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CHOICE OF CURRENCY TO TIE THE PROPOSED WEST AFRICAN CURRENCY, THE ECO, TO: SOME EMPIRICAL INSIGHT

Abdul Salam Sikiru Abidemi¹ and Muhammad Aminu Ado²

Abstract

This study examined whether the proposed West African currency, the ECO, should be tied to the US dollar, Euro, Naira, or CFA? The study partitions the four currencies into two groups: (i) already internationalized currencies (US dollar and Euro); and (ii) emerging currencies for internationalization within ECOWAS (Naira and CFA). Consequently, empirical modelling using panel OLS was conducted on the first group; thereafter, the estimated parameters are used for forecasting under the assumption of a smooth economic condition. Empirical results show that the size of an economy, trade level, and exchange rate are significant determinants in adopting a peg or anchor currency. In addition, the result of the simulation analysis shows that the US dollar has a higher internationalization potential than the Euro. The study also found that the Nigerian Naira has a higher internationalization potential compared to the CFA franc. Thus, the study recommends adopting the US dollar as the currency to tie the ECO currency to and, within the ECOWAS zone, advocates for the use of the Nigerian Naira.

Keywords: *International reserves, Exchange Rate Mechanism, panel OLS,*

JEL Classification:

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1.0 INTRODUCTION

Adoption of the 'ECO' currency would be a major step in establishing the ECOWAS region into a monetary zone to deepen economic cooperation, regional trade integration, free factor mobility, and policy coordination.³ The introduction of a single currency such as the ECO in the case of ECOWAS countries would make the countries in the region surrender their autonomy over monetary policy and, thereby, enable them to gain credibility and, thus, reduce undesired inflation (see Harvey and Cushing, 2015). Consequently, adoption of a single currency has the economic advantage of lower risk premium and interest, and lower transaction cost, among others (see Szapari, 2001). However, there are thorny issues stalling the process⁴. One of such is the economic consideration concerning the dynamics of the exchange rate mechanism to facilitate the operation of the single currency in the region. Other key consideration is the choice of currency to tie the ECO to and by implication, the currency in which foreign reserves would be held. Hence, relevant research questions are as follows: can the constituent economies be brought into a unified exchange rate system? Should the ECO currency be tied to the Euro given that eight of the countries constituting ECOWAS already have half of their foreign exchange reserves with the Bank of France? Should it be tied to the US dollar or some other international currency which countries are major trading partners of ECOWAS countries? Or should the ECO currency be pegged to the Nigerian Naira since it is responsible for the largest share of total trade and gross domestic products in West Africa? Consequent to the foregoing, this study sets out to examine the currency that the newly proposed West African ECO should be tied to. Specifically, the study aims to: (i) empirically examine the factors that influence currency internationalization; (ii) provide a forecast for the share of the US dollar and Euro reserves in the total reserves of the central banks across the world; and finally, (iii) simulate the suitability of the Naira and CFA Franc for internationalization, and eventually, as reserve currency for the proposed West African ECO.

Based on the first research question raised, this study assesses the ECOWAS countries for the implementation of the exchange rate mechanism (hereinafter, ERM) in the region. One of the motivations to approach this research objective stems from the potential benefits of the ERM to the region. The ERM serves as a conduit for achieving macroeconomic stability, monetary convergence, and a path towards trade integration in the area (Ciuriak, 2003, Eichengreen, Gil-Pareja et al., 2007, 1990; 1991; 1989). However, these potential benefits will only be realisable if exchange rate fluctuations between the proposed ECO currency and the currencies of ECOWAS member states do not disrupt economic stability in the proposed single market. Thus, convergence of exchange rates is necessary for the success of the monetary union since the countries at present have their foreign reserves denominated in either the Euro or the US dollars. This underscores the need for the research.

Similar to what is obtained in other jurisdictions, especially the EU, constituting the ECOWAS countries into an ERM requires stability of exchange rates and convergence of inflationary expectations for the monetary area to foster inter-regional trade (Andries et al., 2017; Ciuriak, 2003; Gil-Pareja et al., 2007; Miller and Zhang, 1996; Minford; 1994; Sarno, 1997). How would the ERM work in reality? Technically, the ERM will be wielded as a major monetary policy tool by the proposed ECOWAS Central Bank (hereinafter, the Bank). The Board of Directors of the Bank agrees to a central rate for the ECO against a certain international currency or anchored by a "currency-snake" such as the Naira (or the CFA). The intuition for suggesting the Naira or the CFA is owing to their

³ See Mundell, 1961; Kenen, 1969 for elaborate theoretical attractions of an Optimal Currency Area which the adoption of single currency/common market portends for the ECOWAS region.

⁴ See Harvey and Cushing (2015) on a number of factors such as symmetric response to shocks, among others. Also, see Dutta (2005), Natalucci and Ravenna (2002), Szapary (2001) for EU and Khan (2010) for GCC's experiences, on the choice of currency and exchange rate.

wide use among member countries in the region. For instance, the CFA is the common currency used among 8 of the 16 countries in West Africa. Similarly, the Naira is the currency of Nigeria, the region's and by extension the Continent's most populous country and its largest economy. The Bank would specify a band between the proposed West African ECO exchange rate and the already existing national currencies of the ECOWAS member countries (which can be individually allowed to float with other currencies outside the ERM) (Corrado, 1998; Kawai, 2008; Miller and Zhang, 1996; Zhou, 2003). The Bank intervenes to realign the rates among the countries viz-a-viz the central rate, otherwise, misalignments will unsettle the inter-regional trade flows. This further reinforces the need that the choice of the ECO anchor currency should be well thought out.

The study confronts the research questions with both qualitative and quantitative data analytical tools. It explores both stylized facts and proper empirical model estimation that help to tease out various scenarios and corresponding policy options to guide in the decision of going ahead with the ERM for the ECOWAS region as well as the choice of the anchor currency for the ECO.

The rest of the paper proceeds from the introduction as follows. The next section details the review of the literature while Section 3 contains date description and the preliminary analyses. Section 4 discusses the methodology adopted. Section 5 centres on discussion of the empirical results while Section 6 concludes the paper with policy recommendations.

2.0 EXCHANGE RATE MECHANISM FOR THE ECOWAS: EMPIRICAL ISSUES

Prior empirical evidence is limited to the experiences of European monetary union and the adoption of the Euro. The literature turns up studies that are either in support of or against the EMU, of which could be the basis for the West African Economic and Monetary Union (WAEMU). The study conducted by Banik and Yoonus (2010), who examines the proposed currency union of ECOWAS, finds that ECOWAS is not a safe area to form a currency union because of the heterogeneity of countries in diverse ways in the area. Mati et al., (2019) also find that ECOWAS members are not well prepared for a fully-fledged currency union as members respond to shocks asymmetrically. Conversely, [Dufrenot & Sugimoto \(2013\)](#) discover the tendency of the ECOWAS single currency to compete with other widely recognized foreign currencies if they can pursue goals that will ensure its continuity and stability. Also, Anokye and Imran (2014) who evaluate the possible effects of the ECOWAS currency union on intra-regional trade in West Africa, suggest the intensification of efforts towards the adoption of a single currency.

Going forward, studies around this subject in the literature have identified sources of shocks to exchange rates. For instance, Malik and Umar (2019) find that oil price shocks are responsible for exchange rates variations especially since the global financial crisis. Adu et al., (2019) and Inoue and Rossi (2019), highlight the role of monetary policy shocks to exchange rate fluctuations. De and Sun (2019) and Özmen and Yılmaz (2017) identify interest rate differentials, risk premium, and policy uncertainty as some of the structural shocks that explain movements in exchange rates.

