

# The Implication of Financial Derivable from Abroad on West African Monetary Zone's ECO Currency

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## ABSTRACT

This study aims to determine the extent to which the West African Monetary Zone (WAMZ) can fulfill the Expost conditions for achieving convergence. This study, therefore, evaluates the pattern of shock symmetry and convergence in connection to WAMZ's Pillar III policy strategy. Time series data sourced from the World Bank for the period covering 1970 to 2017 were utilized for this study. Two basic econometric tools such as Impulse Response Function (IRF) and the ADF convergence test were employed to determine whether WAMZ can achieve selected Macroeconomic Convergence Criteria (MCC) in the long-run. From the study, we found that WAMZ is not a full potential candidate for ECO Economic and Monetary Union (EMU) due to the inability of the available results to show overall shock asymmetry in the entire models studied. Also, the study found that WAMZ could attain convergence in its inflation targets, but could not attain convergence in its GDP targets. Thus the results imply that in the long-run, WAMZ does not practically possess the attribute to achieve its MCC. Hence, it is imperative that for the adoption of the ECO currency, WAMZ should design and implement a short-run adjustment method to manage country-wise shocks and implement structural buffers to guard the WAMZ economies against structural shocks. Hence, we recommend that ECO currency be a reserve currency managed by the West African Currency Board (WACB) while the EMU member maintains its domestic currency. WAMZ is basically a quasi EMU.

**Keywords:** MCC, Ex post OCA theory, Foreign Derivable from Abroad, WAMZ

## INTRODUCTION

The inability of WAMZ to meet its Macroeconomic Convergence Criteria (MCC) targets over the years has become the principal obstacle to the implementation of the Economic and Monetary Union (EMU) and the adoption of Eco currency in West African Monetary Zone (WAMZ). The MCC is decomposed into primary and secondary criteria. Available data shows that WAMZ is yet to fully realize its MCC targets (see **Tables 1** and **2**). Additionally, overtime targets met have not been consistently maintained raising the stability question of WAMZ as a potential candidate of EMU.

Due to the failure to meet its MCC targets in 2005, 2009, 2015, and 2020. The non-attainment of convergence poses serious policy challenges. However, in dealing with these challenges, WAMZ had developed a strategic policy blueprint called Banjul Action Plan and Modified Gradualist Hypothesis. The essence of these strategies is to offer the region platform to achieve convergence taking into cognizance the distinctive economic peculiarities in WAMZ.

As a policy enabler to the modified gradualist hypothesis, WAMZ established five policy pillars. These pillars were designed to stimulate the capacity of the region to achieve MCC targets (see Banjul Action Plan, 2009). These pillars include ECOWAS trade liberalization, financial integration with sub-strategy e.g. full capital account liberalization policy, etc. (Emefiele, 2014; Fwangkwal, 2014; WAMI, 2016).

The motivating question becomes what is the (long-run) implication of financial integration pillar to ensuring WAMZ achieves its MCC targets? Financial integration (financial derivable accrued to WAMZ e.g. FDI, ODA, and IBRD) is a key component for implementing common currency. The aim of this paper is therefore to investigate WAMZ capacity to achieve convergence. Specifically, the objectives of this study are viz; to estimate the impact of a shock in WAMZ and to determine (expost) convergence in WAMZ. However, given the economic debate surrounding financial integration viz-a-viz financial derivable from abroad accruable to WAMZ. The significance of this study is to properly situate WAMZ into the debate laid out by the expost OCA theory for countries desiring to achieve convergence conditions for EMU.

