1.471729	-0.1367557	T = 21
RQ	overall	-0.6151765	0.3973359	-2.023813	0.338653	N = 336
	between		0.358935	-1.295162	-0.0979659	n = 16
	within		0.1916588	-1.343828	0.2617918	T = 21
PS	overall	-0.5076927	0.8165588	-2.436677	1.219244	N = 336
	between		0.6669457	-1.806429	0.8588465	n = 16
	within		0.4985056	-2.16151	0.8302713	T = 21
CORR	overall	-0.6143061	0.5168459	-1.701552	1.143337	N = 336
	between		0.4958216	-1.273112	0.7926547	n = 16
	within		0.1896513	-1.394655	-0.0056428	T = 21
INST	overall	1.27e-09	1.000002	-1.932706	2.291253	N = 336
	between		0.9221349	-1.112736	2.062339	n = 16
	within		0. 4477023	-1.742089	1.219857	T = 21

Source: Research finding.

Table 3 shows the pairwise correlation analysis of all the variables used in this study. The correlation coefficient, which ranges between -1 and +1 shows the nature of the association between variables. No variable has a correlation coefficient greater than 1. In fact, all the coefficients are less than 0.8, which suggests a likelihood of an absence of multicollinearity among the variables used. The probability values which are presented below all the correlation coefficients, attest that most of the variables have significant relationships with one another.

Table 3. Correlation Analysis

	LITF	LRGDP	LDistance	language	REER	RTA	CUR	POP	Openness	INST
LITF	1.0000									
LRGDP	0.6404 (0.0000)	1.0000								
LDistance	-0.5331 (0.0000)	-0.0794 (0.1204)	1.0000							
Language	0.3858 (0.0000)	0.1250 (0.0143)	-0.5849 (0.0000)	1.0000						
REER	0.0373 (0.5399)	-0.0325 (0.5858)	-0.3544 (0.0000)	0.5590 (0.0000)	1.0000					
RTA	0.6897 (0.0000)	0.4274 (0.0000)	-0.3813 (0.0000)	0.2922 (0.0000)	0.1463 (0.0136)	1.0000				
CUR	0.0897 (0.0858)	-0.2106 (0.0000)	-0.1824 (0.0003)	0.2087 (0.0000)	-0.0584 (0.3265)	-0.4393 (0.0000)	1.0000			
POP	0.3555 (0.0000)	0.7307 (0.0000)	0.1010 (0.0480)	-0.1470 (0.0039)	-0.0109 (0.8548)	0.1967 (0.0001)	-0.3479 (0.0000)	1.0000		
Openness	0.0917 (0.0790)	0.0098 (0.8489)	-0.1986 (0.0001)	0.2005 (0.0001)	0.0419 (0.4817)	0.1624 (0.0014)	-0.1357 (0.0078)	-0.2141 (0.0000)	1.0000	
INST	0.0576 (0.3040)	0.1380 (0.0113)	0.3474 (0.0000)	-0.4125 (0.0000)	-0.2566 (0.0000)	0.1358 (0.0127)	0.0158 (0.7730)	-0.0708 (0.1957)	-0.1744 (0.0013)	1.0000

Source: Research finding.

Table 4. Panel Unit Root Analysis

First generation test				**Second generation test**
Level	**LLC**	**IPS**	**Breitung**	**Pesaran**
LITF	-6.134***	-1.729	0.194	-2.388***
LRGDP	-2.028**	-0.422	13.068	-1.541
POP	-1.900	26.910	16.837	-4.097***
REER	-	-	-	-3.154***
Openness	-6.765**	-2.307**	-4.506***	-1.817
INST	-6.103***	-1.622	-1.047	-1.677
First Difference				
LITF	-15.350***	-5.529***	-10.693***	-3.713***
LRGDP	-13.139***	-3.755***	-6.038***	-2.558***
POP	-6.307***	-0.017	11.771	-4.121***
REER	-	-	-	-8.809***
Openness	-15.628***	-5.895***	-8.991***	-2.981***
INST	-13.764**	-4.054***	-6.411***	-8.809***

Source: Research finding.
Note: ***, **, * denote significance at 1%, 5% and 10% respectively.

