Nigeria versus Ghana Compatibility: Whither A Joint Monetary Union in West Africa?

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Abstract

In order to examine the effect of the level of symmetry in macroeconomic policies and trade flows on the level of synchronization of business cycles between Ghana and Nigeria as a pair of countries in West African Monetary Zone (WAMZ), an Autoregressive Distributed Lag models was adopted for this study. The augmented dickey fuller unit root test indicated that the variables used were either integrated of order zero or order one. The cusum of squares test indicated the absence of structural breaks in the model. The empirical results provided clear support for Ghana and Nigeria to proceed in the creation of the second West African monetary union with their various currencies tied to the wamz-eco while also creating an enabling environment for other countries within WAMZ to join in due course. The cyclical thrift scheme for ECOWAS countries to boost industrialization, as well as trade protection was also recommended.

1.0 *Introduction*

Since May, 1975 when the Economic Community of West African States (ECOWAS) was established, there has been progressive movement towards the creation of a monetary union in West Africa. For the French speaking West African region, there exist the West African Economic and Monetary Union (WAEMU), created in 1994 and is comprised of Benin, Burkina Faso, Cote d'Ivoire, Mali, Niger, Senegal, Togo and Guinea Bissau the only Portuguese speaking country. They have the Central Bank of West African States, in French meaning *Banque Centrale des Etats de l'Afrique de l'Ouest*(BCEAO) with a single currency known as the West African *CFA franc*, which is tied to the *euro* and guaranteed by the French treasury. For the English-speaking West African region, the West African Monetary Zone (WAMZ) created in the year 2000 has multiple central banks and multiple currencies. Gambia uses the Gambian *dalasi*, Liberia uses Liberian *dollar*, Nigeria uses Nigerian *naira*, Sierra Leone uses Sierra Leonean *leone*, Ghana uses Ghanaian *cedi*, while Guinea the only Francophone country under WAMZ uses Guinean *franc* (Tapsoba, 2009).

It has been in the agenda of ECOWAS to set-up a second West African monetary union under the umbrella of WAMZ, which would eventually merge with WAEMU as an entity, with a single currency known as the *eco*. As a result of this, a decision with reference number: A/DEC.7/12/99 was taken by the Heads of States Conference and Government, in December 1999, ratifying the adoption of Economic Community of West African States (ECOWAS) macroeconomic convergence criteria to include ten (10) indicators (WAMI, 2002). These macroeconomic convergence criteria had remained the eligibility for member countries within ECOWAS for inclusion in the potential monetary union. As a result, January, 2003 was initially due to be the commencement date of the monetary unification but the process was postponed to July 1, 2005 following the poor status of macroeconomic convergence (Essien, 2009), then to December 1, 2009, then to on or before January, 2015. Recently, ECOWAS Heads of States and Governments have compromised the convergence criteria by scaling them down to six (three primary and three secondary criteria) with an ultimate goal of merging both the WAMZ and WAEMU into a single monetary zone by January, 2020.The new primary criteria demand that every member-country's budget deficit should not be more than 3% of gross domestic product (GDP); the average annual inflation rate should be single-digit of not more than 5% by 2019;and gross reserves should not be less than three months of imports. The secondary criteria require that, the public debt to GDP ratio should not be more than 70%; Central Bank financing of budget deficit should not exceed 10%of previous year's tax revenue; and nominal exchange rate variation should be within +/-10% (Business News Staff, 2014; Ordu,2019).

Not minding the various levels of compatibility of ECOWAS countries, the WAEMU region went ahead to violate the ECOWAS agreement in late December 2019, by agreeing with France to rename the *CFA franc* currency the *eco* and to reduce the currency's ties to France. The eco would remain pegged to the *euro*, but the Central Bank of West African States will no longer be required to keep 50 percent of its foreign reserves in the French Treasury. There would also no longer be a French representative on the West African central bank's board (Madden, 2020).

However, research findings reveal that bi-directionally, a monetary union could induce regional business cycles synchronization by stimulating regional symmetry in trade flows and increasing the credibility/optimality of her complementary macroeconomic policies. On the other hand, regional symmetry in trade flows accompanied by credible/optimal macroeconomic policies could synchronize regional business cycles thereby creating a compatible condition suitable for monetary integration (Krugman, 1993; Obstfeld & Rogoff, 2000; Glick & Rose, 2002; Frankel & Rose, 2002; De Grauwe, 2009; UNCTAD, 2014). These views strengthen the position of Fiess (2005) who affirmed that:

 … if the business cycles are similar/synchronized and shocks are common, then a coordination of macro policies can become desirable, with a common currency as the ultimate form of policy coordination. On the other hand, if shocks are predominantly country-specific, then the ability to conduct independent monetary and fiscal policy is usually seen as important in helping an economy adjust to a new equilibrium.

As depicted in table 1.1, real gross domestic product growth for both Nigeria and Ghana between 2010, 2014, 2016 and 2017 shows wide disparities in business cycles fluctuations. That of Ghana fluctuated from 3.40% to 3.99% to 3.54% and up to 5.96%,while that of Nigeria which was 10.60% in 2010, went down to 6.30% in 2014, further down to -1.50% in 2016 and then to 0.77% in 2017.

Table 1.1: Real GDP growth (Annual %) for WAMZ

YEAR ECONOMY	2010	2011	2012	2013	2014	2015	2016	2017
Ghana	3.40	14.00	9.30	7.31	3.99	3.88	3.54	5.96
	10.60	4.90	4.30	5.40	6.30	2.80	-1.50	0.77

(Source: AFDB, 2018)

On issues of trade as depicted in table 1.2, the total trade balance in goods and services for Nigeria depicts a surplus in 2005 down to 2013 and then deficits in 2014 to 2016, while that of Ghana was in deficit all through 2005 to 2016. These trends in trade balance offer clues of asymmetries in the flow of trade between Nigeria and Ghana.