Two points are key from the introduction to study the ECOWAS ERM. One, the choice of the anchor currency for the ECO matters for its fluctuations and the success of the ERM. Two, shocks from the foreign exchange market can destabilise the mechanism and create policy disquiet for the Bank. The probable sources of the foreign exchange fluctuations are highlighted as follows: the movements in interest rates differentials between the ECOWAS economies and the foreign economies in trade relations (Badarau and Sangaré, 2018; Inoue and Rossi 2019; Özmen and Yılmaz, 2017; Saraç and Karagöz, 2016 for evidences of correlations between exchange rate and interest rate differentials); the impact of oil price on exchange rates previously highlighted (also Zhang et al., 2008;

Narayan et al., 2008; Lizardo and Mollick, 2010; Ghosh, 2011; Aloui et al., 2013; Soile and Babajide, (2015) ; Brahmairene et al., 2014; Jain and Biswal, 2016; Rasasi, M. (2017); Huang et al., 2020).

In all of these, attention is better accorded to the real exchange rate (rather than nominal exchange rate) fluctuations in the decision on the convergence of ECOWAS countries for the ERM. This is based on the arguments portraying real exchange rate as a measure of global competitiveness (Sarno, 1997) and, more importantly, among ECOWAS countries that are predominantly traders in primary commodities in the international markets. In this vein, Ayres et al., (2019) document the theoretical mechanism for fluctuations in commodity prices that influence the real exchange rate. Hence, stability of real exchange rate is suitable to our discussion in that stable real exchange rate would indicate that shocks necessitating frequent exchange rate realignment to the ECO band would be infinitesimal for a stable ERM (Coudert and Couharde, 2003; De Grauwe, 1996; Lane, 2012).

3.0 DATA DESCRIPTION AND PRELIMINARY ANALYSES

Since this study assesses the implementation of the exchange rate mechanism upon the adoption of the ECO as a single currency among the ECOWAS countries, the stability of the proposed ERM for the proposed single market is relevant for the constituent ECOWAS countries' currencies. The suitability of the ERM for the gains of the single market hinges on the stability of exchange rates (Andries et al., 2017; Ciuriak, 2003; Gil-Pareja et al., 2007; Miller and Zhang, 1996; Minford, 1994; Sarno, 1997). As previously mentioned, other relevant factor is the choice of the anchor currency for the ECO, which also has implications on the stability of the proposed ERM. In all, the stability of the real exchange rate is suitable to our discussion in that stable real exchange rate would indicate that shocks necessitating frequent nominal exchange rate realignments to the ECO band would be infinitesimal for a stable ERM.

The foregoing is explored with quantitative data, albeit without standard estimable models. The data are confronted with various qualitative and quantitative preliminary techniques. The initial data obtained are the nominal exchange rates for the ECOWAS countries in relation to the Euro and US dollar from the International Financial Statistics (see <https://data.imf.org/>). The consumer prices for the ECOWAS countries and the United States are also obtained from the same source. However, the consumer prices for the Euro area are obtained from OECD database (see <https://data.oecd.org/>). These prices are useful in the computation of the real exchange rate series. The real exchange rates are computed as nominal exchange rate multiplied by the ratio of foreign to domestic prices, where the foreign prices are the Euro area and US consumer prices. This relationship is illustrated in the equation below:

$$r_{exr} = n_{exr} \cdot \frac{p_i}{p_d}$$

Where r_{exr} is the real exchange rate, n_{exr} is the nominal exchange rate defined as local currency per unit of foreign currency, p_i is foreign prices and p_d is domestic prices. The exchange rates data used for the preliminary analyses are monthly and covers the period 2009M01 to 2019M12. This choice is not arbitrary but selected to coincide with the adoption of the roadmap document for the ECOWAS Monetary Cooperation Programme (EMCP). The new-EMCP, as it were, was adopted in 2009 with emphasis on macroeconomic convergence and harmonisation of policies to culminate in the introduction of the ECO as the single currency.

The CFA franc in operation in the WAEMU is tied to the Euro, hence, displays no variation in Figure 1 and zero standard deviation in Table 1. The best performing are the Ghana cedi, The Gambia dalasi and Cabo Verde escudo. Using the standard deviation values, variability is comparatively higher for

the exchange rates expressed in US dollar than the euro exchange rates (Table 1 and 2). However, comparing the diagrams in Figures 1 and 2, those in Figure 2 appear to be more related than those in Figure 1. This suggests that the US dollar exchange rates for the ECOWAS may be more related than the euro exchange rate to form the ERM.

We have argued that the stability of the real exchange rates is necessary for the constitution of the ERM. This is not directly discernible from the graphs. Hence, we adopt a scientific approach by testing each of the real exchange rate series for the presence of unit root or the existence of stationarity. The characteristic of stationarity indicates that the series of concern is stable and such stable series can be brought together in an ERM and be used as adjustment tools or as shock absorbers (Bergin et al., 2017). We employ three unit root tests (the augmented-Dickey Fuller test, Phillips-Perron test, and ADF-based test with structural breaks). The findings of these tests are reported in Tables 3, 4, & 5.

After estimations, we have equal number of stationary (after accounting for structural breaks) and non-stationary real exchange rate series. There are four stationary and four nonstationary real exchange rate series viz-a-viz the euro and US dollar (see Table 5 for summary). This result indicates that the ERM can be instituted given that the findings show prospect of stability. In support of this policy suggestion, the Zhou (2003) paper on the euro ERM also shows same for just four, albeit strong members of the European monetary union. However, the major concern is the CFA franc which is consistently unstable (nonstationary) across the two rates. The other concern is that it is difficult to choose between the euro and the dollar as the anchor currency for the ECO, given the equal number of stationary and non-stationary real exchange rate series. Nonetheless, the Nigerian naira is stationary (with structural breaks) across the two rates and, therefore, its preference as an anchor currency can be explored The Gambian dalasi is also stationary across both the euro and the US dollar. However, because of the size of The Gambian economy relative to the Nigerian economy, it may not be expedient to recommend the dalasi as an anchor currency.

Table 1: Descriptive statistics of ECOWAS nominal exchange rate

Unit	Currency to Euro		Currency to US Dollar	
	Mean	Std. Dev.	Mean	Std. Dev.
Cabo Verde	110.4007	0.854798	89.40868	8.625679
CFA Franc	655.957	0.00000	531.4571	51.68814
The Gambia	47.35236	7.455218	38.68647	8.388545
Ghana	3.570398	1.408759	2.994196	1.379674
Guinea	9127.545	1199.014	7454.775	1421.381
Liberia	118.6877	36.64958	97.86255	36.58126
Nigeria	253.37	65.92069	208.8583	68.98566
Sierra Leone	6690.238	1691.681	5532.041	1806.546
Obs.	132	132	132	132
Start Date	2009	2009	2009	2009
End Date	2019	2019	2019	2019

Source: Data analysis by author

Table 2: Descriptive statistics of ECOWAS real exchange rate

Unit	Currency to Euro		Currency to US Dollar	
	Mean	Std. Dev.	Mean	Std. Dev.
Cabo Verde	102.6505	1.834615	90.71913	10.51283
CFA Franc	600.7687	9.697332	530.4985	55.78620
The Gambia	37.07564	3.685594	32.63234	3.446043
Ghana	2.093841	0.229910	1.868702	0.327134
Guinea	5626.548	1129.835	4889.482	570.0732
Liberia	80.90348	11.15604	71.28176	9.479135
Nigeria	162.3660	25.42436	142.2898	16.96019
Sierra Leone	4748.003	365.9277	4198.647	378.6623
Obs.	132	132	132	132