Table 4 presents the unit root analysis which is used to examine the stationarity properties and the order of integrations of the variables used in this study. The unit root test considered the level and first difference of the variables using first-generation panel unit root tests (LLC, IPS, and Breitung) and second-generation panel unit root tests (Pesaran). The result shows that all the variables (LITF, LRGDP, POP, REER, Openness, and INST) are significant at the level in at least one of the unit root tests employed in this study. This connotes the rejection of the null hypothesis, implying that each of the variables is stationary at level. Also, all the variables are significant at the first difference in at least two of the unit root tests employed in this study, which connotes the null hypothesis's rejection- implying that each variable is stationary at the first difference. The panel unit root test which considered cross-sectional dependence produced the most stationary variables both at levels and first difference. Hence, the order of integration of most of the variables used in this study is I(0).

Table 5. The Principal Component Analysis

Principal	components/correlation
Number of obs= 336	
Number of comp.= 6	

Trace = 6				
Rotation: (unrotated = principal)				Rho =1.0000
Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	4.04798	3.11512	0.6747	0.6747
Comp2	0.93286	0.48699	0.1555	0.8301
Comp3	0.44587	0.110584	0.0743	0.9045
Comp4	0.33529	0.178323	0.0559	0.9603
Comp5	0.15696	0.0759169	0.0262	0.9865
Comp6	0.08105	.	0.0135	1.0000

Source: Research finding.

The results of the PCA are presented in Table 5. We used PCA to construct institutional quality variables using the six institutional quality indexes: control of corruption, the rule of law, regulatory quality, political stability, voice and accountability, and government effectiveness. The PCA shows the variation of each component on the total component and reduces a large sum of correlated values into smaller uncorrelated values (components). The first component in Table 5 takes the largest proportion of the total variance, while the second component has a lower proportion of the remaining variance. In line with the study of Babalola and Shittu (2020), the component with an eigenvalue greater than one is retained while others are dropped. By implication, the first component is retained, which accounts for about 67% of the total variance.

Table 6. Coefficient Estimation

Variable	**Model 1**		**Model 2**		**Model 3**	
	Coeff.	**DK Std. Error**	**Coeff.**	**DK Std. Error**	**Coeff.**	**DK Std. Error**
LRGDP	0.206	0.060	0.455	0.090	0.185	0.054
LDistance	-0.001	0.000	-0.001	0.000	-0.001	0.000
POP	0.009	0.002	-0.002	0.003	0.009	0.002
Language	0.048	0.012	-0.158	0.046	0.125	0.027
RTA	0.734	0.073	0.522	0.073	0.796	0.080
CU	0.374	0.162	0.392	0.132	0.571	0.185
REER	-0.114	0.019	-0.105	0.024	-0.128	0.020
Openness	-0.0003	0.0003	-0.0005	0.0003	-0.005	0.0004
INST	0.1403	0.043	-0.0551	0.0717		
CU_INST			1.081	0.1669		
GE					0.001	0.0007
VA					0.052	0.1770
ROL					0.594	0.2686
RQ					-0.1313	0.2483

Variable	Model 1		Model 2		Model 3	
	Coeff.	DK Std. Error	Coeff.	DK Std. Error	Coeff.	DK Std. Error
PS					-0.3653	1.069
CORR					0.3023	1.986
Observation	238		238		238	
R-Square	0.82		0.85		0.83	
Maximum Lag	2		2		2	

Source: Research finding.
Note: Coeff. and DK Std. Err represents coefficient and Driscoll-Kray Standard errors, respectively. A variable is significant if the division of it the absolute value of its coefficient is greater than its Drisk-Kraay standard error.

Table 7. Diagnostic Tests

Test	P-values
Pesaran CDS	0.000
Friedsman CDS	0.000
Breusch Pagan/Cook-Weisberg	0.070
VIF (average)	1.73

Source: Research finding.

Table 6 presents three estimates of pooled OLS with Driscoll-Kraay standard errors. The models' coefficients of the effect of currency union on intra-regional trade in the West African region indicate how aggregate institutional quality index interactions influence currency union and intra-regional trade nexus and the influence of disaggregated institutional quality indexes on intra-regional trade in the West African region.

According to the result, the gravity variables $LRGDP_{ij,}$ population representing the size and distance, conform to the a priori expectations. Both have positive and negative relationships with intra-regional trade in the West African region, respectively. A percentage increase in the product of gross domestic products of countries i and j increase the intra-regional trade in West Africa by 0.28, on average. The population also has a positive dominating impact on intra-regional trade in West Africa. The distance between the capitals of countries to one another produced a negative and significant relationship with intra-regional trade flows. A unit increase in the distance leads to a 0.01 percent decrease in the intra-West African trade flows. This result is in line with Tinbergen (1962), who pioneers the Gravity equation, and many other previous empirical

studies such as Zannou (2010), Trivić, and Klimczak (2015) Melitz (2008), among others.