Table 1.2: Total trade balance in goods and services (US Dollars at current prices in millions)for WAMZ

YEAR ECONOMY	2005	2010	2011	2012	2013	2014	2015	2016
Ghana	-2711.71	-4487.95	-4908.62	-5187.15	-6292.10	-3985.61	-4310.46	-3066.61
Nigeria	24367.47	11846.26	11643.89	17649.6	22765.13	-1845.35	-23381.14	-8523.65

(Source: UNCTADstat, 2018)

As for regional imports, about ten products dominate West African regions. Fuels still hold a leading position in this list, which represents 24% of total imports, followed by motor vehicles, tractors, cycles and other vehicles. Mechanical appliances and boilers are 3rd position, machinery and electrical appliances (4th), cereals (5th), plastics (6th), works in iron, cast iron and steel (7th), pharmaceuticals (8th) and fish and seafood (9th). Nigeria and Ghana together perform 59% of the community imports against 36% for the eight countries of the West African Economic and Monetary Union. The other five countries of the ECOWAS member states realize only 5% of the community imports (ECOWAS Report, 2018).

Table 1.3: Real exchange rate index (2000 = 100) (for WAMZ)

YEAR ECONOMY	2012	2013	2014	2015	2016	2017
Ghana	0.79	0.90	1.03	1.19	1.38	1.55
Nigeria	79.80	83.15	85.49	87.00	94.10	107.46

(Source: IMF, International Financial Statistics and ADB Statistics Department, 2018)

The exchange rates index as depicted in table 1.3 reveals that between the periods 2015 to 2017 Ghana was 1.19 in 2015, 1.38 in 2016 and 1.55 in 2017, while that of Nigeria fluctuated from 87.00 in 2015 to 94.10 in 2016 and to 107.46 in 2017.

Table 1.4 shows the central government fiscal balance as percentage of GDP between 2015 and 2017 in US dollar. It is evident that all the countries are experiencing dissimilarities in fiscal deficits. That of Ghana was -5.78 in 2015, -8.45 in 2016 and -4.75 in 2017, while that of Nigeria fluctuated from -3.50 in 2015 to -4.71 in 2016 and to -4.76 in 2017.

Table 1.4: Central government fiscal balance (% of GDP) for WAMZ

YEAR ECONOMY	2010	2011	2012	2013	2014	2015	2016	2017
Ghana	-5.24	-0.87	-5.68	-8.55	-6.37	-5.78	-8.95	-4.75
Nigeria	-1.99	-1.85	-1.63	-3.18	-1.52	-3.50	-4.71	-4.76

(Source: World Economic Outlook, Country Database and ADB Statistics Department Estimates, 2018)

The money and quasi money growth in annual percentage reveal trend of asymmetries between 2014 and 2016. As reflected in table 1.5, that of Ghana was 37.05% in 2014, 25.88% in 2015 and 12.40% in 2016, while that of Nigeria fluctuated from 19.38% in 2014 to 2.55% in 2015 and to 11.56% in 2016.

Table 1.5: Money and quasi money growth (annual %) for WAMZ

YEAR ECONOMY	2010	2011	2012	2013	2014	2015	2016
Ghana	32.18	30.09	21.55	19.99	37.05	25.88	12.42
Nigeria	5.93	5.99	26.94	7.38	19.38	2.55	11.56

(Source: AFDB, 2018)

Table 1.6shows the gross external reserves in months of import between 2013 and 2015. It is evident that all the countries are experiencing trends of dissimilarities in this regard. That of Ghana was 2.81 in 2013 and 2.65 in 2014, while that of Nigeria fluctuated from 7.06 in 2013 to 5.09 in 2014 and to 5.11 in 2015.

Table 1.6: Gross international reserves in months of imports for WAMZ

YEAR ECONOMY	2010	2011	2012	2013	2014	2015	2016
Ghana	4.10	3.38	2.94	2.81	2.65	-	-
Nigeria	5.92	4.66	6.89	7.06	5.09	5.11	-

(Source: IMF, International Financial Statistics, 2018)

However, the statistical trends on the level of synchronization and the level of symmetries in business cycles, trade flows and macroeconomic policies depicted in the variables above, and the need for further clarification on the level of compatibility and preparedness for a second West African monetary union makes this research worthwhile.

2.0 Research objective

This study, in its quest for regional integration in West Africa, examines the effect of the level of symmetry in trade flows and the level of symmetry in macroeconomic policies on the level of synchronization of business cycles between Nigeria and Ghana as a pair. The magnitudes of the significant parameter estimate from available result would ascertain their level of compatibility for the formation of the second West African monetary union.

3.0 Definition of terms

3.1 Trade flows

Trade flows are the buying and selling of goods and services between countries. It measures the balance of trade or net export, i.e., the amount of goods and services a country sells to another country minus the amount of goods and services a country buys from another country. This calculation includes all international goods and services transactions and represents a country's trade balance (Long, 2009).The measurement for the level of symmetry in trade flows is the correlations of trade flows between two or more countries.

3.2 Optimal macroeconomic policy

The implementation of macroeconomic policy is usually through two sets of tools: fiscal and monetary policy. Both forms of policy are used to stabilize the economy, which usually means boosting the economy to the level of GDP consistent with full employment (Mayer, 2002).