**Table 1.** Total Number of Primary and Secondary Convergence Criteria met Per Country

Countries	2013	2014	2015	2016	2017	2018
Gambia, The	3	2	2	2	4	4
Ghana	3	2	2	2	4	4
Guinea	5	5	3	4	5	5
Liberia	5	5	5	6	4	4
Nigeria	6	6	5	4	4	5
Sierra Leone	4	5	5	2	2	2

Culled from ECOWAS/WAMA/WAMI, 2017FooterWillBeHere

**Table 2.** Non-Convergent Macroeconomic Convergence Criteria Targets in WAMZ

	Macroeconomic Convergence	Targets	2012	2013	2014	2015	2016
<b>Non-Convergent targets in The Gambia</b>	Ratio of budget deficit to Nominal GDP	$\leq 3\%$	-4.6	-8.7	-9.6	-6.3	-6.3
	Central Bank financing of budget deficit	$\leq 10\%$ previous year's tax revenue	0.4	0.0	40.8	41.5	33.1
	Gross external Reserves	$\geq 3-6$ months	4.8	4.6	3.7	2.5	2.4
	Ratio of total public debt to GDP	$\leq 70\%$	78.0	88.1	104.1	101.1	117.3
	Ratio of budget deficit to Nominal GDP	$\leq 3\%$	-5.7	-8.6	-6.4	-4.8	-10.9
<b>Non-Convergent targets in Ghana</b>	Annual Average Inflation Rate	$\leq 10\%$ (with $\leq 5\%$ in 2019)	9.1	11.7	17.0	17.2	17.5
	Gross external Reserves	$\geq 3-6$ months	3.0	3.1	3.0	2.6	2.8
	Ratio of total public debt to GDP	$\leq 70\%$	47.8	56.8	70.2	73.2	73.1
<b>Non-Convergent targets in Guinea</b>	Gross external Reserves	$\geq 3-6$ months	2.4	2.9	3.2	2.2	1.4
	Nominal Exchange rate variation	$\pm 10\%$	-2.5	2.1	-1.5	2.2	-16.4
<b>Non-Convergent targets in Nigeria</b>	Annual Average Inflation Rate	$\leq 10\%$ (with $\leq 5\%$ in 2019)	12.2	8.5	8.0	9.0	15.7
	Nominal Exchange rate variation	$\pm 10\%$	0.7	2.1	-1.9	-1.9	-23.5
<b>Non-Convergent targets in Sierra Leone</b>	Ratio of budget deficit to Nominal GDP	$\leq 3\%$	-5.2	-1.6	-3.3	-4.1	-6.4
	Annual Average Inflation Rate	$\leq 10\%$ (with $\leq 5\%$ in 2019)	12.9	10.4	7.2	8.1	10.8
	Central Bank financing of budget deficit	$\leq 10\%$ previous year's tax revenue	-37.7	1.7	7.2	-0.7	33.1
	Nominal Exchange rate variation	$\pm 10\%$	3.3	1.1	-4.0	-3.1	-19.1

Culled from the ECOWAS, 2016

## LITERATURE REVIEW

### Theoretical Review

This study reviews three theories to determine whether WAMZ can achieve convergence. They are viz the Optimum Currency Area theory, WAMZ's Modified Gradualist hypothesis, and Solow Conditional Convergence Hypothesis. These theories would provide us the leverage to examine the long-run potential of WAMZ to attain convergence.

WAMZ's developed a modified gradualist hypothesis (MGH) to give leverage for catch-up within WAMZ. MGH is a perspective or long-run adjustment plan that gives room for gradual implementation of Eco currency. In order words, MGH states that countries that meet MCC conditions should commence the operationalization of Eco currency while country's that are unable to meet the MCC conditions could catch-up (long-run), that is, join afterward when they have attained the conditions for EMU.

In a related perspective, Optimum Currency Area theory (OCA), OCA theory is a well-known theory that explains the conditions for the Economic and Monetary Union (EMU). There are two major schools of thought in OCA theory. They are namely ex-ante OCA theory and ex-post OCA theory. The proponents of the ex-ante OCA theory include Mundell (1961), McKinnon (1963), Kenen (1969), Ingram (1977). On the other hand, the ex-post proponents are Frankel and Rose (1997), Bayoumi and Eichengreen (1977). Furthermore, OCA is defined as a system that retains the fixed exchange rate within EMU and flexible exchange rate outside the EMU (Warin, Wunnava and Janicki, 2008: 3). According to Mundell (1961),

OCA theory is concerned with the geographical analysis that the benefits of adopting a single currency or a fixed exchange rate outweigh the cost implications of relaxing the internal instrument for an exchange rate adjustment. This practically includes countries foregoing independence of fixing the exchange rate and adopts a single monetary policy (Ricci, 2007). OCA is used to convey in the deepest form a system employed to define a region whereby there is the presence of internal factor mobility and external factor immobility (Mundell, 1961).