The coefficient of language (dummy variable) in models 1, 2, and 3 positively impacted intra-regional trade in West Africa. Countries that speak the same language trade 0.5 percent (on average) with each other than those that speak a different language. This finding is in line with Egger and Lassmann (2012) and Zannou (2010), finding a positive association between common language and bilateral trade flows. Also, RTA has a positive and significant impact on intra-regional trade in the West African region. A unit increase in the free trade agreement among countries boosts their trade volume by 0.68 percent, on average.

The coefficients of the currency union in models 1, 2, and 3 show that it has a positive association with intra-regional trade integration as countries that spend the same currency in the region trade 0.45 times with each other than those that spend their national currencies. This finding is in line with the studies of Rose (2000) and Glick and Rose (2016), who found a positive relationship between common currency and trade flows. The result contradicts the findings of Larch et al. (2019) who found no economic and significant impact of common currency on trade flows. It also contradicts the finding of He et al. (2019) who found a U-shaped relationship between common currency and trade flows. A good justification for the positive effect of currency union on trade flows is the fact that the existing CFA currency of the francophone countries in West Africa has enhances the trade integrations of countries.

The coefficients of the real effective exchange rate show that there is a relationship between REER and intra-regional trade integrations in the West African region. An appreciation of currencies boosts intra-regional integrations by 0.12 percent, on average. This finding shows the existence of the J curve effect in the region and confirms the finding of Bahmani-Oskooee and Baek (2016), and contradicts the findings of Tunaer (2016), who found no association between exchange rate and trade balance. Our result shows that trade openness does not significantly impact intra-regional trade flows in the West African region.

The coefficient of the institutional quality index in Model 1 shows that institutional quality has a positive and significant impact on intra-regional trade flows in the West African region. A unit increase in the aggregate institutional quality index induced regional trade integrations in West Africa by 1.4 percent. This is in consonance with Maruta (2019) finding, who found a positive association between one of the institutional quality indexes and intra-regional trade flows. The joint effect (interaction) of currency union and institutional quality index in Model 2 shows that the level of institutional quality boosts the currency union- intra-regional trade flows in the West African region, with a total effect of (0.392+1.081*INST)[1]. This implies that adopting a currency union alone does not guarantee robust trade flows among countries and requires a quality institution in the region.

Among all the disaggregated quality indexes, the rule of law and political stability have a significant impact on the intra-regional trade flows in the West African region. The rule of law has a positive relationship with trade-flows in the region, while political stability has a negative impact on the intra-regional trade flows in the West African region. The coefficient of the rule of law is in consonance with Álvarez et al. (2018), who found a positive association between the rule of law trade flows while the coefficient of political stability contradicts Álvarez et al. (2018), who found a positive association between political stability and trade flows in 186 countries. The negative effect of political stability on trade flows in West Africa could be as a result of insecurities such as Boko Haram insurgency, Ebola outbreak, and some other terrorist groups that have made life difficult for citizens of countries within the region over the years.

The coefficient of determination shows that an average variation in the intra-regional trade flows of West Africa is explained by 83 percent of the explanatory variables. Also, VIF statistics in the diagnostic test result presented in Table 7 shows that the model is not suffering from

1. The marginal effect of institutional quality effect on currency union-trade relationship is computed by taking the first order derivative of the total effect.

multicollinearity problem. The Friedman and Pesaran CDS tests show that there is a presence of cross-sectional dependence, while the Breusch pagan test shows the presence of heteroscedasticity. This justifies the use of Drisroll-Kraay as the appropriate technique because it produced a result with a robust standard error and deals with cross-sectional dependence and heteroscedasticity problems.

5. Conclusion

The West African region is on the verge of amalgamating all countries in the region with adopting a uniform currency, ECO. A convergence criterion has been set up, as, at the end of the year 2019, not all countries in the region have met the primary and secondary criteria. Countries intending to join a monetary union that will surrender their central bank's autonomy and national currencies to a centralized central bank will also want to know how the adoption of the currency would influence their trade integrations with their counterparts in the region.