Figure 1: ECOWAS nominal exchange rate to the Euro

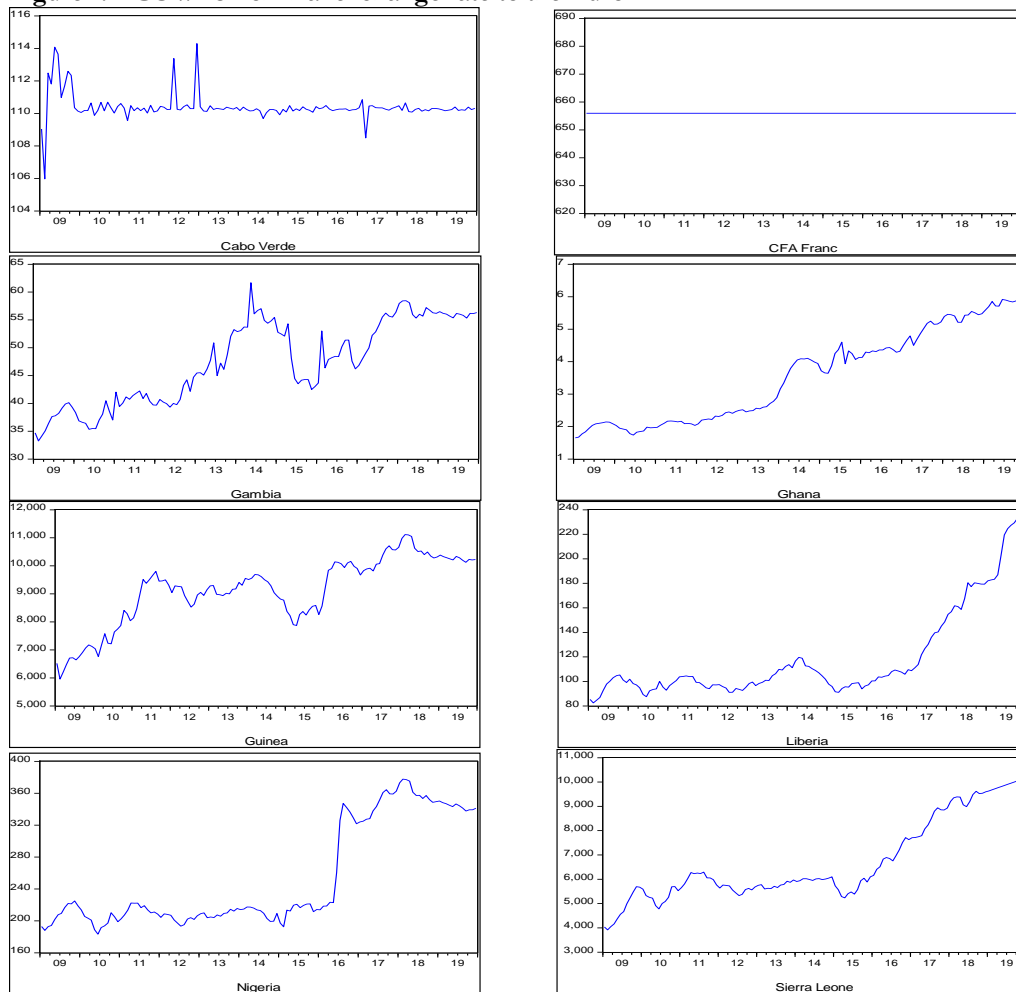


Figure 2: ECOWAS nominal exchange rate to US Dollar

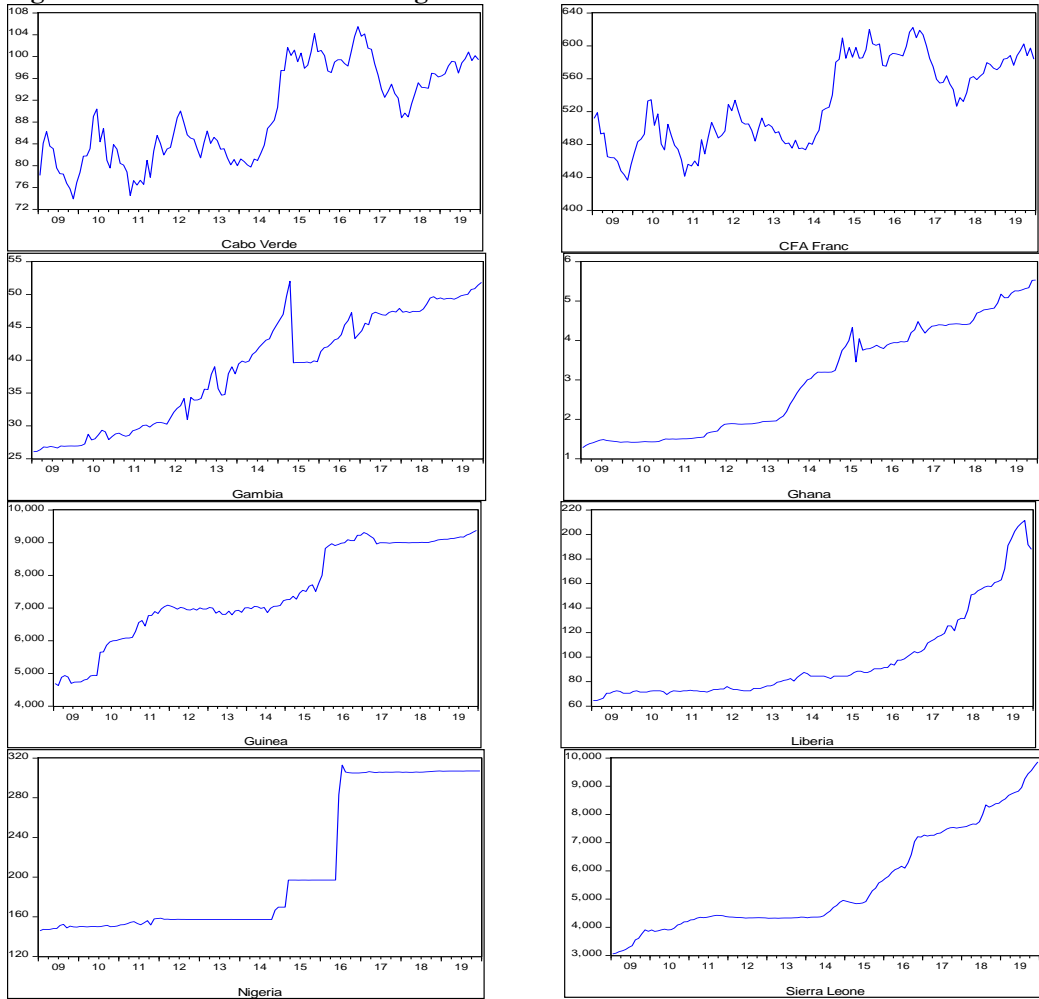


Table 3: Unit root analysis of ECOWAS real exchange rate (to Euro)

Series	ADF test		PP test		ADF_SB		Remark
	Level	1st Diff.	Level	1st Diff.	Level	1st Diff.	
Cabo Verde	-4.367***	-	-	-	-6.186***,#	-	I(0)
			4.255***		[2016M01]		
CFA Franc	-3.191*	-	-3.152*	-20.839***	-4.863*,#	-11.850***	I(1)
		8.244***			[2018M02]	[2009M10]	
The Gambia	-2.268	-	-2.410	-14.496***	-4.879***,#	-	I(0)
		14.48***			[2015M04]		
Ghana	-2.179	-	-2.418	-10.624***	-3.096^	-11.278***	I(1)
		10.54***			[2013M07]	[2015M01]	
Guinea	-2.296	-	-2.296	-10.956***	-4.170#	-11.402***	I(1)
		9.093***			[2012M04]	[2010M04]	
Liberia	-0.9513	-	-0.7223	-8.604***	-3.206#	-8.919***	I(1)
		8.520***			[2019M03]	[2018M12]	
Nigeria	-2.450	-	-1.854	-7.887***	-7.430***,#	-	I(0)
		8.082***			[2011M04]		
Sierra Leone	-4.208***	-	-3.312*	-8.104***	-4.662**^	-	I(0)
					[2011M10]		

Note: ***, **, * represent 1%, 5% & 10% significance level, respectively. Symbols '^' and '#' indicate that the underlying test equation contains 'constant only' and 'constant and trend' respectively. ADF test represents the augmented Dickey Fuller test, while PP is the Phillips-Perron test and ADF_SB is ADF based test with structural break. Level indicates that the series has not undergone any form of transformation while 1st Diff. means that the series has been differenced once. I (0) shows that series is stable at level while I(1) shows it is stable after differencing it ones.

