

## Single Currency and Regional Integration in The ECOWAS Region: A New Estimation Technique Using the Pseudo Maximum Likelihood Poisson with High Dimensional Fixed Effects (PPMLHDFE).

Michael Kouadio N'guessan

Institute of governance, humanities and social Sciences / Pan African University of Yaounde, Cameroon, POBox 5383 Yaounde, Cameroon

### Corresponding author:

Michael Kouadio N'guessan, Institute of governance, humanities and social Sciences, Pan African University of Yaounde, Cameroon, POBox 5383 Yaounde, Cameroon

Submitted: 18 Feb 2022; Accepted: 28 Feb 2022; Published: 12 Apr 2022

**Citation:** Michael Kouadio N'guessan. (2022). Single Currency and Regional Integration in The ECOWAS Region: A New Estimation Technique Using the Pseudo Maximum Likelihood Poisson with High Dimensional Fixed Effects (PPMLHDFE), *J Eco Res & Rev*, 2(2), 81-91.

### Abstract

*The progress of regional integration in ECOWAS is leading to the desire to create an optimal monetary zone. This desire to create an optimal monetary zone is leading to a wave of divergent views on the effect and exchange rate regime of the single currency on trade. On the one hand, WAMZ countries want to adopt it with a flexible exchange rate, while on the other hand, WAEMU countries want to adopt it with a fixed exchange rate pegged to the euro. This divergence of views is at the heart of our problem. We need to analyze the effect of this currency and its flexible exchange rate regime on regional integration, more particularly the market integration of the Economic Community of West African States. Our evaluation is based on an augmented gravity model as the basic theoretical model, with the Pseudo Maximum Poisson Likelihood with High Dimension Fixed Effects (PPMLHDFE) as the estimation method.*

*This panel study is based on data from the World Bank (WDI), IMF (DOTS) and CEPII from 2009 to 2018. The question addressed by the analysis of the potential effect of sharing a single currency on integration by the ECOWAS market, allows us to arrive at two main results. (i) The potential effect of the single currency on trade is significant, robustness tests confirm the positive effect of currency sharing on trade. (ii) The flexible exchange rate has positive effects on trade. Thus, we therefore call on the political leaders of ECOWAS countries to make efforts to meet the convergence criteria and the establishment of this single currency in order to be the foundation of the single African currency, on the one hand. On the other hand, we recommend the adoption of a single currency with a variable exchange rate with a gradual approach.*

**Keywords:** Single currency, flexible exchange rate, regional integration, gravity model, PPMLHDFE

### Introduction

Since the 1960s, African States stated the necessity of regional integration in the founding acts of continental community institutions. The Lagos Plan of Action (1980), accelerating the regional dynamics of structured development, suggests the consolidation of regional economic integration organizations. The establishment of the African Economic Community (AEC) in 1991 and the dissolution of the Organization of African Unity (OAU) to form the African Union (AU) in 2002 result from this rationality. As a result, since the 2000s, ECOWAS countries have been suggesting their desire to accelerate the monetary integration process began in the early 1980s, in order to consolidate the regional integration and to stimulate the trade. This has taken the form of a plan to cre-

ate a single currency in two stages in West Africa. In its first stage, the plan expected the launch of a single currency, the Eco, by the member countries of the West African Monetary Zone (WAMZ) in January 2015. In a second stage, WAMZ expected to merge with the West African Monetary Union (WAMU) to create a single currency for all fifteenth ECOWAS member countries by 2020.

Regional integration is a concept that has been discussing through many political and socio-economic debates in the world, and even more in Africa. Although its definition seems to be unanimous, it includes several aspects (economic, social, etc.). Consequent, according to Bela, regional economic integration is both a dynamic and static phenomenon that must be considered as a process as

---

well as a state of affairs [1]. A process leads to the gradual elimination of different discriminatory practices and a state of affairs that is characterized by the absence of such practices. Regional integration can be defined as "measures taken by governments to liberalize or facilitate trade within region " according to the World Trade Organization (2015).

Integration involves some sharing of sovereignty through the sharing of established regional institutional procedures. It gives preference to the group as a community while pursuing an ultimate goal of institutional merger. It may involve various areas of the state, including sustainable management of the economic environment, also security, human rights, education, health, research and technology or natural resources management [2]. Money is any asset that is generally accepted as payment for goods and services or repayment of debts, and is distinct from both wealth and income [3].

It is unique when it shared with several states and replaces the national currencies (Bakoup and Ndoye, 2016).

The Economic Commission for Africa (2016) assessments of the Abuja Treaty in 2015 put ECOWAS in a customs union stage, with the occurrence of delays in the implementation of the regional integration process undertaken and a slowdown in the process. According to UNCTAD (2016), it has low integration indexes, namely the trade integration index (0.442), the regional infrastructure index (0.426) and a productive integration index (0.265), compared to the EAC1 and AMU2 whose trade integration indexes are respectively (0.780) and (0.631), then the productive integration indexes are successively (0.553) and (0.481). These low indexes, with regard to the trade component of integration, lead to a weakness in trade within ECOWAS countries, which is mainly based on commodities such as cocoa, coffee, oil, cotton, etc.

Indeed, this regional trade accounts for less than 10% of the region's total exports and the cumulative value of its imports amounted to \$98.1 billion, representing about 0.59% of the total value of world imports. In sum, the total value of ECOWAS trade in goods (sum of exports and imports) estimated at \$190 billion, while regional trade accounted for only \$19.1 billion, or about 10% of total trade volume. On a worldwide scale, they only represent 0.7% of world exports and 0.5% of imports, deepening the marginalization of the continent and the ECOWAS area in particular with respect to world trade, over time compared to WAEMU countries. Trade between these countries reflect a greater dynamism than intra-ECOWAS trade, with 15.2% of total exports and 9.3% of total imports and this is due to the difference in currencies (UNCTAD, 2018).

This low level of intra-regional trade is an impediment to the potential gains of a monetary union. This idea debated according to two approaches. The first, so-called traditional approach, states that the decision to create (or enter) a monetary union depends on the expected positive externalities. The second, so-called endogenous approach, argues that monetary union acts as a subsidy to the

bilateral trade of the countries that have adopted it. Clearly, monetary unification increases the volume of trade [4-7]. While for Rose it intensifies market integration, for Santana- Gallego and Jorge exchange rate volatility is not a determinant of trade volumes or even its volatility has a negative effect on trade [8-10].