This study focused on ex-post OCA theory. According to ex-post the condition to establish an EMU or single currency is shock symmetry, degree of labour mobility, synchronization of output, the long-run relationship of macroeconomic criteria, the existence of long-run symmetry of trade integration. In the unambiguous term, ex-post OCA delved into the long-run nexus between international integration and business cycle co-movement (Bayoumi and Eichengreen 1993, 1994, 1996; Mundell, 1973).

Frankel and Rose (1997) empirically posited the possibility of a degree of structural homogeneity and real convergence ex-post (Wagner, 2014). Frankel and Rose (1997) based their ex-post argument on the rationality that historical data are spurious to measure the workability, potentiality, and prospect of countries for EMU. They argued that countries seeking EMU could attain long-run convergence based on the following properties viz close international trade links, business cycle correlation, shock symmetry, etc. For example, close integration within EMU could foster an environment that could mitigate the adverse effects of asymmetric shocks. OCA

theory based on the argument of ex-post OCA believes that countries could achieve convergence in the long-run.

Long-run convergence of EMU has given rise to two major analytical debates viz the existence of symmetry (European Commission, 1990) and the existence of asymmetry (Krugman, 1993) in EMU. Thus the implication for symmetry findings means the suitable for currency union (EMU) and on the other hand, the existence of asymmetry means such economies are not suitable to be called a currency union (EMU).

The foregoing debate further provides us with leverage to use the variant instrument to underscore the empirical validity of the availability of long-convergence in WAMZ. However, the ex-post theory on convergence would be purview using the Solow convergence analysis to deepen the discourse on convergence.

Solow Conditional Convergence Hypothesis, Solow (1957) developed an exogenous production function in which inputs are substitutable, continuous, and has a constant return to scale (CRS) property. Solow calibrated a CRS production function that incorporates output growth over time as a function of rates of savings, depreciation, population growth, and technological progress inputs growth over time. The major crux of the argument under Solow multiplicative growth model is on the portent ability that the dynamical changes of stock of labour, knowledge, and capital overtime are predictive.

Solow's model predicts the capacity of the growth of capital. Solow explained how converges occur regardless of the initial point of the capital stock, it convergences with capital growth. Solow states that the economy converges to a balanced growth path. The balance growth rate of output per worker is determined solely by the rate of technological progress.

The nexus between Modified Gradualist hypothesis, Expost OCA theory, and Solow conditional convergence hypothesis revolves around the attainment of MCC. These theories were employed to study the WAMZ's transition to achieve convergence. The gap this study fills is to examine the capacity of WAMZ's pillar on full account liberalization (proxy with financial derivable accrued to WAMZ) to achieve convergence.

### Empirical Review

The sweeping empirical works on the long-run capacity of EMU to achieve convergence could be traceable to Frankel and Rose (1997). Frankel and Rose (1997) argued that EMU would foster an environment that could diminish the adverse effects of asymmetric shocks. Additionally, Bayoumi and Eichengreen (1994) state that EMU can mitigate shocks. On the other hand, Jurak (2007) contends that alleviation of shock is guaranteed under a liberalized capital account system in that through financial transmutation of cross border capital flows this could help drive financial intermediation. The foregoing works factually connote that financial intermediation, therefore, enhances and creates buffers to withstand against shocks. Belke and Kaas (2004) clearly state that global finance could help to reduce exchange rate volatility through financial intermediation. From Belke and Kass (2004) we could trace the effect of exchange rate volatility as a precursor to asymmetric shocks. Thus asymmetric shocks thereby generate exchange market pressure. Loosely, McKinnon and Shaw (1973) financial liberalization and growth nexus are the benchmark to explain

the positive realities of financial integration. Agenor (2003) and Saurina (2006) hold the view that mitigation of risk exposure from shock occurs through portfolio diversification and global risk-sharing. Obstfeld (1994) acknowledged that the potential growth and welfare gains deliverables from global risk-sharing could be large and permanent. In succinct, potential benefits of financial integration on risk-sharing encourages consumption smoothing and foreign bank penetrations (Caprio and Honohan, 1999; Levine, 1996), and it creates investment, efficiency, and growth addition (Baldwin and Forslid, 2000).