Table 4: Unit root analysis of ECOWAS real exchange rate (to US dollar)

Series	ADF test		PP test		ADF_SB		Remark
	Level	1st Diff.	Level	1st Diff.	Level	1st Diff.	
Cabo Verde	-2.323	-	-2.501	-11.251***	-4.272*^	-11.659***	I(1)
		11.25***			[2014M08]	[2015M01]	
CFA Franc	-2.973	-	-3.110	-12.457***	-4.133^	-13.194***	I(1)
		12.50***			[2014M08]	[2011M04]	
The Gambia	-2.925	-	-2.925	-14.501***	-6.178***,#	-	I(0)
		12.91***			[2015M04]		
Ghana	-2.416	-	-2.174	-15.925***	-4.620**^	-	I(0)
		16.73***			[2013M11]		
Guinea	-1.994	-	-2.149	-11.652***	-3.863^	-13.610***	I(1)
		11.65***			[2011M08]	[2010M03]	
Liberia	0.147	-	-0.336	-9.766***	-4.668***,#	-	I(0)
		9.679***			[2019M03]		
Nigeria	-2.395	-	-2.011	-9.338***	-6.180***,#	-	I(0)
		9.443***			[2016M05]		
Sierra Leone	-2.550	-	-2.382	-7.680***	-4.196^	-8.867***	I(1)
		7.693***			[2015M07]	[2016M10]	

Note: ***, **, * represent 1%, 5% & 10% significance level, respectively. Symbols '^' and '#' indicate that the underlying test equation contains 'constant only' and 'constant and trend' respectively. ADF test represents the augmented Dickey Fuller test, while PP is the Phillips Perron test and ADF_SB is ADF based test with structural break. Level indicates that the series has not undergone any form of transformation while 1st Diff. means that the series has been differenced once. I (0) shows that series is stable at level while I(1) shows it is stable after differencing it ones.

Table 5: Summary table of unit root analysis

Unit	Currency per euro	Currency per dollar
Cabo Verde	Stationary	Non-stationary
CFA Franc	Non-stationary	Non-stationary
The Gambia	Stationary with structural break	Stationary with structural break
Ghana	Non-stationary	Stationary with structural break
Guinea	Non-stationary	Non-stationary
Liberia	Non-stationary	Stationary with structural break
Nigeria	Stationary with structural break	Stationary with structural break
Sierra Leone	Stationary with structural break	Non-stationary

4.0 METHODOLOGY

This study is guided by the purchasing power parity (PPP) theory. Under the PPP, exchange rate is determined as a reaction to restore a balance when domestic residents demand for foreign exchange because of their demand for foreign goods/assets and the supply of foreign exchange when foreign nationals demand for domestic goods/assets. The demand by the domestic and foreign nationals for goods and assets are determined by the relative prices, incomes, and interest rates; hence price differentials, income differentials, and interest rate differentials are major determinants of exchange rate. In relation to the West African currency area, the significance of the PPP suggests that the exchange rates of member countries that are set within the band of the central ECO rate oscillates to offset differentials, and in the bid to restore balance of payments equilibrium. Hence, with a focus on real exchange rate stabilisation, there will be need for frequent realignments by the Bank operating the ERM to account for the differentials that influence exchange rates in the ECOWAS area.

To determine whether the ECO currency should be backed with US dollar, Euro, Naira or CFA franc, this study conducts empirical analyses in determining the relative degrees of internationalization of the four currencies following the approach by Wu et al., (2014). Currency internationalization indicates that a currency is used by any private sector or official institutions outside its issuing country (Cohen, 1971). This is measured as the share of the reserve currency(ies) in the central banks worldwide (see Wu et al., 2014). The higher the share of the reserve currency(ies) in the central banks worldwide the better and more dependable the use of such currency as foreign reserves. This was based on the validity of the assumption of “network externality,” which suggests that many countries prefer to hold their reserves in a stable international currency.

The foregoing assumption is invoked in this study, for the ECOWAS countries, to examine the relative internationalization potentials of the Naira and the CFA, as reserves for the ECO in the ECOWAS region. In this case, the study compares the strengths of the US dollar and the Euro, already internationalized currencies with the strength of the Naira and the CFA when they are internationalized using a “counterfactual analysis”. Thus, the focus is to determine the currency with greater potential of achieving higher reserves among the already internationalized currencies (US dollar and Euro) and the currency with greater potential of achieving higher reserves among the emerging internationalized currencies (Naira and CFA franc). This specifically answers the question as to whether the ECO should be tied to the US dollar or Euro; or tied to the Naira or CFA franc.

According to Wu et al., (2014), the level of internationalization of a currency is dependent on the size of the economy, trade as well as the stability of the currency of the country. Thus, the empirical model for the analysis of currency internationalization is specified as a panel:

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \dots\dots\dots(1)$$

Here, panel OLS served as the baseline model where, Y_{it} is the ratio/percentage of an international reserve currencies i (US dollar and Euro) in the reserve holdings of the global central banks at time t ; X_{it} represents the explanatory variables which are indicators of the macroeconomic environment stability and trade performance of the home country of reserve currencies (USA and Euro Area). Specifically, the factors include the economic size measured as the GDP of the country relative to the world GDP and the total trade of the country relative to the world trade. It also includes inflation rate and the exchange rate of the country as measures of price stability.

Thus, in an elaborate form, the model can be specified as:

$$crr_{it} = \alpha + \beta_1 size_{it} + \beta_2 trade_{it} + \beta_3 inf_{it} + \beta_4 lexr_{it} + \varepsilon_{it} \dots\dots\dots(2)$$

Where crr_{it} is the currency reserve ratio, $size_{it}$ the country's GDP, $trade_{it}$ is total country trade relative to world trade, inf_{it} is inflation rate and $lexr_{it}$ is country exchange rate.

The scope of the study is 2009M1– 2019M12 with the year of the introduction of Euro as the start period and the period of available recent data as the end period.

Wu et al., (2014) noted that the relationship between currency reserves and its determinants can be nonlinear, as they stated that the currency reserves ratio responds sensitively to its determinants as the ratio goes beyond a certain “critical value” (the “tipping point”); this is referred to as the “tipping phenomenon”. To capture this, a logistic transformation was performed on Y_{it} as $\ell Y_{it} = \log(Y_{it} / 1 - Y_{it})$. Hence, equation (1) can be redefined as:

$$\ell Y_{it} = \alpha' + \beta' X_{it} + \varepsilon_{it}' \dots\dots\dots(3)$$

where α' is the constant (or intercept); β' represents the coefficients of the determinants of the currency reserves ratio; and ε_{it}' is the identically distributed error term from the nonlinear model. In an elaborate form, this model can be specified as:

$$l crr_{it} = \alpha + \beta_1' size_{it} + \beta_2' trade_{it} + \beta_3' inf_{it} + \beta_4' lexr_{it} + \varepsilon_{it}' \dots\dots\dots(4)$$

This model is expected to better fit the performance of currency reserves ratio if a nonlinear relationship truly exists.