Much empirical studies have justified the positive link between single currency sharing and trade intensification. Nevertheless, it raises doubts about the existence of such link for a future currency union, especially when we consider the debates on the feasibility of the monetary union with regard to divergence views point on the adoption of the exchange regime, security crisis and the failure to comply with the convergence criteria. Theoretically, a divergence of views between the two countries could be a cause for concern, but it is not clear whether it would be possible to achieve a monetary union. From a theoretical standpoint, there is a divergence of views between the exogenous paradigm and the endogenous paradigm of the theory of optimal currency zones (OCZ). For the feasibility of a single currency, the former requires compliance with the economic criteria of the OCZs, and a good level of convergence of the economies [11-13]. The second raises a debate opposing the thesis of the virtuous circle of the OCZs (Frankel and Rose, 1998; Rose, 2000) and the thesis of the vicious circle of the OCZs [14]. Thus, for Tsangarides and Qureshi (2008), endogenous mechanisms can cause over time to make sharing a single currency beneficial.

The regional integration's process to which adding the problem of several currencies, coupled with the project of adopting the single currency such as the ECOWAS zone, as well as the nature of its exchange rate regime towards other currencies. It therefore requires looking at the potential effects and the exchange rate regime of such currency on regional integration in this REC. Indeed, while for some, the single currency intensifies trade, for others bilateral trade reacts significantly positively to currency parity (Dorn et al., 2013) or even its volatility has an intuitively significant negative effect on trade [15, 16]. What are the effects of a single currency on regional integration in the ECOWAS region? The main objective of this paper is to analyze the effect of the single currency and exchange rate variability on regional integration in the ECOWAS region.

In the analysis of bilateral trade flows, the gravity model is the most widely used. Indeed, it allows us to analyze the effect of the model's variables on trade volumes. To achieve this analysis, unlike Santos Silva and Teneyro who recommend using a Pseudo-Maximum Likelihood Poisson estimator (PPML), due to high dimensional fixed effects panels; we use the new and more robust estimation technique developed by Sergio Correia et al. "high-dimensional fixed-effects Pseudo-Maximum Likelihood Poisson estimator" [17-20]. This work will contribute to the empirical literature on the effects of a monetary union on trade in general and specifically in ECOWAS countries. It will bring out the economic policy implications of consolidating the monetary union and in-

---

creasing trade. Following this introduction, the rest of the paper structures in four sections. Section 1 concerns the literature's review. Section 2 presents the stylized facts of ECOWAS trade. Section 3 deals with the empirical strategy and Section 4 presents the discussion of the results and policy implications

## Review of the Literature

Many economists agree that mutual trade and economic openness increase between countries that share a single currency, due to lower transaction costs and a stable exchange rate regime. In addition, in the empirical literature, there is a broad consensus that a monetary union increases the volume of trade between the countries involved. Some recent studies find out a significant positive relationship between a currency union and trade, while others find a mixed result. This work has followed two lines of inquiry. The first, which follows the logic of Rose (2000), assesses the direct effect of currency unions on integration through trade. Using a panel data study covering 186 countries over the period 1970-1990, she showed that a currency union triples the volume of trade on average. According to Glick and Rose, using the gravity model, although the currency union increases the trade of countries involved about 50%; it still has different effects on the trade of some countries in the European Union [6]. For Mignamissi, the potential effect of the single currency on bilateral trade is positive and significant, but it differs across communities because of the characteristics of member countries [7]. Thus, for Sadeh, the euro, in addition to intensifying trade between the countries of the European Union, would have increased the trade of European countries that are not members of the euro zone by 35%. Studies of Qing He and al. (2019) using a gravity model, also result in the fact that monetary integration increases intra-regional trade. Moreover, the relationship between currency and trade varies with the number of member countries in the currency union and the differences in economic development of member countries [5].

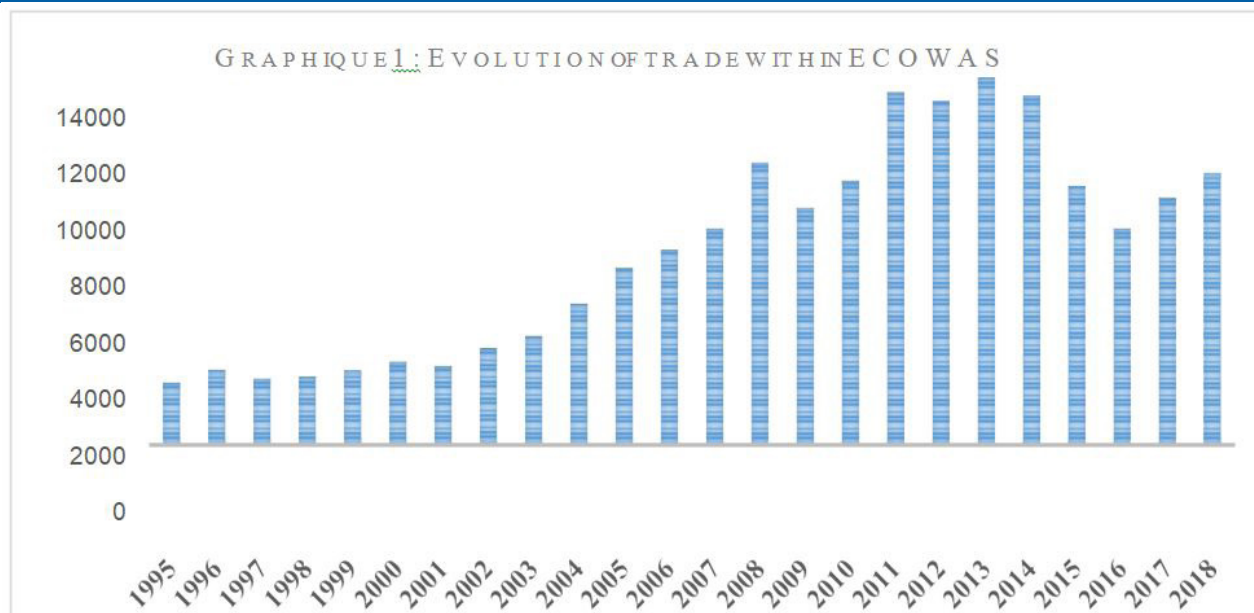
The second axis focuses attention on the effect of monetary regimes and policies on trade through an assessment of the effect of change in monetary regime on trade. It also estimates the determinants of bilateral exports. This axis shows that the positive and significant effect of monetary integration on bilateral trade weakened by the complexity of political regimes, especially as the ECOWAS space coupled with a series of elections. Other recent studies have examined the link between the single currency and trade according to Anyanwu (2003) [21]. These researches, based on an exogenous analysis, show that the African franc zone is not optimal, but tend to validate its optimality according to the endogenous approach<sup>8</sup>. Some recent research globally confirms the existence of endogenous effects of a single currency Couharde and al [22]. To these two axes, another synthesis debate concerns the variability of the exchange rate. Indeed, several authors have also analyzed the impact of the exchange rate regime on trade.