Conversely, Grauwe (2011) foresees that the monetary union is susceptible to shocks. Belke and Gros (1998) hold the opinion that shocks are not holistic, it impacts on few participating countries. This finding is complemented by the works of Haque, Mathieson, and Sharma (1997) that EMU is often plagued with asymmetric shocks. Krugman (2014) explored the negatives of cross border movement of capita movement from core to periphery as the major causative to the effect of the shock in post-Euro EMU. To deepen the robust counter-argument on financial integration is to introduce the positions: Chang and Velasco (2000) that financial integration is windows of volatility; causes a concentration of capital flow, misallocation of capital and pro-cyclicality movement (Lucas paradox (1990), Fieldstein-Horiorka puzzle (1980) and Gourinchas and Jeanne (2006), Stiglitz (2000) financial repression of cross border flow.

Evans and Hnatkovska (2006) in a detrended Hodrick-Precott Filter and correlation methods observed a dual relationship between integration and volatility that occur in the initial stage and later stage. The initial stage integration leads to volatility in consumption and output, later stage integration caused a decline in volatility. Thus, risk sharing is generated and with minimal welfare. Kose, Prasad, and Terrones (2003) found a decline in output growth volatility in the 1990s. They observed also the existence of a rise in the volatility of ratio of consumption growth to income growth, however, integration improved risk-sharing and possibility of consumption smoothing to a threshold level. This study was facilitated by the regression econometric technique. Senay (1988) and Obstfeld and Rogoff (1995) independently adopted a stochastic sticky-price model position. They conclude that the impact of financial openness on output and consumption volatility depends on the nature of shocks. Bayoumi and Eichengreen (1994) posit that shocks of exogenous could be policy-induced. Thus, policy shocks are not unavoidable and tend to be even mitigated by EMU.

More recently, Blanchard, Ostry, Ghosh, and Chamon (2016) empirically admit that bond flows are contractionary and non-bond flows are expansionary. It is based on the recent study that the study built on to conjure-up deep concern to determine which debates best explain economic conditions in WAMZ. This is because, WAMZ could also be systematically exposed to internationally-related shock that has dominating effects (Flood, 1979; Kim and Roubini, 2000; Mackowiaki, 2007; Rafiq, 2015).

More worries over the occurrence of spillover effects of shocks such as the liquidity risk, global financial crises, and causes speculative reasons could affect the sustainability of EMU in WAMZ. Thus, the interdependencies of markets

provide the crux to x-ray the contagion nature of shocks propagation inherent in the world economic system (Gimet, 2009).

One form of financial integration is the liberalization of capital flows (Liebscher et al. 2006). Financial openness can be measured from three positions namely; de-jure, de-facto, and hybrid indicators (Quinn, Schindler, and Toyoda, 2011). Risk-sharing, optimal allocation of capital, and economic growth are amongst the leading driving significance for financial integration. More so, through financial integration, economies foster financial intermediation that accelerates risk-sharing across borders. This process in turn guarantees reduced regional shocks' impact on domestic consumption.

But the hypothetical significance of financial liberalization or capital movement might not be satisfactory true in the real sense. This is because financial globalization generates cross-border financial contagion through herding and asymmetric information. This could occur when regional shock exceeds the risk-bearing capacities of the regional financial system to meet liquidity demands.

### Gap of the Study

From the review, the idea of financial openness as a condition to achieve convergence could be misleading. Based on the key importance placed on financial integration in Banjul Action Plan, it is obvious further analysis be conducted to determine WAMZ was not captured in the debate.

Frankel and Rose (1998) applied cross-section correlation, Bayoumi and Eichengreen (1998) employed VAR; Harvey and Cushing (2015) followed Blanchard and Quah (1988): Structural VAR. Based on the foregoing studies we employed 1) Impulse response function and variance decomposition for estimate shock impact, 2) ADF unit root test to determine convergence and divergence in WAMZ as an instrument to determine the convergence in WAMZ.