Macroeconomic policy is optimal if it is symmetric between two or more countries and if a significant increase in this level of symmetry in monetary or fiscal policy would result in an increase in the level of synchronization of business cycles.

3.3 Level of symmetry/asymmetry

According to Collins English Dictionary (2014), symmetry/asymmetry implies similarity, correspondence, or balance among systems or parts of a system. In this work, it implies the level of similarity in co-movement of business cycles; trade flows as well as macroeconomic policy variables among pair of countries, while the level of asymmetry is the reverse of the level of symmetry and indicates the level of dissimilarity in the co-movement of variables among pair of countries.

3.4 Business cycles synchronization

Business cycles are fluctuations in aggregate economic activity. There are four stages in a complete business cycle, which are recession, through, expansion and peak. The degree of business cycle synchronization between two countries or regions is the convergence of their economic growth rates over time, characterized by the correlation of the periodic component of real GDP growth.

4.0 Empirical literature review

The empirical literatures expound on the effects of trade-integration/bilateral-trade/trade-intensity and macroeconomic policy on business cycles synchronization in Europe, Asia and America. In Africa, and above all West Africa, research work in this area is still rare. Most of the findings resulted from different methodologies such as the HP filters, the BP filters, the Generalized Method of Moment, the VAR, SVAR, FAVAR and DSGE models as the case may be. Most of the studies came to a conclusion that increase in trade-integration/bilateral-trade/trade-intensity increases business cycles synchronization (Mendoza,1991, 1995; Frankel & Rose, 1998; Fidrmuc, 2001; Bordo&Helbling, 2003; Darvas&Szapary, 2004; De Haan, et al., 2005; Akin, 2006; Jules-Armand, 2007; Chang, 2011; Pundit, 2011; Grigoli, 2008; Juvenal &Montiero, 2012, etc.). In the same vein, Calderon, Chong and Stein (2002) were of the view that a positive relationship between trade intensity and cycle correlation could potentially be due to both variables being explained by a third factor, namely, the formation of a currency union. And that the impact of trade intensity on cycle correlation is smaller the greater the production structure asymmetries between countries. However, for Artis and Zhang (1999), increased monetary integration was positively related to business cycles synchronization, while Krugman (1993) opined that integration was likely to support specialization according to the comparative advantage.

However, Kumakura (2005) deviated from the point of view of the traditional OCA theory given the speed of globalization among the Asia-Pacific countries by arguing that a monetary union enhances trade and business cycle co-movements among its member countries sufficiently as to obviate the need for national monetary policy. According to his result, although trade was relevant to the business cycles of individual countries, the main determinant of their international correlations was not the geographical structure of their trade but what they produce and export more specifically and the extent to which their output and exports were concentrated on electronic products. His work was one of the first of the kinds that proffered clues on similarities in trade patterns as a determinant factor for the synchronization of business cycles.

Jules-Armand (2007) argued that the impact of African bilateral trade on BCS was positive and robust. He tested for the 53 African countries over the 1975-2004 periods the hypothesis suggesting that monetary integration adds force to bilateral trade intensity which in turn, improves conditions for the practice of common monetary policy throughout business cycles synchronization. In addition to macroeconomic convergence criteria, the promotion of bilateral trade by dropping tariff, non-tariff and infrastructures barriers would accelerate the synchronization of African business cycles and facilitate African monetary integration. More trade thus brings African business cycles closer together and could add force to various projects of monetary integration in progress.

Finally, he opined that those results did not take into account other possible controls mentioned in recent papers such as similarity of trade and of productive structure, and that such data were very difficult to collate for African countries. So far, his paper had remained an optimistic view on African monetary integration. It provided some insights on the fact that African MUs could be self-validating through bilateral trade but the aspect of the effects of macroeconomic policies, that is, monetary and fiscal policies on business cycles synchronization were not taken into consideration. His work did not also consider the aspect of the effects of the level of symmetry in trade flows on business cycles synchronization.

Coleman (2011) contributed to the discussion on the long-term sustainability of the embryonic second monetary union in Africa, the West African Monetary Zone (WAMZ). He analyzed the level of economic and monetary integration in West Africa by analyzing the degree of growth cycle synchronization between the five candidate countries over the past thirty years.

His empirical approach improves on the standard Pearson Correlation between trend and cyclical components of GDP by analyzing a measure of co-movement at higher frequencies between computed z-scores for all possible pairings of the candidate countries. His results indicated a lack of a consistent pattern of synchronized growth cycles, which raises concerns about the economic sustainability of the WAMZ, as it implies that members may face significant stabilization costs. No investigation was made on issues in trade flows and macroeconomic policies holistically.

On the effect of macroeconomic policies, most research works reviewed revealed that the convergence of macroeconomic policies such as fiscal and monetary policies were systematically linked to business cycles synchronization (Böwer&Guillemineau, 2006; Crespo-Cuaresma, et al., 2010b; Jidoud, 2012, etc.). However, of all the works reviewed, none emphasized or addressed the issue of industrialization of UDCs and LDCs in West Africa through introduction of cyclical thrifts scheme and incentives from reserves/savings from regional countries, to stimulate investment and production, to cushion anticipated distortions/shocks before, during and after monetary integration for symmetry in trade flows and business cycles synchronization, neither did they adopted an ARDL model to examine the effect of the level of symmetry in trade flows and level of symmetry in macroeconomic policy on the level of business cycles synchronization between pair of countries in WAMZ.