We quote among others [15, 16]. For the formers, bilateral trade responds significantly and positively to currency parity, but only after at least 8 years and remains constant thereafter. As for Miron and al, exchange rate volatility has an intuitively significant negative effect on trade while the common currency has a positive effect. Finally, studies of Santana-Gallegos and Perez-Rodríguez show that exchange rate volatility is not a determinant of trade volumes. Indeed, for them, exchange rate volatility does not positively influence trade because; it constitutes an important mean for the crisis transmissions [9, 16].

## The Stylized Facts

According to the literature on currency areas and regional integration, countries with large trade flows are more likely to form an optimal currency union, thanks in part to low transaction costs. Thus, regional integration offers unique opportunities to carry out the transformation and development of a sub-regional space. This integration faces certain obstacles. These obstacles limit trade. These include tariff and non-tariff barriers of trade, increased competition between countries due to low trade complementarity, and obstacles to the free movement of factors of production. However, like most regional integration mechanisms in Africa, ECOWAS and WAE-MU have focused primarily on border measures and tariffs that have significantly hampered all integration efforts.

Regional integration has several aspects. In the context of our research, the trade component is the one we are interested in because of the weakness of intra-community trade due to linguistic and cultural barriers within ECOWAS countries, the low level of diversification of member states' production, and the relative weakness of infrastructure (transport, energy) and the non-consolidation of the common external tariff. According to the index of Regional Integration in Africa (UNCTAD, 2016), SADC has an overall score of (0.531) higher than ECOWAS (0.509). As trade integration is a regional priority for all RECs, according to UNCTAD9 (2016), ECOWAS also has a low score (0.531) in this area. ECOWAS also has a low trade integration index score (0.442), below the average of the eight RECs (0.540), compared to the EAC (0.780), and AMU (0.631). In addition to this low level of trade integration index, there are non-tariff measures (NTMs), including domestic measures. These measures, which are more important than customs duties, also slow down intra-regional trade, as they considerably increase the cost of doing business (WTO10, 2011). The persistence of non-tariff barriers (NTBs) further hinder Intra-ECOWAS trade, particularly quantitative restrictions. These NTMs disproportionately and negatively affect small countries and producers. The total value of ECOWAS trade in goods (sum of exports and imports) estimated at \$190 billion in 2015, while regional trade accounted for only \$19.1 billion, or about 10% of total trade volume (Figure 1).



Source: Author, based on UNCTADSTAT data

Figure 1

This trade is essentially dominated by four (04) of the fifteen (15) member states (Nigeria, Côte d'Ivoire, Ghana and Senegal), which account for a large share of intra-community trade. Indeed, these four countries respectively account for 83.3% and 63.6% of intra-community exports and imports. For Mignamissi, ECOWAS represents a low weight in trade with 9.15% of intra exports in the total, compared to regions such as ASEAN, NAFTA and the EU that trade with each other at 34.47%, 51.38% and 65.18% respectively for exports, and 43.48%, 36.01% and 60.17% for imports. At the sub regional level, East Africa remains the fastest growing sub region, at 6.1% in 2017 and 6.2% in 2018 [7]. West Africa's economy grew by 3.2% in 2018, up from 2.4% in 2017. According to statistics, the share of ECOWAS exports in global exports was only 0.5% in 2017. This figure indicates the marginal role played by the region in global trade. According to UNCTAD (2018) report, countries within ECOWAS globally have an export basket dominated by primary products that are competitive in the global market but in little demand by other African countries. Indeed, the giant Nigeria exports more petroleum products. This export is directed outside the ECOWAS region. Despite, the numerous institutional measures taken by the regional economic communities to promote intra-African trade within the framework of the various regional trade agreements that they have signed. Among them, we can list the customs unions (WAEMU, UDEAC13 and SACU14). It is clear today that official trade between African countries represents only a small share of their total trade and is tending to stagnate or even decline. Intra-regional trade in Africa remains insignificant compared to their total exports outside the continent.

As regards the monetary cooperation program in ECOWAS, it is set up to accompany a process of monetary integration, the single

currency is a currency shared by several states and which replaces national currencies. It allows for the creation of a large integrated market that is conducive to the creation of large companies that can then enter the world market. However, the common currency does not allow for market integration to the same extent as the single currency. Indeed, in terms of monetary sovereignty, in a common currency countries retain their monetary sovereignty. This allows each country to pursue a monetary policy that meets its needs, if it does not harm its partners. The single currency implies a single monetary policy.

This policy, determined by the community central bank, takes into account the zone as a whole. The monetary geography of ECOWAS includes, on the one hand, the WAEMU countries and Cape Verde, whose currencies are pegged to the euro and then operate according to the principles of the Eco zone, and, on the other hand, the English-speaking countries of West Africa and Guinea, which have independent currencies. In 1987, the Authority of Heads of State and Government met in Abuja to adopt the ECOWAS Monetary Cooperation Programme (EMCP). The main objective was to achieve a harmonized monetary system through compliance with a set of macroeconomic convergence criteria<sup>8</sup> that would lead to the homogenization of the economies of member states. After 1999, the lack of political will and commitment, the lack of uniformity in the adoption of the macroeconomic framework and finally the lack of coordination and harmonization of policies between countries, led to the proposal of a two-track "fast-track" approach. In the first instance, the CMCP envisaged the launch of the WAMZ single currency and in the second instance the merger between WAMZ and WAEMU to launch the ECOWAS single currency.

After the Bamako summit in 2000, for the creation of WAMZ whose mandate was to create a common central bank and launch a common currency in 2003, the merger between WAEMU and WAMZ planned for 2004. This single currency project, which was initiated in December 2009 by the member countries of the WAMZ (Ghana, Nigeria, Guinea, Gambia and Sierra Leone) and which hopes to eventually include all ECOWAS countries, was joined by the countries of the CFA zone (Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal and Togo) in June 2013. Mainly due to the inability of WAMZ member countries to meet the convergence criteria, the CFCP has been postponed several times (2003, 2005, 2009, 2013 and 2015), although a strategy emerged in 2005. This strategy advocates moving towards another option, which is to abandon the intermediate stage of the WAMZ single currency by maintaining the creation of a single currency in 2020 for those member countries that meet the first-tier criteria. However, its implementation is proving difficult, as the path to economic convergence is rather complex. Indeed, divergences have arisen due to its peg to the euro, its fixed parity and the failure to meet the convergence criteria<sup>15</sup>. This is why, on 10 February 2020, Nigeria requested a postponement of the launch of the Eco, the single West African currency, theoretically scheduled for 1 July 2020 for the formation of an optimal monetary zone. So what are the theoretical and empirical foundations of an optimal currency area?