5.0 COUNTERFACTUAL EXERCISE FOR NAIRA AND CFA

As the Naira and CFA are not readily internationalized across the West African region, this study follows the approach by Wu et al., (2014) in the case of the Chinese Renminbi (RMB), to determine the relative potentials of the Naira and CFA internationalization. Specifically, the parameters generated from equations (1) and (2) are used to perform “counter-factual simulation” for the potentials of the Naira and CFA becoming an international reserve currency within the ECOWAS region. The simulation was conducted under three basic scenarios, labelled as (A_n) in equation (3), over the 7-year forecast period of 2019 - 2025. The first scenario is considered as the baseline

scenario, this examined the case where the status quo is maintained; such that the size of the economy, trade, inflation, and the exchange rates of Nigeria and WAEMU countries continue on its natural trajectory. The second scenario is the optimistic scenario, where Nigeria and WAEMU countries experience a major increase in the size of their economies and trade, including price and exchange rate stability. The third scenario is the pessimistic scenario, where Nigeria and WAEMU countries experience a major decrease in the size of their economies and trade, including exchange rate depreciation in the nearest 7 years. Accordingly, equation (1) can be re-specified in respect of the Naira and CFA reserves as:

$$\hat{Y}_t^{A_n} = \hat{\alpha} + \hat{\beta}X_t \dots\dots\dots(5)$$

where $\hat{Y}_t^{A_n}$ is the simulated series of the percentage of Naira/CFA as an international reserve currency in the reserves holdings of central banks in West Africa under the baseline, optimistic, and pessimistic scenarios, and X_t is the list of explanatory variables for Nigeria/WAEMU. These comprise of the percentage of GDP of Nigeria/WAEMU in the total of ECOWAS GDP, percentage of external trade of Nigeria/WAEMU in the total trade by ECOWAS countries, inflation, and exchange rate of Nigeria/WAEMU. The logistic transformation for nonlinear modelling, following equation (2) is presented as:

$$\ell\hat{Y}_t^{A_n} = \hat{\alpha} + \hat{\beta}X_t \dots\dots\dots(6)$$

Where, the dependent and explanatory variables are as previously defined for equation (4). The table describing the data and its sources is presented in Table 6.

Table 6: Variables description

S/N	Variables	Acronyms	Measurement	Sources
A. Readily internationalized currencies (US dollar and Euro) Equation (1) and (2)				
1.	Share of an international reserves currency in the total reserves' holdings of the central banks in the world.	crr/lcrr	Percentage (%)/log rate	IMF COFER Database
2.	Share of GDP of the country having its currency as international reserves in the world GDP.	Size	Percentage (%)	Computed using WDI data
3.	The trade of the country having its currency as international reserves relative to the total world trade.	Trade	Percentage (%)	Computed using WDI data
4.	Domestic inflation rate for the country having its currency as international reserves	Inf	Percentage (%)	WDI
5.	National currency per SDR	Lextr	log rate	IFS

B. Emerging internationalized currencies (Naira and CFA) Equation (3) and (4)

1.	Share of an international reserves currency in the total reserves' holdings of the central banks in the ECOWAS.	Crr	Percentage (%) / log rate	Simulated
2.	Share of GDP of the country having its currency as international reserves in the ECOWAS GDP.	Size	Percentage (%)	Computed using WDI data
3.	The trade of the country having its currency as international reserves relative to the total ECOWAS trade.	Trade	Percentage (%)	Computed using WDI data
4.	Domestic inflation rate for the country having its currency as ECOWAS reserves	Inf	Percentage (%)	WDI
5.	Official exchange rate of the country having its currency as ECOWAS reserves.	Lexr	log rate	WDI

Source: *Compiled by the authors*

Note: *WDI indicates World Development Indicators, while IFS implies International Financial Statistics, IMF is International Monetary Fund and COFER is Currency Composition of Official Foreign Exchange Reserve. GDP is Gross Domestic Product; ECOWAS is Economic Community of West African States and SDR is Special Drawing Right*

6.0 RESULTS AND DISCUSSION

The results of the empirical modelling of the currency internationalization of the US dollar and Euro from the linear (equation 1) and nonlinear model (equation 2) represented in Table 7. The results show that currency internationalization is positively influenced by the size of economy of the reserve currency country. This result holds under both linear and non-linear models. Meanwhile, the adjusted R-square and F-statistics suggest that the relationship is better explained by the nonlinear model (Model 2); given their relative higher values. With positive and significant coefficient of economic size, it suggests that the currency of a country with higher size is better positioned for currency internationalization. Similar result is obtained for trade, as it also has a positive and significant effect on the share of currency of the country held as reserves globally relative to the total world reserves. It also indicates that as a country engages in more trade with the rest of the world, it has higher potential of becoming, or serving better, as an internationally-recognized currency. This result is consistent with that of Wu et al., (2014), which also find that size and trade play significant roles in determining the degree of internationalization of a currency.

Table 7: Currency internationalization and its determinants

	Model 1 (crr)	Model 2 (lcrr)
Intercept	-80.04035*** (23.8757)	-6.420445*** (1.128958)
Size	3.498532*** (0.6068004)	0.173355*** (0.0286924)
Trade	2.163164* (1.134465)	0.1051567* (0.0536429)
Inflation	-1.628492 (1.193143)	-0.0777233 (0.0564175)
Log(exchange rate)	74.02758*** (18.60095)	3.950369*** (0.8795421)
No of obs.	38	38
Adjusted R ²	0.7683	0.7944
F-stats	31.67***	36.74***

Note: ***, **, * represent 1, 5 & 10% respectively. Values in “(…)” are standard errors of the associated coefficients.

Meanwhile, both model 1 and model 2 show that inflation rate has no significant role to play in determining the suitability of a currency for internationalization. This was then dropped as part of the variables used for the simulation exercise (Wu et al., 2014). Lastly, the exchange rate was found to have a positive and significant impact on currency internationalization. This suggests that as the currency of reserve country depreciates (appreciates), its suitability for internationalization increases (decreases). Notably, a depreciation of an international currency will mean an appreciation of the currency of the countries holding reserves in such currency. A stable exchange rate is most preferred for a country having its currency held as international reserves. This is apparent as the reserve holding countries may detest any appreciation or depreciation pressure from external forces. The negative insignificant effect of inflation rate on currency internationalization was also found by Wu et al., (2014).

Table 8: Currency reserves ratio forecast for US dollar and Euro

Years	CRR_US	CRR_EURO
2017	54.813	17.6225
2018	57.9172	19.38961
2019	60.72311	20.39672
2020	60.50925	20.38392
2021	60.29499	20.37113
2022	60.08033	20.35834
2023	59.86529	20.34556
2024	59.64986	20.33279
2025	59.43406	20.32002

Source: Computed by the authors

Note: The forecast values are simulated using estimated parameters for nonlinear model (Model 2) in Table 7. The values for the exogenous variables such as the size of the economy, trade level and exchange rate were generated on the assumption that the economies remained on the current trajectory, no positive or negative structural shock. The use of exponential smoothing approach was explored in the case.

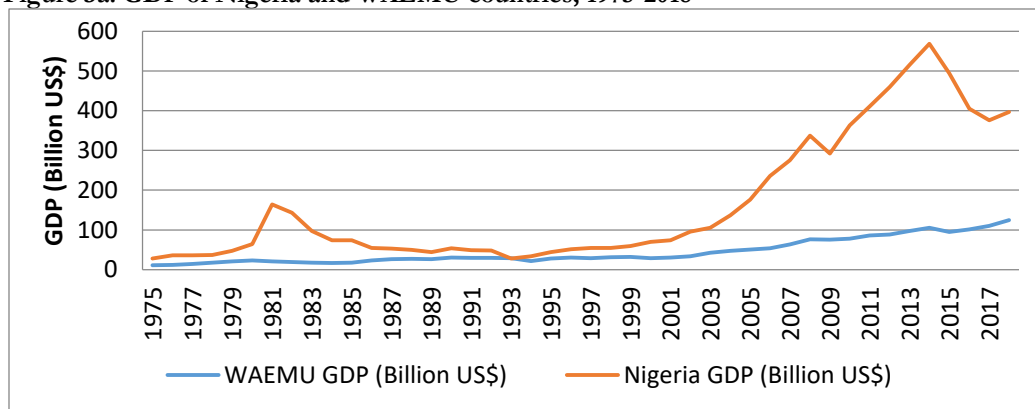
Table 8 presents the forecast for the share of US dollar reserves and Euro reserves in total reserves of the central banks in the world. Under the assumption that the economies (USA and Euro area)