5.0 Theoretical framework

The theoretical framework of this study anchors on the theory of Optimum Currency Areas (OCA) to show the relevance of establishing a monetary union in West Africa as a developing nation. 1961 was the year Mundell published a revolutionary paper in which he first developed the concept of OCA. Important contributions to expound the theory were later made by McKinnon (1963) and Kenen (1969). In general, the decision to join a currency area involves the abandonment of an independent national monetary policy to follow a unified one. This might involve the creation of a new single currency by a new independent central bank or the fixity of the national mutual exchange rates. In the latter case, a common reserve will be needed for countries to supplement their external positions vis-à-vis other member countries (Cohen, 1992). If the currency area chooses to peg its unified currency (single or multiple) to a key currency (such as US dollar or euro), it abandons the area's monetary independence for the sake of the key currency's country. Towards this decision, the OCA theory emphasizes on economic integration, that is, the synchronization of business cycles of regional countries as the main aim to join a currency area.

For regional countries to be economically integrated, that is to synchronize their business cycles, the following conditions were prescribed: there has to be free flows of goods and services within the region, i.e., production and export are widely diversified and of similar structure between countries and countries are very open to trade and trade heavily with each other, hence, there should be symmetry in trade flows; there has to be free flows of financial capital (assets) and physical capital; free flows of workers/labour i.e., there exist immigration and emigration; likewise, countries must agree to compensate each other for adverse shocks, currency union member countries must share a wide consensus on the way to deal with shocks and when the common monetary policy gives rise to conflicts of national interests, the countries that form a currency area need to accept the costs in the name of a common destiny (Mundell, 1961; McKinnon, 1963; Kenen, 1969; Baldwin &Wyplosz, 2009).

6.0 Model specification

To address the objective involving an empirical evaluation of the effect of the level of symmetry in trade flows and level of symmetry in macroeconomic policy on the level of synchronization of business cycles in WAMZ region, an augmented cum eclectic Frankel and Rose (1998) model is presented as follows:

$$BS_{ijt} = f(TF_{ijt}, MP_{ijt}, FP_{ijt}, RSV_{ijt},, FDI_{ijt}, EXR_{ijt}, u_{ijt}) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (6.1)$$

In linear form we present (6.1) as follows:

$$BS_{ijt} = \beta_0 + \beta_1 TF_{ijt} + \beta_2 MP_{ijt} + \beta_3 FP_{ijt} + \beta_4 RSV_{ijt} + \beta_5 FDI_{ijt} + \beta_6 EXR_{ijt} + +\varepsilon_{it} \dots\dots (6.2)$$

Where $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0, \beta_6 > 0$.

Where BS_{ij} represents the Level of synchronization of business cycle between countries i and j, TF_{ij} is the Level of symmetry in trade flows between countries i and j, MP_{ij} is Level of symmetry in monetary policy between countries i and j, FP_{ij} is the Level of symmetry in fiscal policy between countries i and j, while, RSV_{ijt}, FDI_{ij} and EXR_{ij} represents the Level of symmetry in external reserve, Level of symmetry in foreign direct investment inflows and the Level of symmetry in index of real exchange rates between countries i and j respectively. Here, i stands for Ghana while j stands for Nigeria.

The base model of (6.2) could be adjusted to an autoregressive distributed lag (ARDL) model to provide more efficient estimates if the variables in question are more or less integrated of order zero or order one as the case may be. The Akaike Information Criterion (AIC) was used to choose the best autoregressive distributed lag model of order one specified in the form:

$$BS_{it} = \beta_0 + \beta_1 BS_{it-1} + \beta_2 TF_{it} + \beta_3 TF_{it-1} + \beta_4 MP_{it} + \beta_5 MP_{it-1} + \beta_6 FP_{it} + \beta_7 FP_{it-1} + \beta_8 RSV_{it} + \beta_9 RSV_{it-1} + \beta_{10} FDI_{it} + \beta_{11} FDI_{it-1} + \beta_{12} EXR_{it} + \beta_{13} EXR_{it-1} + e_{it} \dots\dots\dots (6.3)$$

TheARDL model of equation (6.3) predict the impact of the level of symmetry in trade flows and level of symmetry in macroeconomic policy on the level of synchronization of business cycles. Where t in equation (6.3) is the time frame.

The variables under consideration were correlated within three-year non-overlapping intervals from 1980 to 2017 thereby reducing the number of observations/periods to eighteen.

7.0 Definition of variables

7.1 Business cycle synchronization (BS)

To measure this variable, the time series correlation coefficient between de-trended Real GDPs growth of country i and j is used as follows (Akin, 2006; Shin and Wang, 2004; Calderón, et.al, 2002):

$$BS_{ij} = corr(BC_i, BC_j)_t = \frac{cov(y_i^c, y_j^c)}{\sqrt{var(y_i^c) . var(y_j^c)}}$$

The positive coefficient indicates the business cycle synchronization between two counties i and j while its negative sign is an indication of non-synchronization. However, to avoid correlation coefficient to be bounded in the [-1: 1] interval, the correlation was computed over 3-year interval with non-overlapping window, so that the error term in a regression model with those correlation coefficients as dependent variable would be normally distributed. This is aimed at making the inference on estimated results to be unbiased. This also conforms to studies on duration of business cycles: Burns and Mitchell (1946) define the duration of a business cycle for the United States of America between a minimum of 16 and 22 months and a maximum of 100 and 106 months. For the United Kingdom the values lie between minimal 16 and 22 months and maximal 135 and 141 months. Baxter and King (1999) refer to Burns and Mitchell, but declare the minimum and maximum duration of a business cycle to be 6 and 32 quarters respectively. Where $corr(y_i^c, y_j^c)$ is the pair-wise correlation coefficient of the cyclical components of real GDP growth of country i and country j. y_i^c represents de-trended real GDP growth, i.e. the i cyclical component of real output y for country i, while y_j^c is the j cyclical component of real output y for country j and t is the time span. The measure of the cycle will be obtained by Hodrick-Prescott (HP) filtering of real output data, where $\lambda = 100$ since annual frequencies in the data was used. The values for each variable would be computed over the period 1980 to 2017.