## Methodology

There are several techniques and methods for assessing regional trade (macroeconomic indicators such as growth and inflation, trade flows and revealed comparative advantages, etc.). Among them, the gravity model is the most suitable to forecast good results between monetary union and bilateral trade, because of its stability and robustness, although it has some criticisms regarding to border effects (common culture, distance, etc.). The gravity model proposed in this paper inspired by the empirical literature on the subject. Indeed, the gravity model continues to be mentioned as a reference model in international economics (Anderson et al, 2016; Glick and Rose, 2016). Several specifications of the gravity equation exist (see Head and Mayer, 2014).

In this paper, we chose the following specification

$X_{ijt}$ : represents the value of bilateral trade between country  $i$  and country  $j$ .

$Y_{it}$  et  $Y_{jt}$  are the Gross Domestic Product (GDP) of country  $i$  and country  $j$  ;

$Dist_{ij}$  measures the distance between country  $i$  and country  $j$ .

$\alpha$ ,  $\beta_1$  and  $\beta_2$  are coefficients;  $\beta_1$  is assumed negative while  $\beta_2$  is assumed positive.

The gravity model presented in this work takes the following general form:

$$\text{Log}(X_{ijt}) = \beta_0 + \beta_1 \text{Log}(\text{GDP}_{it}) + \beta_2 \text{Log}(\text{GDP}_{jt}) + \beta_3 \text{Log}(\text{POP}_{it}) + \beta_4 \text{Log}(\text{POP}_{jt}) + \beta_5 \text{Log}(\text{dist}_{ij}) + \beta_6 \text{MU}_{ij} + \beta_7 \text{OUV}_{ij} + \beta_8 \text{LC}_{ij} + \beta_9 \text{CE-DEAO}_{it}) + \beta_{10} \text{FRONT}_{ij} + \beta_{11} \text{Colon. Commun}_{ij} + \beta_{12} \text{NATDEMu}_{ij} + \varepsilon_{ijt}$$

$X_{ijt}$  the bilateral exports of country  $i$  to country  $j$ .

$\text{GDP}_{it}$  is the nominal GDP of country  $i$  in year  $t$ .

$\text{GDP}_{jt}$  is the nominal GDP of country  $j$  in year  $t$ .

$\text{POP}_{it}$  is the population of country  $i$  in year  $t$ .

$\text{POP}_{jt}$  is the population of country  $j$  in year  $t$ .

$\text{Dist}_{ij}$  is the distance between countries  $i$  and  $j$ .

Among the dummy variables,  $\text{MU}_{ij}$  is the variable simulating the sharing of the single currency, taking the value 1 if countries  $j$  and  $i$  belong to the same monetary union, and 0 otherwise.

$\text{OUV}_{ij}$  is a dummy variable, which is 1 if the countries have both access to the sea, and 0 otherwise.

$\text{ECOWAS}_{ij}$  is the expression of a membership of the trade partners  $i$  and  $j$  to the same sub- regional space. This variable takes the value 1 if country  $i$  belongs to the ECOWAS space and country  $j$  does not. In other words, if both countries belong to the ECOWAS region the modality is 0.

$\text{LC}_{ij}$  represents the common official language between the trading partners: taking the value 1 if the countries share the same language, and 0 otherwise.

$\text{FRONT}_{ij}$  represents the common border between the countries: taking the value 1 if the countries share the same border, and 0 otherwise.

$U_{ij}$  is the variable simulating the sharing of the single currency, taking the value 1 if countries  $i$  and  $j$  share the same currency, and 0 otherwise.

$\text{NATDEMu}_{ij}$  is the variable measuring the exchange rate regime between trading partners. It is assumed to be flexible (1) between country  $i$  and country  $j$ , if country  $i$  belonging to the ECOWAS space has as a trading partner a country  $j$  not belonging to this space and fixed (0) between country  $i$  and country  $j$  belonging to the ECOWAS space.

$\varepsilon_{ijt}$  is the error term.

The originality of this study, compared with previous studies, is to see with what intensity the future single ECOWAS currency and its exchange rate regime could affect the trade of these countries, while using a new more robust estimation technique (PPMLHDFE) and more recent data.

### The Estimation Technique and Data Sources

The management of the problem of zero flows of the dependent variable has always been a subject of debate in the gravity model literature, as these zero flows lead to a loss of information. The inability of log-linear specifications to deal effectively with this problem has directed the debate towards non-linear specifications, of which Santos-Silva and Tenreyro propose the log-linear form as a strategy for overcoming the inconsistency arising from the use of OLS. However, due to the presence of heteroskedasticity and zero flows in the dependent variable, the assumption of a lognormal distribution of the error terms of the log-linear model violated [17].

Santos-Silva and Tenreyro recommend the use of the Poisson Pseudo Maximum Likelihood (PPML) estimator in this context. However, in the context of this work, due to the presence of fixed effects, the large number of zero values in the dependent variable and the multiple sources of heteroscedasticity with which the panel data are confronted, we use, contrary to the other authors, a new estimation technique called the In contrast to other authors, we use a new estimation technique known as the Poisson rapid estimation technique with high-dimensional fixed effects (PPMLHDFE) [17-19].

Indeed, this estimator, according to, then (Sergio Correia et al., 2019), in addition to taking into account the advantages of the Poisson estimator (PPML), it also has the advantage of controlling several fixed effects [23]. It implements a new and more robust approach to check the existence of (pseudo) maximum likelihood estimates. It also allows controlling multiple sources of heterogeneity while speeding up compared to existing algorithms for non-linear estimation of high-dimensional fixed effects. It also has the advantage of leading to a faster calculation of the parameters of interest while eliminating some unnecessary steps (number of iterations).

The variables used in this work are of two types: quantitative variables and dummy variables. Our sample covers the ECOWAS countries (exporting countries), plus their partners. These partners were choosing according to the trade volume of ECOWAS countries towards these countries. Since 2015, the structure of ECOWAS trade with the rest of the world has been dominated by exports to the European Union (23%), whose main partners are France, Germany, Italy, Portugal, Spain, Holland, Belgium and the United Kingdom. ECOWAS also has a significant trade volume with the United States, Canada and Mexico (24%). In addition, there are South Africa, China, Japan, Brazil, India and South Korea (UNCTAD, 2018). To these potential partners, we add the 15 ECOWAS countries to this list, thus making a base with thirty- (30) partner countries with the exception of Russia and Belgium due to missing data on independent variables for the study period.