experience no structural shocks before 2025, our forecast shows that the share of US dollar in world reserves will increase from its value of 57.92 percent in 2018 to 60.72 percent in 2019. It will then start to decline gradually from its value in 2019 to 60.1 percent in 2023 and 59.43 percent in 2025. The projected gradual fall in the share of US dollar in total world reserves may not be unattributed to the increasing “network externalities” of the Chinese Renminbi (RMB), as it is becoming increasingly acceptable as an international reserve currency. Notwithstanding, the share of the US dollar in the world’s reserves is almost three times as high as the share of the Euro in the world reserves before 2018 and over the forecast period (2019 - 2025). This indicates that the dominance of the internationalization of the US dollar over Euro will continue in the short- to medium-term. Hence, in the choice of currency reserves for the proposed West African ECO, the US dollar appears more dependable than the Euro. In other words, it is more dependable for the ECO to be tied to the US dollar than for it to be tied to the Euro.

6.1 Simulation for the Naira and CFA franc reserves

In a bid to analyse the relative suitability of the Nigerian Naira and the WAEMU CFA franc for internationalization and, eventually, as reserves currencies for the proposed West African ECO, the macroeconomic stability and trade potentials of the two nations, are considered. Historically, since the inception of the ECOWAS in 1975, the productivity of Nigeria has been consistently higher than that of the WAEMU countries (see Figure 3a). The gap between the productivity of the two nations became remarkably close in 1993, it has since grown wide apart to maintain a difference of US\$272.38 billion in 2018.

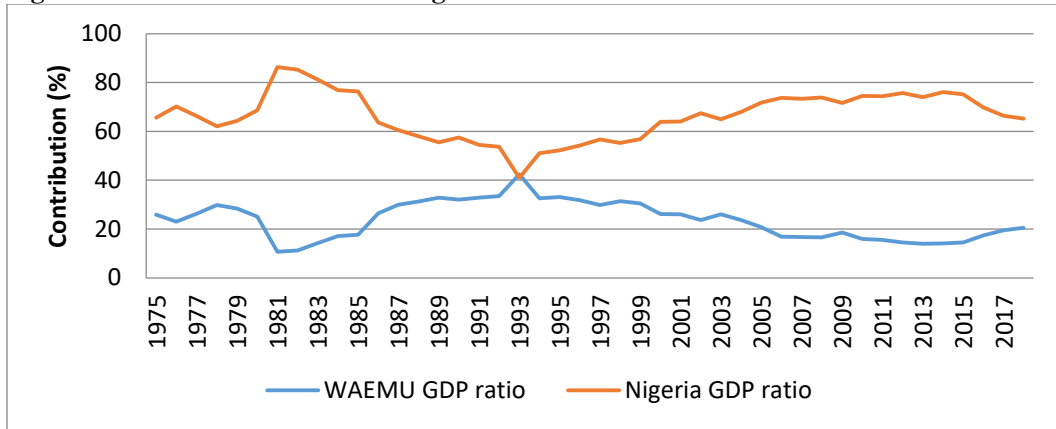
Figure 3a: GDP of Nigeria and WAEMU countries, 1975-2018



Source: World Development Indicator

In terms of their relative GDP contributions to the ECOWAS productivity (see Figure 3b), Nigeria’s contribution to the ECOWAS productivity rose from about 70 percent in the 1970s to about 86 percent in 1981. It fell to about 40 percent in 1993; while the contribution of the WAEMU increased from about 10 percent in 1981 to the historical high of about 41 percent in 1993. Historically, both Nigeria & WAEMU member staffer accounted for 97 percent of total ECOWAS productivity in 1981 and the lowest of 83.38 percent in 1993.

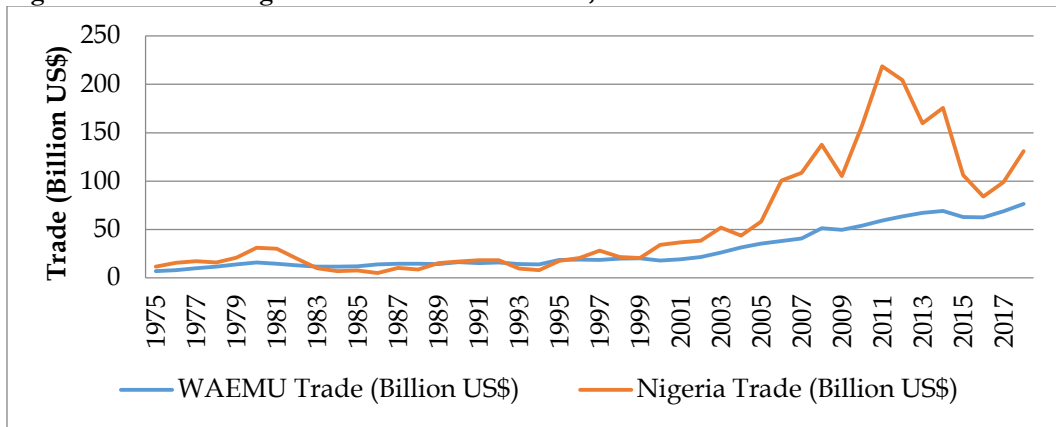
Figure 3b: Contribution of GDP of Nigeria and WAEMU countries to ECOWAS GDP



Source: World Development Indicator

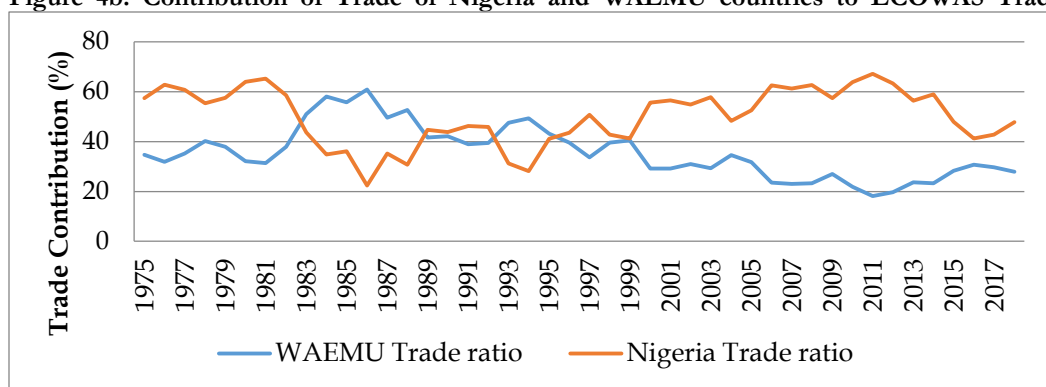
The relative size and ratio of Nigeria and WAEMU trade, is also considered in figures 4a and 4b. Figure 4a shows that the international trade level of Nigeria and WAEMU were almost similar before 1999. The trade level of Nigeria appears to grow astronomically between 1999 and 2011, rising to a high of US\$218.62 billion. It then fell to about US\$83.89 billion in 2016 before it rose again to US\$131.1 billion in 2018. Over the period 1999 to 2018, however, the WAEMU trade level is consistently below that of Nigeria, recording the historical high of US\$76.4 billion in 2018. In terms of contribution to the ECOWAS trade also, the WAEMU contributed more than Nigeria between 1983 and 1989. But since 1999, the contribution of Nigeria to ECOWAS trade has been the highest in the region, reaching 67.1 percent in 2011.