## METHODOLOGY

### Theoretical Framework

This study directly follows ex post OCA theory analysis on the realization of long-run convergence. Hence, this study focused on whether WAMZ possesses the conditions put forward by ex post OCA theory to achieve convergence.

Quasi-experimental research design was used in this research. The secondary data collection method was used to obtain data for this study. In this regard, this paper dissected the ex post OCA theory to study and examine given the extent of capital flows from abroad (Pillar III) and its implication on WAMZ convergence state. From ex post OCA theory, we decomposed this study into viz shock and convergence analysis.

### Material and Methods

In this study, we utilized two different models to achieve two distinct grey areas concerning the long-run stability of the WAMZ region to achieve Eco EMU. The establishment of ECO depends on the attainment of MCC. Three variables such as FDI, ODA, and IBRD loans were used to proxy capital inflows

integration (Pillar III), and RGDP, trade % GDP, Trade openness, GDPPC were proxy for macroeconomic indicators that could help determine whether WAMZ is stable, sustainable and inclusive in the long-run.

The assumption in this paper is that the signs and magnitude (i.e. positive, negative, Probability values) of the impact of the proxies of capital inflows integration on selected macroeconomic variables will be interpreted as for positive impact= Eco EMU is less risk exposed, and negative impact = Eco EMU is risk exposure. Hence we utilized 4 models, 4 regressands, and 3 regressors. Purposive sampling technique is used to select the countries considered in this paper. They are The Gambia, Ghana, Guinea, Liberia, Nigeria, and Sierra Leone. But, there are caveats in this study (i) in the country-specific study the paper did not consider Guinea and Liberia due to large scale absence of data for the hypothesized variables from 1970-2017 (ii) for convergence evaluation RGDP targets and Inflation targets were considered between The Gambia and Nigeria, and The Gambia and Sierra Leone. The Gambia was adopted as a leading country, whilst Nigeria and Sierra Leone were designated follower countries (iii) this paper focused on long-run impact assuming away any short-run impact which is in tandem with the ex post OCA theory.

### Pre-Diagnostic Test

The time-series data contained trend, we carried out the unit root test and differenced the variables at  $I(1)$  known as  $I(2)$ . Additionally, the structural breakpoint unit root test for the construction of dummy variables was conducted the derived dates were used for the construction of dummy variables. Thus dummy variables such as DUM\_FDI, DUM\_ODA, DUM\_IBRD are 1 for after breakpoint date and 0 for before breakpoint date. We sourced the data from the World Bank from 1970 to 2017. The instruments employed in this study were broken into two parts viz;

#### Part 1

The Impulse Response Function follows Koop, Pesaran and Porter (1996) modified by Pesaran and Shin (1998)

$$\Delta y_t = \alpha_{0y} + \alpha_{1y}t - \pi_y Z_{t-1} + \sum_{i=1}^{\rho-1} \tau_{iy} \Delta Z_{t-1} + \varphi_y \omega_t + \varepsilon_t \quad (1)$$

Where:  $t=1, 2, \dots, n$ . Also,  $\alpha_{0y}$  and  $\alpha_{1y}$  are  $M_y \times 1$  vectors,  $\pi_y$  is the long-run multiplier matrix of order  $M_y \times m$ . Vectors are given as  $Z_t = \begin{pmatrix} y_t \\ X_t \end{pmatrix}$ ,  $\mu_t = \begin{pmatrix} U_t \\ V_t \end{pmatrix}$ ,  $\alpha_t = \begin{pmatrix} \alpha_{0y} \\ \alpha_{0x} \end{pmatrix}$ ,  $\alpha_1 = \begin{pmatrix} \alpha_{1y} \\ 0 \end{pmatrix}$ ,  $\pi_t = \begin{pmatrix} \pi_{1y} \\ 0 \end{pmatrix}$ ,  $\tau_i = \begin{pmatrix} \tau_{1y} \\ \tau_{ix} \end{pmatrix}$ ,  $\varphi_t = \begin{pmatrix} \varphi_{iy} \\ \varphi_{ix} \end{pmatrix}$ . However, the generalized IRF for system-wide shocks  $\mu_1$  is defined by  $GI_z(\langle N | \mu_t | \partial_{t-1}^\circ \rangle) = \langle \langle Z_{t+N} | \mu_t = \mu_t^\circ | \partial_{t-1}^\circ \rangle \rangle - \langle \langle Z_{t+N} | \partial_{t-1}^\circ \rangle \rangle$  (Nwaobi, 2012: 496).