### Results of The Estimation

Variables of the model	Ordinary Least Squares	Pseudo Poisson Maximum Likelihood (PPML)	Pseudo Poisson Maximum Likelihood with high Fixed Effects (PPMLHDFE)
Single Currency	2.095*** (0.153)	1.057*** (0.209)	1.057*** (0.209)
Opening to the Sea	0.409*** (0.0959)	0.567*** (0.130)	0.567*** (0.130)
Common Border	0.650*** (0.138)	0.205 (0.203)	0.205 (0.203)
Common colonist	-1.114*** (0.186)	0.380* (0.199)	0.380* (0.199)
Common Language	0.813*** (0.147)	0.236 (0.147)	0.236 (0.147)
Ecowas	-0.365 (0.289)	-0.910*** (0.319)	-0.910*** (0.319)
Single currency's Natur	0.747***	2.037***	2.037***
Ln (PIBi) Ln (POPj)	(0.261) 1.333*** (0.0517) 0.545*** (0.0338)	(0.276) 1.008*** (0.0742) 0.696*** (0.0499)	(0.276) 1.008*** (0.0742) 0.696*** (0.0499)
Ln(PIBj)	-0.0111 (0.0116)	-0.0530*** (0.0133)	-0.0530*** (0.0133)

Ln(POPi)	-0.179***	0.00624	0.00624
Ln (distance) Constant	(0.0438)	(0.0827)	(0.0827)
	-0.953*** (0.0852)	-1.226*** (0.111)	-1.226*** (0.111)
	-28.91*** (1.235)	-22.44*** (1.412)	-22.44*** (1.412)
Observations	4,497	4,497	4,497
R-squared	0.385	0.622	0.7830
<i>Source:</i> Author, based on Stata 14 software *** p<0.01, ** p<0.05, * p<0.1			

Gambia	Central Bank of Gambia	Dalasi (GMD)	Flexible exchange 1 EUR = 55,1372 GMD
Ghana	Banque of Ghana	Cedi (GHS)	Flexible exchange 1 EUR = 6,21704 GHS
Guinea	Central Bank of Republic of Guinea	Guinea Franc (GNF)	Flexible exchange 1 EUR = 10.247,4 GNF
Liberia	Central Bank of Liberia	Liberian Dollar (LRD)	Flexible exchange 1 EUR = 214,676 LRD
Nigeria	Central Bank of Nigeria	Naira (NGN)	Flexible exchange 1 EUR = 419,412 NGN
Sierra Leone	Banque of Sierra Leone	Leone (SLL)	Flexible exchange 1 EUR = 10.382,9 SLL

The best estimator retained is the Pseudo Poisson Maximum Likelihood with Large Fixed Effects (PPMLHDFE) due to the significance of the variables of interest and the high R- squared.

### Discussion of Results and Policy Implications

The results of our econometric estimations, presented in the table above, show that our model is globally significant (Prob>chi2= 0.000). Indeed, with the exception of the traditional variable 'common settler' which is significant at the 10% level, the other variables are significant at the 1% level, except for the variables 'common language' and 'common border' which are not significant. All estimated coefficients are statistically significant at the 1% level. The coefficients of the variables for the exporting country (ECOWAS country), the partner country (ECOWAS country) and the partner country (ECOWAS country) are significant and their signs are in line with the expected ones. The coefficients associated with the variables gross domestic product of the exporting country (ECOWAS country), the partner country (ECOWAS country and other partners) and distance are elasticities. The coefficient associated with the GDP of the exporting country (ECOWAS country) indicates at a significance level of 1%, all other things being equal, that a 10% increase in the GDP of this country generates an increase of more than 10% in the export trade of ECOWAS. This result is in line with many other studies, including [24, 25]. This confirms the idea that the higher the per capita income of a country, the greater the production capacity and the volume of goods available for export. This result also indicates the country's ability to produce and export at lower costs, all other things being equal. In contrast, the effect of GDP on the importing country's trade is negative and significant. Clearly, the higher the GDP of the importing country, the lower the elasticity of demand for goods from abroad. Specifically, a 1% increase in the GDP of the importing country leads to a decrease of more than 0.050113% in trade. Our results are in agreement with those of [26]. For them, when it comes to imports, the population of this country is a good indicator of market size

that can absorb local products at lower cost. Similarly, the presence of galloping inflation in the country can discourage economic operators in importing countries, who fear importing this negative shock into their economies. A substitution effect of imported goods by domestic goods will take place in the partner countries, even if the latter are of inferior quality. Partner countries consume more of the local products they import. The analysis of the econometric results shows that, at the 1% threshold, a 1% increase in the population of the partner country results in a 0.696% increase in trade. Indeed, the larger the population of the destination country, the higher the bilateral trade. This positive sign for the population of the importing country would mean that the latter is productive and oriented towards the consumption of products, thus a factor increasing bilateral trade [7].

Our hypothesis on distance is true. The effect of distance on trade is negative as predicted. Intra- regional trade decreases with increasing distance. Its coefficient is negative and significant at 1%. Countries that are far away trade less than those that are closer together. Similar to Coulibaly, D. et al. Kothoni, R. et al our results show that a 1% increase in distance between two countries leads to a decrease in their bilateral trade of about 1.23%. This weakness could be because of the facilities offered by the global digital environment to modernize trade structures [27, 28].

Similarly, the simultaneous opening to the sea positively affects trade between countries as predicted. This dummy variable has a positive and significant coefficient at 1%. Like many other authors, we find that openness to the sea increases trade between countries 0.7621 times ( $e^{0,5665587} - 1$ ). The single currency, our variable of interest (Mu) that captures the use of the same currency positively and significantly affects trade. This confirms the hypothesis of [27, 29]. We obtain that an adoption of the single currency would improve ECOWAS bilateral trade flows by about 1.88 times. This is very much in line with studies by [5,6,30].

---

Regarding to our second variable of interest, on the exchange rate regime (flexibility), designed to capture the effect that the flexible regime of this single currency would have on trade, if adopted, seems to have a positive effect on trade of the countries in the zone. In contrast to who finds that exchange rate, variability has no significant impact on bilateral trade. We arrive at almost the same result as (Senadza and Diaba, 2018). For them, exchange rate flexibility has a negative effect on trade in the short run and a positive effect in the long run. The result of our study indicates a positive and significant coefficient at 1%. The adoption of a flexible exchange rate by ECOWAS countries towards their partner's increases trade by 6.665 times [31].