7.2 Trade flows similarity index (TF)

Regarding the independent variables, to measure the level of symmetry in trade flows, a correlation coefficient of external trade balance in goods and services of two countries are calculated. For this, the trade flow in each country in the given time period is calculated first and the correlation coefficient between them is then estimated as follows:

$$TF_{ijt} = corr(TF_i, TF_j)_t$$

The correlation was computed over 3-year interval with non-overlapping window, so that the error term in a regression models would be normally distributed.

7.3 Monetary policy similarity index (MP)

The first measure of macroeconomic policy is the similarity in monetary policy. A correlation coefficient of broad money supply growth of two countries is calculated based on the study of (Shin, et. al, 2004). For this, the growth rate of broad money supply in each country in the given time period is calculated first and the correlation coefficient between money growths is then estimated thus:

$$MP_{ijt} = corr(MP_i, MP_j)_t$$

The correlation was computed over 3-year interval with non-overlapping window, so that the error term in a regression models would be normally distributed.

7.4 Fiscal policy similarity index (FP)

The second measure of macroeconomic policy is the similarity in fiscal policy. Fiscal shocks have strong, persistent and positive impact on output. Several papers in the literature have measured similarities in fiscal policy, using correlation coefficient or mean absolute difference of budget deficit to GDP ratios of country i and j for period t. This paper measures similarity index of fiscal policies by looking at the correlation of central government fiscal balance as a percentage of GDP for country i and j:

$$FP_{ij} = corr(FP_{it}, FP_{jt})$$

The correlation was computed over 3-year interval with non-overlapping window as well.

7.5 Similarity index of external reserve (RSV)

Given that any part of revenue generated and not spent is reserved, and external reserves in months of import is also determined by the cyclical stance of the economy. By implication, as revenues increase in periods of booms, external reserves increase as well and becomes endogenous to business cycles. Therefore, given this limitation as in the case of fiscal surplus, symmetry in reserves between two countries i and j could be correlated thus:

$$RSV_{ij} = corr(\frac{RSV_{it}}{IMP_{it}}, \frac{RSV_{jt}}{IMP_{jt}})$$

Where, RSV is the value of external reserve during months of imports. This way we trace the symmetry in reserves in order to investigate whether or not a certain percentage of proceeds from external reserves could be kept aside from regional countries to create a cyclical thrift scheme.

The correlation was computed over 3-year interval with non-overlapping window as well.

7.6 Similarity index of foreign direct investment inflows (FDI)

Another form of synchronizing bilateral business cycles is through domestic investment. Here it is envisioned that proceeds from external reserve could be used to boost industrialization through an expansion of foreign direct investment inflows. This way productivity shocks from trade and macroeconomic policies that could hinder prices and employment could be distorted. Therefore, the correlation of FDI of counties i and j are adopted as the index of FDI inflows, thus:

$$FDI_{ijt} = corr(FDI_i, FDI_j)_t$$

To avoid correlation coefficient to be bounded in the [-1: 1] interval, the correlation was computed over 3-year interval with non-overlapping window as well.

7.7 Similarity index of real exchange rates (EXR)

Another indicator of monetary policy coordination is the stability of bilateral exchange rate. The exchange rate would justify the need for a single currency given the level of similarity in exchange rate that could synchronize business cycles. Here it is measured by the use of Pearson correlation between two regional countries.

$$EXR_{ijt} = corr(EXR_i, EXR_j)_t$$

Where EXR_i is the index of real exchange rate for country i and EXR_j for country j.

The correlation was computed over 3-year interval with non-overlapping window as well.

8.0 Sources of data

The dataset used for this research contains yearly observations dating from 1980 to 2017 due to lack of availability of monthly and quarterly series. The available data was obtained from World Development Indicator (2018), United Nations Commission on Trade and Development (UNCTAD) database (2018), IMF, International Financial Statistics (2018), Socio-economic data base of AFDB (2018), and Global Economic Monitor (2018).

9.0 Presentation and analysis of result

9.1 Augmented dickey fuller unit roots test:

Table 9.1: Unit root test for the variables in the level of synchronization of business cycle equation between Ghana and Nigeria

Variable	Level		First difference		I
	τ	5%	τ	5%	
BS	-4.7701	-3.0656	-5.5760	-3.0810	I(0)
TF	-4.5599	-3.0522	-4.4483	-3.1199	I(0)
MP	-5.1053	-3.0522	-7.0234	-3.0810	I(0)
FP	-3.9467	-3.0522	-5.7472	-3.0989	I(0)
RSV	-6.5550	-3.0522	-4.9018	-3.0810	I(0)
FDI	-3.0670	-3.0656	-3.6760	-3.0810	I(0)
EXR	-2.5077	-3.0522	-3.8609	-3.0656	I(1)

Note: τ= computed t-value; 5% = critical value; I = order of integration; I(0) = integrated of order zero; I(1) = integrated of order one; BS- Level of synchronization of business cycle between Ghana and Nigeria;

TF- Level of symmetry in trade flows between Ghana and Nigeria; MP- Level of symmetry in monetary policy between Ghana and Nigeria; FP- Level of symmetry in fiscal policy between Ghana and Nigeria; RSV- Level of symmetry in external reserve between Ghana and Nigeria; FDI- Level of symmetry in foreign direct investment inflows between Ghana and Nigeria; EXR- Level of symmetry in real exchange rate index between Ghana and Nigeria

(Source: Author's computation)

The augmented dickey fuller unit roots test of table 9.1 was performed on the variables of the study and the test indicated that some of the variables in the Ghana-Nigeria equation specified were integrated of order zero except the level of symmetry in exchange rate index which was integrated of order one at 5% level of significance.