This study examines the effect of the existing currency union on the intra-regional trade flows in the 16 West African countries. It also examines how the institutional quality influences the currency-trade flows nexus in the region, relying on the estimates of Driscoll-Kraay standard errors methods which captures a cross-sectional dependence problem that is peculiar to countries in the West African region. This method also differs from other panel estimates as it is robust to serial correlation, autocorrelation, heteroscedasticity, and cross-sectional dependence. The study used annual data between 1996 and 2019 for all the 16 countries in the West African region.

The empirical result shows that all the gravity variables (RGDP, POP, and distance) conform to the a priori expectations. Real effective exchange rate has a negative relationship with trade flows which implies an appreciation in currency boosts trade flows in the West African countries. The currency union dummy also has a positive association with trade flows, and the coefficient increased when interacted with the institutional quality index. Only the rule of law coefficient and political stability significantly impact the intra-regional trade flows in the West

African region. The negative impact of political stability on trade flows in West Africa is attributed to high insecurity levels in the region.

Based on the above, this study concludes that the Rose effect of a common currency on trade exists in West Africa and that the level of institutional quality also subscribes to the currency union trade flows relationship.

References

Álvarez, I. C., Barbero, J., Rodríguez-Pose, A., & Zofío, J. L. (2018). Does Institutional Quality Matter for Trade? Institutional Conditions in a Sectoral Trade Framework. *World Development*, *103*, 72-87.

Arribas, I., Bensassi, S., & Tortosa-ausina, E. (2020). Trade Integration in The European Union: Openness, Interconnectedness, and Distance. *North American Journal of Economics and Finance*, *52*, 101-167.

Babalola, S., & Shittu, W. (2020). Foreign Aid and Economic Growth in West Africa: Examining the Roles of Institutions. *International Economic Journal*, *0*(0), 1-19.

Bahmani-Oskooee, M., & Baek, J. (2016). Do Exchange Rate Changes Have Symmetric or Asymmetric Effects on the Trade Balance? Evidence from U.S.–Korea Commodity Trade. *Journal of Asian Economics*, *45*, 15-30.

Berger, H., & Nitsch, V. (2008). The Trade Effect of The Euro in Historical Perspective. *Journal of International Money and Finance*, *27*(8), 1244-1260.

Breitung, J. (2000). The Local Power of Some Unit Root Tests for Panel Data. *Advances in Econometrics*, *15*, 161-177.

Carpio, R., & Guo, M. (2021). Bayesian Estimation of the Eurozone

Currency Union Effect. *Review of International Economics*, *29*(3), 511-532.

Debrun, X., Masson, P., & Pattillo, C. (2005). Monetary Union in West Africa: Who Might Gain, Who Might Lose, and Why? *Canadian Jornal of Economics*, *38*(2), 454-481.

Egger, P. H., & Lassmann, A. (2012). The language Effect in International Trade: a Meta-Analysis. *Economics Letters*, *116*(2), 221-224.

Glick, R., & Rose, A. K. (2016). Currency Unions And Trade: a Post-EMU Reassessment. *European Economic Review*, *87*(March), 78-91.

Harvey, S. K., & Cushing, M. J. (2015). Is West African Monetary Zone (WAMZ) A Common Currency Area? *Journal of Advanced Research*, *5*(1), 53-63.

He, Q., Zhang, C., & Zhu, W. (2019). Does Currency Matter for Regional Trade Integration? *International Review of Economics and Finance*, *xxxx*, 1-16.

Hoechle, D. (2007). Robust Standard Errors for Panel Regressions with Cross-Sectional Dependence. *Stata Journal*, *7*(3), 281-312.

Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics*, *115*(1), 53-74.

Kangami, D. N., & Akinkugbe, O. (2021). Common Currency and Intra-Regional Trade in the Central African Monetary Community (CEMAC). *Journal of African Trade*, *8*(1), 13-22.

Katayama, H., & Melatos, M. (2011). The Nonlinear Impact of Currency Unions on Bilateral Trade. *Economics Letters*, *112*(1), 94-96.

Larch, M., Wanner, J., Yotov, Y. V., & Zylkin, T. (2019). Currency Unions and Trade: A PPML Re-assessment with High-dimensional Fixed Effects. *Oxford Bulletin of Economics and Statistics, 81*(3), 487-510.

Larch, M., Wanner, J., & Yotov, Y. V. (2018). Bi- and Uni Lateral Trade Effects of Joining the Euro. *Economics Letters*, *171*, 230-234.