### **The Policy Implications**

The coefficients associated with the variables of the gravity model are mostly significant and also show the expected signs. These results lead us to formulate the following two main policy implications:

First, the significant influence of the single currency sharing on trade would indicate that a single currency area should, other things being equal, increase the intensity of intra-regional

trade considerably. This answers our question as to whether or not sharing a single currency is a determinant of increased trade within the ECOWAS region. In this regard, we recommend that member states to accelerate reforms relating to the harmonization of macroeconomic policies, presupposing convergence of budgetary and monetary policies (compliance with the convergence criteria), prior to the monetary union stage.

Finally, one of our recommendations concerns the exchange rate of the single currency. We recommend the adoption of a semi-flexible exchange rate regime in the first instance and in the long term a flexible exchange rate regime (gradual approach). Indeed, a flexible exchange rate could have positive effects on growth, thus on employment and the balance of trade. The evolution of the exchange rate remains for the WAEMU countries as well as for speculators and industrialists, a subject of perplexity, and a source of fragility in the future. These countries are indebted and indebted enough, and therefore vulnerable. A rise in commodity prices will create Dutch disease effects and lead to an appreciation of the real effective exchange rate (rise in the prices of tradable compared to non-tradable) and to a loss of competitiveness of the economy: this amplifies the pessimistic vision of countries in the adoption of the flexible exchange rate regime linked to other currencies. To this, it must add the sensitivity of household purchasing power to unanticipated inflation, which leads to a deterioration of the trade balance.

### **Conclusion**

The progress of regional integration in ECOWAS has led to the desire to create an optimal currency area. This stage of regional integration has given rise to a wave of divergent views on its effect

and exchange rate regime on trade. On the one hand, WAMZ countries want to adopt it with a flexible exchange rate, while on the other hand, WAEMU countries want to adopt a fixed exchange rate pegged to the euro. This divergence of views is the central point of our problem, especially when we know that its adoption has effects on the trade of countries. The question addressed by the evaluation of the potential effect that sharing a single currency would have had on integration through the ECOWAS market, allowed us to identify several factors that influence trade. To achieve this, we used a gravity model following the latest developments from Head and Mayer (2014).

The variables of distance, growth domestic product, population, exchange rate regime, openness to the sea, common settler, common border, common language and community membership, nature of the single currency, and single currency simulating the sharing of a single currency by REC member countries were selected. The present panel study based on data from the World Bank (WDI), the IMF (DOTS) and CEPII from 2009 to 2018. We estimate our equation by the Pseudo Maximum Poisson with high fixed Effects (PPMHDFFE). We find out three main results: (i) the potential effect of the single currency on bilateral trade is significant; robustness tests confirm the positive effect that currency sharing would have had on trade; (ii) a flexible exchange rate could have positive effects on trade (iii) distance is a factor limiting trade. In the meantime, we invite ECOWAS countries to make efforts to meet the convergence criteria in order to be the foundation of the single African currency. However, our study has some shortcomings, notably the lack of recent data to better express the reality. In addition, several other methods exist to quantify the nature of the exchange rate regime of the single currency.

### **Availability of Data and Materials**

Our data extracted from the World Bank WDI database (nominal GDP and population), the IMF (DOTS) data (exports and imports) and the CEPII database (distance) and from Google Earth (common language, common border, opening to the sea, common settlement and single currency). The period of study chosen is 2009-2018, mainly because of the date on which the single currency was initially planned to be introduced within ECOWAS (December 2009) and because of the availability of data on the dependent variable, which is total bilateral exports.

### **Competing Interests**

Not applicable

### **Funding**

Not applicable

### **Author's contributions**

Not applicable



---

## List of abbreviations

ASEAN: Association of Southeast Asian Nations AU: African Union

DOTS: Direction of Trade Statistics - IMF Data ECOWAS: Economic Community of West African States EMCP: Monetary Co-operation Programme

GDP: Gross Domestic Product IMF: International Monetary Fund OAU: Organization of African Unity OMZ: Optimal Monetary Zone

PPML: Pseudo Maximum Poisson Likelihood

PPMHDFE: Pseudo Maximum Poisson Likelihood with High Dimension Fixed Effects UNCTAD United Nations Conference on Trade and Development

WAEMU West African Economic and Monetary Union WAMZ: West African Monetary Zone

WDI: World Development Indicators

## Acknowledgments

I acknowledge the African Union and the Panafrican University for giving the scholarship opportunity. Acknowledgements are also due to Professor Henri Ngoa Tabi for teaching me article-writing structure.