#### Part 2

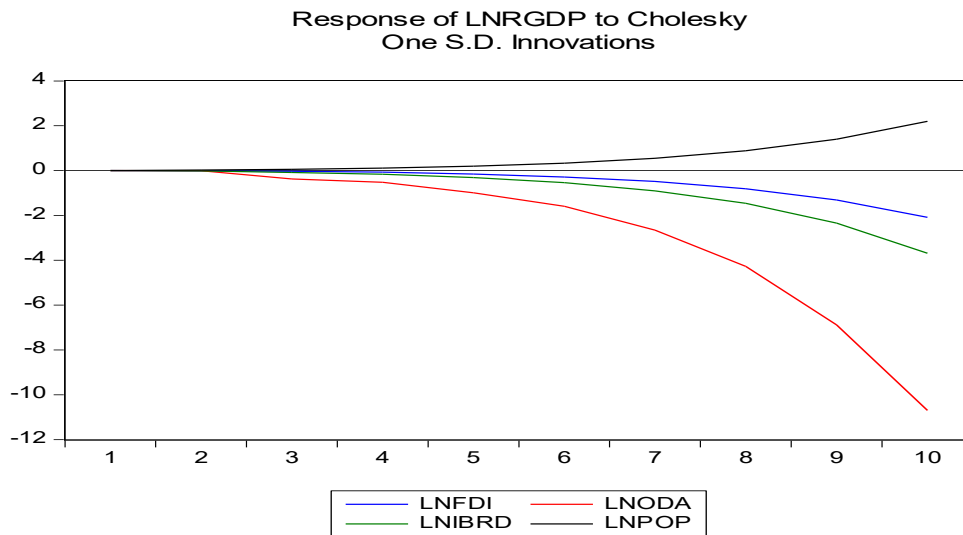
The adopted ADF Convergence Structural Break Test followed Bernard and Durlauf (1995), modified by Oxley and Greasley (1999), further modified by Baafi (2018).

$$\begin{aligned} (\text{INF}_{GAM,t} - \text{INF}_{SLR,t}) &= \Psi + \delta \text{TEX}_t + \alpha (\text{INF}_{GAM,t-1} - \text{INF}_{SLR,t-1}) + \lambda \text{DV} + \phi_k (\text{INF}_{GAM,t-k} - \text{INF}_{SLR,t-k}) + \varepsilon_t \quad (2) \\ (\text{INF}_{GAM,t} - \text{INF}_{SLR,t}) &= \Psi + \delta \text{TEX}_t + \alpha (\text{INF}_{GAM,t-1} - \text{INF}_{SLR,t-1}) \\ &\quad + \lambda \text{DV} + \phi_k (\text{INF}_{GAM,t-k} - \text{INF}_{SLR,t-k}) + \varepsilon_t \quad (2) \end{aligned}$$

**Table 3.** Impulse Response Function

Period	LNRGDP	LNFDI	LNODA	LNIBRD	LNPOP
1	0.652488	0.000000	0.000000	0.000000	0.000000
2	1.090615	-0.014377	-0.008360	-0.016090	0.021586
3	2.031713	-0.027057	-0.375774	-0.080267	0.053260
4	3.386007	-0.069888	-0.519412	-0.158815	0.107540
5	5.461480	-0.153982	-0.993403	-0.309345	0.195142
6	8.644370	-0.283970	-1.594326	-0.538722	0.332215
7	13.68504	-0.484517	-2.653513	-0.900882	0.546713
8	21.16841	-0.809963	-4.275397	-1.463246	0.885155
9	32.58674	-1.311102	-6.882495	-2.346067	1.404826
10	49.77789	-2.086459	-10.69591	-3.688525	2.200669