9.2 Cesium of squares test for structural breaks for Ghana and Nigeria

Fig. 9.1: Dependent Variable: Level of business cycles synchronization between Ghana and Nigeria (BS)
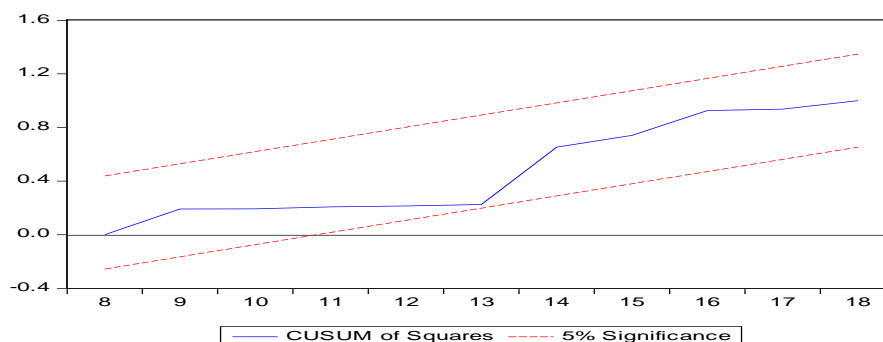
The cusum of squares test of fig. 9.1 revealed that all the variables in the business cycles model had no structural break. This is because the variables lie within the 5 per cent significance boundary. The reason behind this is the fact that the level of synchronization of business cycles and the level of symmetry of the explanatory variables among the pair of countries ware first determined with the aid of Pearson correlation within the three-year non-overlapping window.

Table 9.2: Autoregressive Distributed Lagresult for Ghana and Nigeria as apair

Dependent variable: Level of synchronization of business cycle between Ghana and Nigeria			
Indep. Variables	Coefficients	t-statistic	Prob. Value
BS(-1)	-0.49*	-2.90	0.00
TF	0.88*	4.97	0.00
TF(-1)	0.64*	4.67	0.00
MP	0.11	1.01	0.31
MP(-1)	0.79*	4.05	0.00
FP	1.17*	7.30	0.00
FP(-1)	0.88*	8.16	0.00
RSV	0.25*	2.71	0.01
FDI	-0.66*	-3.59	0.00
FDI(-1)	1.25*	5.53	0.00
EXR	-0.91*	-3.98	0.00
EXR(-1)	-0.36	-1.67	0.10
Constant	0.96*	6.83	0.00
R-Squared	0.81		
Chi-squared	168.52*		
Prob. of Chi-squared	0.00		

Note: *= 1 percent level of significance; **= 5percent level of significance; (-1) = one period lag of the variable
BS- Level of synchronization of business cycle between Ghana and Nigeria; TF- Level of symmetry in trade flowsbetween Ghana and Nigeria; MP- Level of symmetry in monetary policybetween Ghana and Nigeria; FP- Level of symmetry in fiscal policybetween Ghana and Nigeria; RSV- Level of symmetry in external reservebetween Ghana and Nigeria; FDI- Level of symmetry in foreign direct investment inflowsbetween Ghana and Nigeria; EXR- Level of symmetry in real exchange rate indexbetween Ghana and Nigeria

(Source: Author's computation)

9.3 Autoregressive Distributed Lag result for Ghana and Nigeria as a pair

The result of table 9.2below reveals that one per cent increase in the level of symmetry in trade flows between Ghana and Nigeria in a given period would result in an immediate increase in the level of synchronization of business cycle between Ghana and Nigeria by 0.88 per cent and an increase in the level of synchronization of business cycle between both countries by 0.64 per cent one period after. Likewise, one per cent increase in the level of symmetry in monetary policy between both countries in a given period is associated with an immediate increase in the level of synchronization of business cycle between Ghana and Nigeria by 0.11 per cent and an increase in the level of synchronization of business cycle between both countries by 0.79 per cent one period after.

The result also shows that one per cent increase in the level of symmetry in fiscal policy between Ghana and Nigeria in a given period is associated with an immediate increase in the level of synchronization of business cycle between Ghana and Nigeria by 1.17 per cent and an increase in the level of synchronization of business cycle between both countries by 0.88 per cent one period after. A one per cent increase in the level of symmetry in external reserve between Ghana and Nigeria in a given period is associated with an immediate increase in the level of synchronization of business cycle between both countries by 0.25 per cent.

Also, one per cent increase in the level of symmetry in foreign direct investment inflows between Ghana and Nigeria in a given period would result in an immediate decrease in the level of synchronization of business cycle between Ghana and Nigeria by 0.66 per cent and an increase in the level of synchronization of business cycle between them by 1.25 per cent one period after.

Finally, one per cent increase in the level of symmetry in real exchange rate index between Ghana and Nigeria in a given period would result in an immediate decrease in the level of synchronization of business cycle between them by 0.91 per cent and a decrease in the level of synchronization of business cycle between both countries by 0.36 per cent one period after.

The probability value of 0.00 for each indicates that the coefficient of the level of symmetry in trade flows and its one period lag are statistically significant at one per cent level respectively, while the probability value of 0.31 and 0.00 for each reveal that the coefficient of the level of symmetry in monetary policy is statistically insignificant at five per cent level, while its one period lag is statistically significant at one per cent level.