## Authors' Information

Not applicable

## References

- Balassa, B. (1961). Towards a theory of economic integrations. *Kyklo*, 14(1), 1-17
- Rostow, W. W., & de Lavergne, P. (1997). Les etapes de la croissance economique: un manifeste non communiste. *Economica*.
- Mishkin, F. (2013). Monnaie, banque et marches financiers. *Nouveaux Horizons*. Mitrany, D. (1943). A Working Peace System.
- Frankel, J., & Rose, A. (2002). rAn Estimate of the Effect of Currency Unions on Trade and Output. *sQuarterly Journal of Economics CXVII*, 2.
- Sadeh, T. (2014). The Euro's Effect on Trade. *European Union Politics*, 15(2), 215-234.
- Glick, R., & Rose, A. K. (2016). Currency unions and trade: A post-EMU reassessment. *European Economic Review*, 87, 78-91.
- Mignamissi, D. (2018). Monnaie unique et integration par le marche en Afrique: le cas de la CEEAC et de la CEDEAO. *African Development Review*, 30(1), 71-85.
- Rose, A. (2000). One money, one market? The effects of common currencies on international trade. *Economic Policy*, 15(30), 7-46.
- Santana-Gallego, M., & Perez-Rodríguez, J. V. (2019). International trade, exchange rate regimes, and financial crises. *The North American Journal of Economics and Finance*, 47, 85-95.
- Miron, D., Miclus, P., & Vamvu, D. (2013). Estimating the Effect of Common Currencies on Trade: Blooming or Withering Roses? *Procedia Economics and Finance*, 6, 595-603.
- Mundell, R. A. (1961). A theory of optimum currency areas. *The American economic review*, 51(4), 657-665.
- McKinnon, R. I. (1963). Optimum currency areas. *The American economic review*, 53(4), 717-725.
- Kenen, P. B. (2019). The theory of optimum currency areas: an eclectic view. In *Essays in International Economics* (pp. 163-182). Princeton University Press.
- Krugman, P. (1993). On the Relationship Between Trade Theory and Location Theory. *Review of International Economics*, 1, 110-122.
- Dorn, S., & Egger, P. H. (2013). Fixed currency regimes and the time pattern of trade effects. *Economics Letters*, 119(2), 120-123.
- Miron, D., Miclus, P., & Vamvu, D. (2013). Estimating the Effect of Common Currencies on Trade: Blooming or Withering Roses?. *Procedia Economics and Finance*, 6, 595-603.
- Silva, J. S., & Tenreyro, S. (2006). The log of gravity. *The Review of Economics and statistics*, 88(4), 641-658.
- Silva, J. S., & Tenreyro, S. (2010). Currency unions in prospect and retrospect. *Annu. Rev. Econ.*, 2(1), 51-74.
- Silva, J. S., & Tenreyro, S. (2011). Further simulation evidence on the performance of the Poisson pseudo-maximum likelihood estimator. *Economics Letters*, 112(2), 220-222.
- Correia, S., Guimarães, P., & Zylkin, T. (2019). Verifying the existence of maximum likelihood estimates for generalized linear models. *arXiv preprint arXiv:1903.01633*.
- Anyanwu, J. C. (2003). Estimating the macroeconomic effects of monetary unions: the case of trade and output. *African Development Review*, 15(2-3), 126-145.
- Couharde, C., Coulibaly, I., Guerreiro, D., & Mignon, V. (2013). Revisiting the theory of optimum currency areas: Is the CFA franc zone sustainable?. *Journal of Macroeconomics*, 38, 428-441.
- Frankel Larch, M., Wanner, J., Yotov, Y. V., & Zylkin, T. (2018). Currency unions and trade: A PPML re-assessment with high-dimensional fixed effects. *Oxford Bulletin of Economics and Statistics*, 81(3), 487-510.
- Buongiorno, J. (2015). Monetary union and forest products trade—the case of the euro. *Journal of Forest Economics*, 21(4), 238-249.
- Mbouandi Njikam et Avom. (2013). L'integration par le Marche cas des Pays de la CEEAC', article. *LAREA-FSEG Universite de Yaounde II-Cameroun*.
- Avom, D., & Mignamissi, D. (2013). Evaluation et analyse du potentiel commercial dans la Communaute economique et monetaire de l'Afrique centrale (CEMAC). *L'Actualite economique*, 89(2), 115-145.
- Coulibaly, D., Gnimassoun, B., & Mignon, V. (2018). Growth-enhancing effect of openness to trade and migrations: What is the effective transmission channel for Africa?. *Journal of African Economics*, 27(4), 369-404.

28. Kothoni, R. et al. (2019). Potentiel d'expansion des échanges commerciaux entre les pays d'Afrique de l'Ouest. *Observatoire de la Francophonie économique*, OFE-*RP* no.1.
29. Baita, K. (2019). *Intégration régionale et échanges commerciaux: Une analyse empirique dans les pays de la Communauté Économique des États de l'Afrique de l'ouest (Regional Integration and Trade: An Empirical Analysis in the Countries of the Economic Community of West African States)*. Available at SSRN 3405310.
30. Mika, A., & Zymek, R. (2018). Friends without benefits? New EMU members and the "euro effect" on trade. *Journal of International Money and Finance*, 83, 75-92.
31. Geldi, H. K. (2012). Trade effects of regional integration: A panel cointegration analysis. *Economic Modelling*, 29(5), 1566-1570.
32. Candau, F., & Rey, S. (2014). The effect of the euro on aeronautic trade: A French regional analysis. *Economic Modelling*, 41, 345-355.
33. Agbodji, A. E. (2007). Intégration et échanges commerciaux intra sous-régionaux: le cas de l'UEMOA. *Revue africaine de l'intégration*, 1(1), 161-188.
34. Alesina, A., Barro, R. J., & Tenreyro, S. (2002). Optimal currency areas. *NBER macroeconomics annual*, 17, 301-345.
35. Alhassan, A., & Payaslioglu, C. (2020). Institutions and bilateral trade in Africa: an application of Poisson's estimation with high-dimensional fixed effects to structural gravity model. *Applied Economics Letters*, 27(16), 1357-1361.
36. Anderson, J. E., & Yotov, Y. V. (2010). The changing incidence of geography. *American Economic Review*, 100(5), 2157-86.
37. Anderson, J. E., & Van Wincoop, E. (2003). Gravity with gravitas: A solution to the border puzzle. *American economic review*, 93(1), 170-192.
38. Anderson, J. E. (2011). *The Gravity Model: Annual Review of Economics*.
39. Anderson, J. E., Vesselovsky, M., & Yotov, Y. V. (2016). Gravity with scale effects. *Journal of International Economics*, 100, 174-193.
40. Anderson, J. E. (1979). A theoretical foundation for the gravity equation. *The American economic review*, 69(1), 106-116.
41. Auray, S., Eyquem, A., & Poutineau, J. C. (2012). The effect of a common currency on the volatility of the extensive margin of trade. *Journal of International Money and Finance*, 31(5), 1156-1179.
42. Avom, D. (2005). Les déterminants des échanges dans la CEMAC: une évaluation empirique.
43. Ben Kahla, K., Ben Mansour, K., & Charreire-Petit, S. (2016). La protection des lanceurs d'alerte à l'épreuve des normes et des termes de référence de la Banque Africaine de Développement (BAD). *La Revue des droits de l'homme. Revue du Centre de recherches et d'études sur les droits fondamentaux*, (10).
44. Baldwin, R. (1993). The potential for trade between the countries of EFTA and Central and Eastern Europe (No. 853). CEPR Discussion Papers.
45. Benassy-Quere, A., & Coupet, M. (2005). On the adequacy of monetary arrangements in sub-Saharan Africa. *World Economy*, 28(3), 349-373.
46. Carrère, C. (2004). African regional agreements: impact on trade with or without currency unions. *Journal of African Economies*, 13(2), 199-239.
47. Carrère, C. (2013). UEMOA, CEMAC: quelle performance en matière de commerce?. *Revue d'économie du développement*, 21(1), 33-60.
48. CEDEAO. (2019). *RAPPORT DE CONVERGENCE MACROECONOMIQUE*.
49. CNUCED. (2016). *Indice de l'intégration régionale en Afrique Rapport 2016*. CNUCED. (2016). *Rapport économique sur l'Afrique*.
50. CNUCED. (2018). *Rapport sur le commerce et le développement*. CNUCED. (2018). *Rapport sur le commerce et le développement 2018*.
51. Conde, L. (2012). Thèse de Doctorat, Trois essais sur la monnaie unique de la CEDEAO et les défis associés.
52. Cîndea, I. M., & Cîndea, M. (2012). The euro effect on international trade. *Procedia-Social and Behavioral Sciences*, 58, 1267-1272.
53. Crola, J. D. (2019). *Sahel: lutter contre les inégalités pour répondre aux défis du développement et de la sécurité*. OXFAM.
54. De Sousa, J. (2012). The currency union effect on trade is decreasing over time. *Economics Letters*, 117(3), 917-920.
55. Frankel, J. A., & Wei, S. J. (1998). Regionalization of world trade and currencies: Economics and politics. In *The regionalization of the world economy* (pp. 189-226). University of Chicago Press.
56. Eaton, J., & Kortum, S. (2001). Trade in capital goods. *European Economic Review*, 45(7), 1195-1235.
57. Evenett, S. J., & Keller, W. (2002). On theories explaining the success of the gravity equation. *Journal of political economy*, 110(2), 281-316.
58. Fontagne, L., Pajot, M., & Pasteels, J. M. (2002). Potentiels de commerce entre économies hétérogènes: un petit mode d'emploi des modèles de gravité. *Economie prévision*, (1), 115-139.
59. Frankel, J., & Rose, A. (2002). *An Estimate of the Effect of Currency Unions on Trade and Output*. *Quarterly Journal of Economics* CXVII, 2.
60. Frankel, J. A., & Rose, A. K. (1998). The endogeneity of the optimum currency area criteria. *The economic journal*, 108(449), 1009-1025.
61. Friedman, M. (1953). *Essays in positive economics*. University of Chicago press.
62. Gnimassoun, B. (2020). Regional Integration: Do intra-African trade and migration improve income in Africa?. *International Regional Science Review*, 43(6), 587-631.
63. Haas, E. B. (2008). *Beyond the nation state: Functionalism and international organization*. ECPR Press.
64. Haas, E. (2020). *Uniting of Europe: Political, Social, and Eco-*