Levin, A., Lin, C. F., & Chu, C. S. J. (2002). Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties. *Journal of Econometrics*, *108*(1), 1-24.

Linder, S. B. (1961). An Essay on Trade and Transformation. *Ekonomisk Tidskrift*, *63*(4), 1-166.

Lohmann, J. (2011). Do Language Barriers Affect Trade? *Economics Letters*, *110*(2), 159-162.

Maruta, A. A. (2019). Trade Aid, Institutional Quality, and Trade. *Journal of Economics and Business*, *103*(April 2018), 25-37.

Melitz, J. (2008). Language and foreign trade. *European Economic Review*, *52*(4), 667-699.

Mika, A., & Zymek, R. (2018). Friends without Benefits ? New EMU Members and the ‘‘Euro Effect” on Trade q. *Jornal of International Money and Finance*, *83*, 75-92.

Nitsch, V. (2002). Honey, I Shrunk the Currency Union Effect on Trade. *World Economy*, *25*(4), 457-474.

Ogbuabor, J. E., Anthony-Orji, O. I., Ogbonna, O. E., & Orji, A. (2019). Regional Integration and Growth: New Empirical Evidence from WAEMU. *Progress in Development Studies*, *19*(2), 123-143.

Pesaran, M. H. (2004). General Diagnostic Tests For Cross Section Dependence In Panels. *ECB Working Paper, 1229*, 1-47.

Prasad, E., & Songwe, V. (2021). *Regional Integration in West Africa: Is there a role for a Single Currency?* Washington, DC: Brookings Institution Press.

Qureshi, M. S., & Tsangarides, C. (2008). Monetary Union Membership in West Africa : A Cluster Analysis. *World Development*, *36*(7), 1261-1279.

Ro'i, L., & Sénégas, M. A. (2012). Bilateral Trade, Colonial Heritage and Common Currency Arrangements: an Oceanian Perspective. *Economie Internationale*, *129*(1), 63-98.

Rose, A. K. (2000). One Money, One Market: Estimating the Effect of Common Currencies on Trade. *Economic Policy*, *15*(30), 8-45.

Saputra, P. M. A. (2020). Bilateral Trade and Monetary Regime: Analysis for ASEAN-5 Countries and their Main Trading Partners. *Advances in Economics, Business and Management Research*, *144*(2019), 135-141.

Serenis, D., & Tsounis, N. (2014). Does Exchange Rate Variation Effect African Trade Flows? *Procedia Economics and Finance*, *14*(14), 565-574.

Tinbergen, J. (1962). An Analysis of the World Trade Flows in Shaping the World Economy. *Shaping the World Economy, 3*, 1-117.

Tohmo, T., Heimonen, K., & Nieminen, M. (2021). Effects of the European Monetary Union on High-Technology Exports. *Journal of Industry, Competition and Trade*, *21*(2), 251-285.

Trivić, J., & Klimczak, Ł. (2015). The determinants Of Intra-Regional Trade in the Western Balkans. *Zbornik Radova Ekonomskog Fakultet Au Rijeci*, *33*(1), 37–66.

Tunaer Vural, B. M. (2016). Effect of Real Exchange Rate on Trade Balance: Commodity Level Evidence from Turkish Bilateral Trade Data. *Procedia Economics and Finance*, *38*(October 2015), 499–507.

Yeyati, E. L. (2003). On the Impact of a Common Currency on Bilateral Trade. *Economics Letters*, *79*(2003), 125–129.

Zannou, A. (2010). Determinants of Intra-ECOWAS Trade Flows. *African Journal of Business Management*, *4*(May), 678–686.

Appendix

Table A1. List of Countries Considered

1	Benin
2	Burkina Faso
3	Cape Verde
4	The Gambia
5	Ghana
6	Guinea
7	Guinea-Bissau
8	Ivory Coast
9	Liberia
10	Mali
11	Mauritania
12	Niger
13	Nigeria
14	Senegal
15	Sierra Leone
16	Togo

Source: Research finding.

Table A2. Test for Multicollinearity

Variable	VIF	1/VIF
RTA	2.57	0.389592
Distance	2.15	0.464629
CUR	2.09	0.477429
Language	2.07	0.483424
INST	1.94	0.516673
POPi	1.32	0.758097
Open	1.28	0.781515
REER	1.09	0.919571
WAGDP	1.08	0.925107
Mean VIF	1.73	

Source: Research finding.