The coefficient of the level of symmetry in fiscal policy and its one period lag are both statistically significant at one per cent level given their respective probability value of 0.00, while the coefficient of the level of symmetry in external reserves is statistically significant at one per cent level given the probability values of 0.01. Likewise, with the probability value of 0.00 for each, the coefficient of the level of symmetry in foreign direct investment inflows and its one period lag are both statistically significant at one per cent level, while with the probability value of 0.00, the coefficient of the level of symmetry in real exchange rate index is statistically significant at one per cent level, but the coefficient of its one period lag is statistically insignificant at five per cent level with a probability value of 0.10.

The R-squared value of 0.81 indicates that the variations in the level of synchronization of business cycle between Ghana and Nigeria is explained by 81 per cent variation in the explanatory variables which includes the level of symmetry in trade flows and its one period lagged value, the level of symmetry in monetary policy and its one period lag, the level of symmetry in fiscal policy and its one period lag, the level of symmetry in external reserves, the level of symmetry in foreign direct investment inflows and its one period lag and the level of symmetry in real exchange rate index as well as its one period lag. The probability value of Chi-squared of 0.00 indicates that the regression equation between Ghana and Nigeria as a pair is statistically significant at one per cent level.

By implication, the coefficients of the level of symmetry in trade flows and its one period lag, the level of symmetry in monetary policy and its one period lag, level of symmetry in fiscal policyand its one period lag, the level of symmetry in external reserves, the level of symmetry in one period lag in foreign direct investment inflows all conformed to the theoretical expectations. Whereas, the coefficients of the level of synchronization of business cycles lag one period, the level of symmetry in foreign direct investment inflows, as well as the level of symmetry in real exchange rate index and its one period lag never conformed to the theoretical expectations.

10.0 Conclusion/Recommendations

This work provides an answer on the compatibility and feasibility of creating a second West African monetary union. Ghana and Nigeria are a pair of countries within ECOWAS whose level of symmetry in trade flows, monetary and fiscal policies could synchronize her business cycles.For this pair, the level of symmetry in their index of exchange rate does not seem to synchronize their business cycles. As a result, there must be a strong exchange rate alignment in the course of pegging the Ghanaian cedi and Nigerian naira to the *wamz-eco*.

The Nigerian naira and Ghanaian cedi should continue to thrive but multilaterally tied/pegged to a single currency the *wamz-eco* while paving ways for the individual currencies to eventually culminate. The cyclical thrift scheme would offer an enabling environment for improved level of industrialization to boost productions, employment as well as regional trade given the level of exchange rate alignment. Attention must be centered on domestic investment by compelling the various countries under WAMZ to plunge a certain percentage of internally generated revenue or from external reserves into the cyclical thrift scheme in order to boost industrialization within ECOWAS region.

References

Akin, C. (2006). Multiple determinants of business cycle synchronization. Paper presented at the 2006 Annual Meeting of the Canadian Economic Association, Montreal.

Artis, M. J., & Zhang, W. (1999). Further evidence on the international business cycle and the ERM: Is there a European business cycle? *Oxford Economic Papers*, 51, 120-132.

Baldwin, R. &Wyplosz, C. (2009). *The Economics of European Integration*, 3rd Ed, McGraw Hill Higher Education.

Baxter, M., & King, R. G. (1999). Measuring business cycles: Approximate band-pass filters for economic time series, *The Review of Economics and Statistics,* 81(4), 575–593.

Bordo, M. D, &Helbling, T. (2003). Have national business cycles become more synchronized? *NBER Working Paper*, (10130).

Böwer, U. &Guillemineau, C. (2006). Determinants of business cycle synchronization across euro area countries, *ECB working paper series*, (587).

Burns, A. M., & Mitchell, W. C. (1946). *Measuring Business Cycles*, Vol (2), National Bureau of Economic Research, New York.

BusinessNews Staff (2014). ECOWAS Relaxes Compliance Criteria to Hasten Monetary Union by 2020.
http://businessnews.com.ng/2014/07/16/ecowas-relaxes-compliance-criteria-hasten-monetary-union-2020/

Calderón, C., Chong, A. & Stein, E. (2002). Trade intensity and business cycle synchronization: Are developing countries any different? *Working Papers of the Central Bank of Chile,*Huérfanos 1175, 1-39.

Chang, H. (2011). Macroeconomic synchronization and policy coordination after regional economic integration in the Americas, *IdeAs*, 1, 1-21.
http://ideas.revues.org/60

Cohen, B. J. (1992). *The New Palgrave Dictionary of Money and Finance*. London: The Macmillan Press Limited.

Coleman, S. (2011). Investigating Business Cycle Synchronization in West Africa, *Discussion Papers in Economics*, 2011(1).

Collins English Dictionary (2014). 12th Edition, HarperCollins Publishers

Cooper, R., &Kempf, H. (2004). Overturning Mundell: Fiscal policy in a monetary union, *Review of Economic Studies,* 71(2), 371- 396.

Crespo-Cuaresma, J., Pfaffermayr, M., Fernández-Amador, O. & Keppel, C. (2010b). Macroeconomic aspects of European integration: Fiscal policy, trade integration and European business cycle, *FIW-Research Report,* 04, 1-35.

Darvas, Z., &Szapáry, G. (2004). Business cycle synchronization in the enlarged EU: comovements in the new and old members, *Central Bank of Hungary Working Paper,* No. 2004/1.