- conomic Forces, 1950-1957.
65. Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: Journal of the econometric society*, 1251-1271.
  66. Head, K., & Mayer, T. (2014). Gravity equations: Workhorse, toolkit, and cookbook. In *Handbook of international economics* (Vol. 4, pp. 131-195). Elsevier.
  67. Hove, S., Mama, A. T., & Tchana, F. T. (2015). Monetary policy and commodity terms of trade shocks in emerging market economies. *Economic Modelling*, 49, 53-71.
  68. Johnson H.G. (1970). *Further Essays in Monetary Theory*. Harvard University Press. Katayama et Melatos. (2011). The nonlinear impact of currency unions on bilateral trade. *Economics Letters*, 112, Issue 1, 94-96.
  69. Kaufmann, Hugo M. (1997). L'Union économique et monétaire européenne: une expérience dont le temps est venu ou l'a fait? *Archive of regional integration*.
  70. Dellas, H., & Tavlas, G. S. (2009). An optimum-currency-area odyssey. *Journal of International Money and Finance*, 28(7), 1117-1137.
  71. Mundell, R. A., & Swoboda, A. K. (1969). Monetary problems of the international economy. In *Conference on International Monetary Problems* (1966: University of Chicago). University of Chicago Press.
  72. McCallum, J. (1995). National borders matter: Canada-US regional trade patterns. *The American Economic Review*, 85(3), 615-623.
  73. Meade, J. E. (1955). *The theory of customs unions*. North-Holland Publishing.
  74. 2016Bahmani-Oskooee, M., & Kanitpong, T. (2019). Thailand-China commodity trade and exchange rate uncertainty: Asymmetric evidence from 45 industries. *The Journal of Economic Asymmetries*, 20, e00130.
  75. Moravcsik, A. (1991). Negotiating the Single European Act: national interests and conventional statecraft in the European Community. *International organization*, 45(1), 19-56.
  76. Madiès, M. L. P. M. T. (2007). *Les grandes questions d'économie et finance internationales*. Bruxelles. Editions de Boeck Université, 283.
  77. OMC. (2011). *Rapport sur le commerce mondial*.
  78. OMC. (2015). *L'intégration du commerce en vue de la réalisation des Objectifs de développement durable. L'intégration*.
  79. Plümper, T., & Troeger, V. E. (2007). Efficient estimation of time-invariant and rarely changing variables in finite sample panel analyses with unit fixed effects. *Political analysis*, 15(2), 124-139.
  80. He, Q., Zhang, C., & Zhu, W. (2021). Does currency matter for regional trade integration?. *International Review of Economics & Finance*, 76, 1219-1234.
  81. Rose, A. K. (2001). Currency Unions And Trade: The Effect Is Large. *Economic Policy: A European Forum*, 33(10), 449-457.
  82. Schmitter, P. C. (1970). A revised theory of regional integration. *International organization*, 24(4), 836-868.
  83. Senadza, B., & Diaba, D. D. (2017). Effect of exchange rate volatility on trade in Sub-Saharan Africa. *Journal of African Trade*, 4(1-2), 20-36.
  84. Sorgho, Z. (2013). *Modèle gravitationnel appliqué au commerce: Une «success story» dans l'étude des déterminants des flux commerciaux bilatéraux - Vue d'ensemble sur le modèle* Fondation Pour Les Etudes Et Recherches Sur Tsangarides, C. G., Ewencyk, P., & Hulej, M. (2006). Stylized facts on bilateral trade and currency unions: Implications for Africa. *Le Développement International* | F.
  85. Tavlas, G. S. (1994). The theory of monetary integration. *Open economies review*, 5(2), 211-230.
  86. Tinbergen, J. (1962). *Shaping the world economy; suggestions for an international economic policy*.
  87. Tsangarides, C. G., Ewencyk, P., & Hulej, M. (2006). Stylized facts on bilateral trade and currency unions: Implications for Africa.
  88. Tsangarides, C. G., & Qureshi, M. S. (2008). Monetary union membership in West Africa: A cluster analysis. *World Development*, 36(7), 1261-1279.
  89. VINER, J. (1950). *The Economics of customs Unions*, Tevens and Sons Ltd. Nova York.
  90. Zhao, X., & Kim, Y. (2009). Is the CFA Franc zone an optimum currency area? *World Development*, 37(12), 1877-1886.

**Copyright:** ©2022 Michael Kouadio N'guessan. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.