Figure 4a: Trade of Nigeria and WAEMU countries, 1975-2018



Source: World Development Indicator

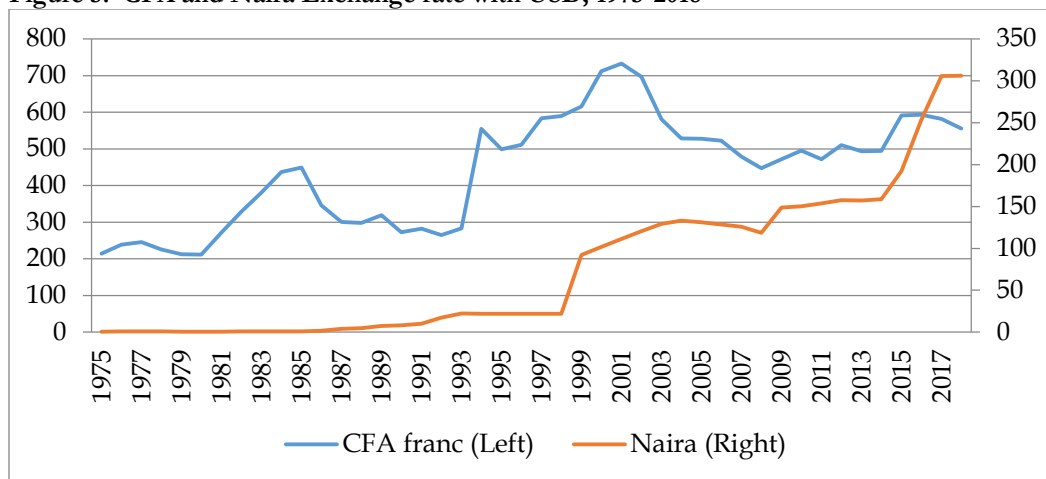
Figure 4b: Contribution of Trade of Nigeria and WAEMU countries to ECOWAS Trade



Source: World Development Indicator

Furthermore, Figure 5 shows the trend in the exchange rate of Nigeria (Naira/USD) and that of WAEMU (CFA/USD). The figure shows that both currencies have depreciated with varying degrees. In recent times, between 2017 and 2018, however, Naira has remained stable against the US dollar at the rate ₦306, while the CFA franc has appreciated from CFA 582.09/US dollar in 2017 to CFA 555.72/US dollar in 2018.

Figure 5: CFA and Naira Exchange rate with USD, 1975-2018



Source: World Development Indicator

To generate the Naira and CFA reserves as a ratio of total reserves of ECOWAS countries, equations 4 and 5 were simulated. The assumptions leading to three basic scenarios, were invoked to generate the forecast values for explanatory variables particularly the size, trade, and exchange rate. First, we have the baseline scenario, where the size, trade, and exchange rate of Nigeria and the WAEMU are expected to remain on their natural path. Second, is the optimistic assumption. This is a situation where we envisage a case for an exponential increase in the exogenous variables between 2019 and 2025. Accordingly, the size and trade level of Nigeria and the WAEMU increases, and their exchange rates are stable. Based on the observation of the relative growth rate of the size and trade level of Nigeria relative to WAEMU, the size and trade level of Nigeria was assumed to grow at double the growth rate of WAEMU's size and trade level.

Third, is the pessimistic scenario. In this situation, we imagine a drastic reduction in the exogenous variables between 2019 and 2025. Conversely, the size and trade level of Nigeria and the WAEMU are expected to decrease, and their exchange rates are expected to depreciate. Based on the observation of the relative growth rate of the size and trade level of Nigeria relative to WAEMU, the size and trade level of Nigeria was assumed to decelerate at about half the rate of WAEMU's size and trade level. In addition, the exchange rate was assumed to depreciate by 5 percent between 2019 and 2023, and by 7 percent between 2024 and 2025. Tables 9a, 9b, and 9c below present the values for the variables under the different scenarios.

Table 9a: Baseline Scenario

Years	NIGERIA			WAEMU		
	Size (%)	Trade (%)	(₦/USD)	Size (%)	Trade (%)	(CFA/USD)
2019	65.5457	46.3332	305.9956	20.19295	28.43201	563.6308
2020	65.43333	46.7874	306.022	20.28129	28.27109	561.2569
2021	65.46704	46.65114	306.0141	20.25479	28.31937	561.9691
2022	65.45693	46.69201	306.0165	20.26274	28.30488	561.7555
2023	65.45996	46.67975	306.0158	20.26035	28.30923	561.8196
2024	65.45905	46.68343	306.016	20.26107	28.30792	561.8003
2025	65.45933	46.68233	306.0159	20.26085	28.30832	561.8061

Source: Computed by the author

Note: The forecast values under the baseline scenario were determined using the Exponential smoothing approach. WAEMU is West Africa Economic and Monetary Union and USD is United State Dollars.

Table 9b: Scenario 1 - Optimistic scenario

Years	NIGERIA			WAEMU		
	Size (%)	Trade (%)	(₦/USD)	Size (%)	Trade (%)	(CFA/USD)
2019	66.17115	49.8472	306.0837	20.98741	28.89562	555.7178
2020	67.17115	51.8472	306.0837	21.48741	29.89562	555.7178
2021	68.17115	53.8472	306.0837	21.98741	30.89562	555.7178
2022	69.17115	55.8472	306.0837	22.48741	31.89562	555.7178
2023	69.67115	56.8472	306.0837	22.73741	32.39562	555.7178
2024	70.17115	57.8472	306.0837	22.98741	32.89562	555.7178
2025	70.67115	58.8472	306.0837	23.23741	33.39562	555.7178

Source: Computed by the author

Note: The forecast values under scenario 1 was determined based on the optimistic assumptions that the economic and trade size of both Nigeria and WAEMU (West Africa Economic and Monetary Union and USD is United State Dollars.) increased over the period 2019-2025, with exchange rate stability and Nigeria's size and trade rate growing at double the growth rate of WAEMU.

The simulated values for the Naira and CFA reserves as a percentage of total reserves of ECOWAS countries are presented graphically in figures 6 and 7, and in tabular form in tables 10 and 11. Apparently, the results show from the baseline scenario that the Nigerian Naira would possibly maintain a stable level of around 32 percent of the total reserves of ECOWAS countries while the WAEMU CFA would maintain fairly stable level of around 25 percent of the total reserves of ECOWAS countries. This implies that the Naira can be more internationalized in ECOWAS countries than the CFA franc. In the case of economic prosperity as assumed under the optimistic scenario, CFA franc reserves ratio increased slowly from 25.16 percent in 2019 to 26.01 in 2025 (see Table 10, Figure 6); whereas Naira reserves ratio increased at a faster rate, accelerating from 32.7 percent in 2019 to 34.4 percent in 2025 (see Table 11, Figure 7). This further reinforces the

conclusion from the baseline scenario, that the Naira can be more internationalized than the CFA in ECOWAS countries.

Table 9c: Scenario 2 - Pessimistic scenario

Years	NIGERIA			WAEMU		
	Size (%)	Trade (%)	(₦/USD)	Size (%)	Trade (%)	(CFA/USD)
2019	64.17115	45.8472	312.2054	19.98741	26.89562	566.8322
2020	63.17115	43.8472	318.4495	19.48741	25.89562	578.1688
2021	62.17115	41.8472	324.8185	18.98741	24.89562	589.7322
2022	61.17115	39.8472	331.3148	18.48741	23.89562	601.5269
2023	60.67115	38.8472	347.8806	18.23741	23.39562	631.6032
2024	60.17115	37.8472	365.2746	17.98741	22.89562	663.1834
2025	59.67115	36.8472	383.5383	17.73741	22.39562	696.3425

Source: Computed by the author

Note: The forecast values under the scenario 2 was determined based on pessimistic assumption that the economic and trade size of both Nigeria and WAEMU (West Africa Economic and Monetary Union and USD is United State Dollars.) decreased over the period 2019-2025, with exchange rate depreciation and Nigeria's size and trade rate decelerating at half the growth rate of WAEMU.