De Grauwe, P., (2009). "Top-down versus Bottom-up Macroeconomics", paper presented at the DG ECFIN Annual Research Conference, Brussels, 15-16 October 2009

De Haan, J., Inklaar, R., & Jong-A-Pin, R. (2005). Will business cycles in the Euro Area converge? A critical survey of empirical research, *CCSO Working paper*, 2005/08.

ECOWAS Report (2018).
http://www.ecowas.int/doing-business-in-ecowas/import-and-export/

Fidrmuc, J. (2001). The endogeneity of the optimum currency area criteria, intra-industry trade, and EMU enlargement, *LICOS Discussion Paper*, Centre for Transition Economics.

Fiess, N. (2005). Business cycle synchronization and regional integration: A case study of Central America, *World Bank Policy Research Working Paper*, 3584, 1-19.

Frankel, J. A., & Rose, A. K. (1998). The endogeneity of the optimum currency area criteria, *Economic Journal*, 108(449), 1009-1025.

Frankel, J. A., & Rose, A. K. (2002). An estimate of the effect of common currencies on trade and income, *The Quarterly Journal of Economics*, 117(2), 437–466.

Glick, R.& Rose, A. K.(2002). Does a Currency Union Affect Trade? The Time Series Evidence, *NBER Working Paper*, No.8396.

Grigoli, F. (2008). The impact of trade integration on business cycle synchronization for Mercosur Countries, *Liuc Papers,* No. 222.

Jidoud, A. (2012). The Sources of Macroeconomic Fluctuations in Sub-Saharan African
Economies: An application to Cote d'Ivoire. Toulouse School of Economics (TSE-GREMAQ).

Jules-Armand, T. (2007). Bilateral trade and business cycles synchronization: African monetary integration perspective, *Economic Bulletin, 6*(25), 1-15.

Juvenal, L., & Monteiro, P. S. (2012). Trade and synchronization in a multi-country economy, *Working Paper,* Research Division, Federal Reserve Bank of St. Louis. 1-48. http://research.stlouisfed.org/wp/2010/2010-038.pdf

Kenen, P (1969). "The Theory of Optimum Currency Areas: An Eclectic View," in Robert Mundell and Alexander Swoboda (eds), *Monetary Problems of the International Economy*, Chicago: University of Chicago Press (1969), pp.41-60.

Kumakura, M. (2005). Trade and business cycle correlations in Asia-Pacific, *Institute of Developing Economies (IDE) Discussion Paper*, Vol. 44.

Kose, M. A., Prasad, E. S., & Terrones, M. E. (2003). How does globalization affect the synchronization of business cycles? *American Economic Review*, 93, 57–62.

Krugman, P. (1993). Lessons of Massachusetts for EMU. In F. Torres & F. Giavazzi (Eds.), Adjustment and Growth in the European Monetary Union (pp. 241-261). New York: Cambridge University Press and CEPR.

Long, T. (2009). Trade Flows and Capital Flows.
https://www.dailyfx.com/forex/education/learn_forex/the_basics/fundamental_analysis/1/2009-10-15-2154-Trade_Flows_and_Capital_Flows.html

Madden, P. (2020). Africa in the news: WAEMU's eco implementation, Sahel security update,
and Foresight Africa launch. Africa in Focus.
https://www.brookings.edu/blog/africa-in-focus/2020/01/18/africa-in-the-news-waemus-eco-implementation-sahel-security-update-and-foresight-africa-launch/

Masson, P. R., & Taylor, M. P. (1993). Fiscal Policy within Common Currency Area, *Journal of Common Markets Studies*, 3(1).

Mayer, T. (2002). Monetary policy: Role of. In B. Snowdon& H. Vane (Eds.), An Encyclopedia of Macroeconomics (pp. 495–499). Northampton, Massachusetts: Edward Elgar Publishing.

McKinnon, R. I. (1963). Optimum Currency Areas, *American Economic Review*, 5, 717- 725.

Mendoza, E. G. (1991). Real business cycles in a small open economy, *American Economic Review*, 81, 797-818.

Mendoza, E. G. (1995). The terms of trade, the real exchange rate, and economic fluctuations, *International Economic Review*, 36, 101-137.

Mundell, R. (1961). A Theory of Optimal Currency Areas, *American Economic Review*, 657-665.

Obstfeld, M. &Rogoff, K. (2000). New directions for stochastic open economy models, *Journal of International Economics,*50 (2000), 117 –153

Ordu, A. U. (2019). An evaluation of the single currency agenda in ECOWAS region. *Africa in Focus.*
https://www.brookings.edu/blog/africa-in-focus/2019/09/24/an-evaluation-of-the-single-currency-agenda-in-the-ecowas-region/

Pundit, M. (2011). Co-movement of business cycles and trade in intermediate goods, *Job Market Paper,* Boston College, Chestnut Hill.

Shin, K., & Wang, Y. (2004). Trade integration and business cycle synchronization in East Asia, *Asian Economic Papers,* 2, 1–20.

Tapsoba, S. J-A (2009). West African Monetary Integration and Interstates Risk-Sharing, *Journal of Monetary and Economic Integration*, 9(1), 31-50.

UNCTAD Trade and Development Report (2013). Geneva: United Nations Conference on Trade and Development.

UNCTAD World Investment Report (2014). Geneva: United Nations Conference on Trade and Development.

WAMI. (2002). Questions and answers on the West African Monetary Zone.
http://www.ecowas.int/specialized-agencies/west-african-monetary-institute-wami/

World Bank (2018). World Development Indicators: Statistic Department, Publications Services:
Washington, DC 20433 USA.
http://data.worldbank.org/indicator.