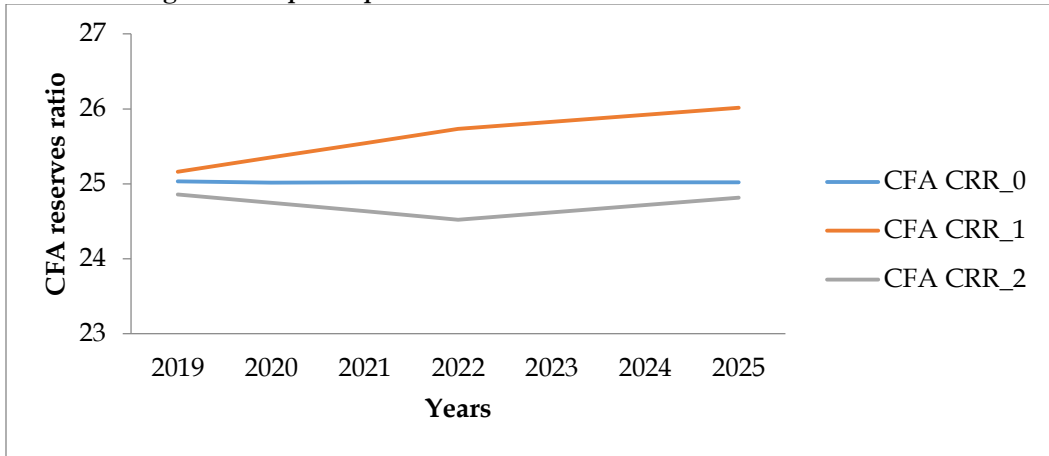
Table 10: Simulation results for CFA reserves ratio to total ECOWAS reserves

Years	CFA		
	CRR_0 (%)	CRR_1 (%)	CRR_2 (%)
2019	25.03216	25.16039	24.85796
2020	25.01362	25.35071	24.74587
2021	25.01919	25.54103	24.63377
2022	25.01752	25.73136	24.52167
2023	25.01802	25.82652	24.61925
2024	25.01787	25.92168	24.71683
2025	25.01791	26.01685	24.8144

Source: Computed by the authors

Note: CRR_0, _1 and _2 indicate currency reserves ratio (in this case, CFA reserves ratio) under the baseline, scenario 1 and scenario 2, respectively. ECOWAS is Economic Community of West African State.

Figure 6: Graphical presentation of simulated results for CFA reserves



Source: Authors computation

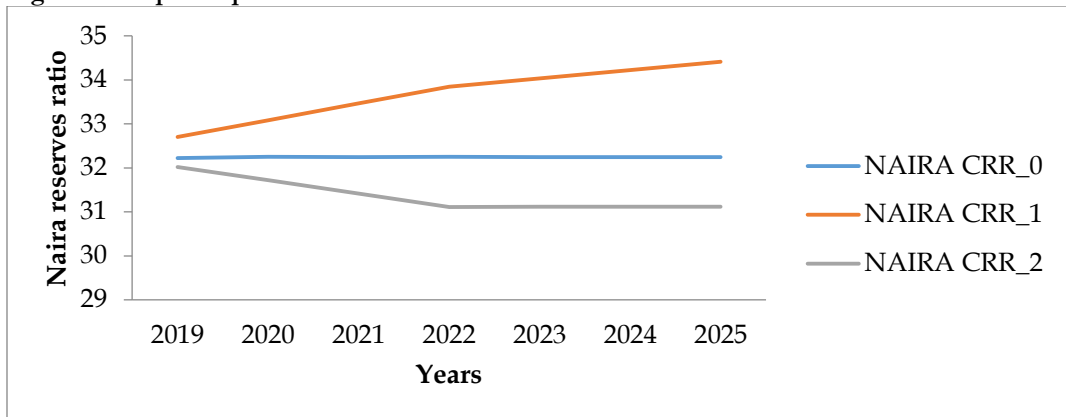
Table 11: Simulation results for Naira reserves ratio to total ECOWAS reserves

Years	NAIRA		
	CRR_0	CRR_1	CRR_2
2019	32.22678	32.70397	32.0209
2020	32.25574	33.08462	31.71848
2021	32.24705	33.46527	31.41606
2022	32.24966	33.84592	31.11364
2023	32.24888	34.03624	31.11605
2024	32.24911	34.22657	31.11847
2025	32.24904	34.41689	31.12088

Source: Computed by the authors

Note: CRR_0, _1 and _2 indicate currency reserve ratio (in this case, Naira reserves ratio) under the baseline, scenario 1 and scenario 2, respectively. ECOWAS is Economic Community of West African State.

Figure 7: Graphical presentation of simulated results for Naira reserves



Source: Authors computation

However, in the case of an adverse economic shock as assumed under the pessimistic scenario, the CFA reserves ratio decreases but was quick at recovering from the shock compared to the Naira reserves ratio. This is apparent as the CFA reserves ratio almost recovered from the shock after 6 years; as it dropped from 24.86 percent in 2019, to 24.52 percent in 2022, and later increased to 24.81 percent in 2025. On the other hand, the Naira reserves ratio dropped from 32.02 percent in 2019 to 31.11 in 2022 and remained at 31.12 from 2023 to 2025. This suggests that the CFA may serve as a better internationalized currency in the case of a negative external shock. Meanwhile, the potential for internationalization is still higher for the Naira, as it still has higher reserves ratio than CFA even during the negative external shock.

7.0 CONCLUSION AND POLICY RECOMMENDATION

This study examined whether the proposed West African ECO currency should be tied to the US dollar, Euro, Naira, or CFA. A counter-factual analysis for the determination of currency internationalization potential was employed following Wu et al., (2014). The four currencies involved were grouped into two. The first group is the group of currencies that are already internationalized, that is, the US dollar and Euro; and the second group is the group of emerging currencies for internationalization within the ECOWAS region. Empirical modelling using panel OLS was conducted on the first group and estimated parameters were used for forecasting under the assumption of a smooth economic condition. The exponential smoothing approach is employed in this regard. The empirical results show that the size of the economy, trade level, and exchange rate performance of the country whose currency is being used as international reserves play significant roles in the internationalization of the country's currency. In addition, the result of the simulation analysis shows that the US dollar has a higher internationalization potential than the Euro.

The simulation exercise was conducted for the second group of currencies, which consists of the Naira and CFA franc. This was analysed under three different scenarios as well, namely, the baseline, the optimistic, and the pessimistic scenarios. From the simulation exercise, it is observed that the Naira has a higher internationalization potential compared to the CFA franc. This result was vividly confirmed under the baseline and the optimistic scenarios. Even while the CFA franc appears to serve as a better internationalized currency in the case of a negative external shock (under pessimistic scenario), the potential for internationalization is still higher for the Naira, as the latter maintained higher reserves ratio than the CFA.

Thus, this study recommends two options for the ECOWAS region in respect of the proposed West African ECO.

- i. The first option suggests the use of the US dollar if the intention is to tie the currency to a readily internationalized currency.
- ii. The second option advocates the use of Naira if the intention is to tie the currency to a potential emerging internationalized currency.

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APPENDIX

Table A: Szroeter's test for Homoskedasticity

Variable	chi2	df	p
size	5.18	1	0.0228
trade	0.08	1	0.7745
inf	0.11	1	0.7375
lexr	0.67	1	0.4122

Note: df is degree of freedom, p is the probability value, Size is size of the country's GDP, Trade is total country trade relative to world trade, inf is inflation rate and lexr is country exchange rate.

Table B: Exponential smoothening with no seasonal effect (Reliability Test for baseline Scenario analysis).

NIGERIA	WAEMU
Trade (%)	Trade (%)
47.1635	27.8524
46.8611	27.8093
46.5587	27.7661
46.2563	27.7229
45.9538	27.6798
45.6514	27.6366
45.3490	27.5934

Source: Computed by the author