Source: Eviews 9



**Figure 1.** One Percentage Shock in FDI, ODA, IBRD and its Impact on RGDP

Source: Eviews 9

Where  $ZGN = (RGDP_{GAM,t} - RGDP_{NIG,t}) = \log$  difference of GDP of Gambia and Nigeria;  $ZDGS = (RGDP_{GAM,t} - RGDP_{SLR,t}) = \log$  difference of GDP of Gambia and Sierra Leone;  $ZGN(-1) = (RGDP_{GAM,t-1} - RGDP_{NIG,t-1})$ ,  $ZGN(-2)$ lag:  $(RGDP_{GAM,t-k} - RGDP_{NIG,t-k})$ , etc.

## RESULTS

In line with exposit OCA theory this paper examined the long-run capacity of WAMZ under a financial openness system taking into account the one percentage standard deviation shock in capital inflows on selected macroeconomic indicators. This paper then evaluates the convergence capacity of WAMZ on its MCC.

### Part 1: Impulse Response Function

In line with exposit OCA theory position on shock similarity, **Table 3** illustrates the impact of shocks obtained from FDI, ODA, and IBRD loans on RGDP (a proxy for domestic output productivity). In the 3rd year FDI caused negative 2.7 percent shock on RGDP, ODA had negative 37.5 percent shock on RGDP and IBRD loans caused a negative 8 percent shock on RGDP. The result provides clear pictures of how RGDP responds to one percent of standard deviation shocks emanating from global financial integration. In the 10th year, in the long-run ceteris paribus, the shocks of FDI, ODA, and

IBRD loans deepen negatively. RGDP was hit by 208.6 percent negative shocks by FDI inflow, 106.9 percent negative shocks by ODA inflow, and 368.8 percent negative shocks by IBRD loans. The negative responses of RGDP to one percent shock implies that domestic output capacity of WAMZ responds negatively to an inward movement of external resources inflows. We could attribute this negative relationship between RGDP and FDA to mean that WAMZ economies are fragile to global shocks. More so from the result obtained from variance decomposition (see **Figure 1**) which depicts that shock from FDI, ODA and IBRD remain unchanged in the long run.

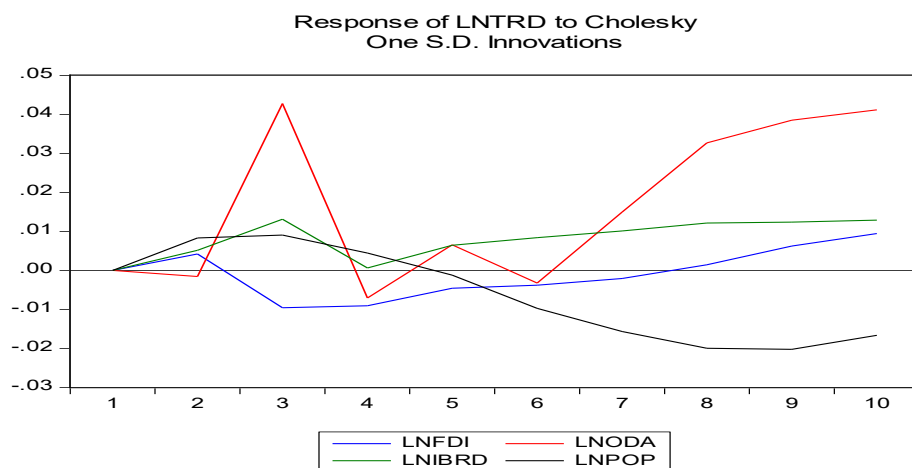
**Table 4** depicts the decomposition of variations of the negative shocks in **Table 3**. The magnitude of the movement in shocks was carried out under the variance decomposition (see **Table 4**). Specifically, variance decomposition showed how shocks vary over time. Evidently, the speed of shock is minimal and positive. It implies that the shock does not fade out in the long-run.

From **Table 4**, FDI shocks on RGDP showed that it persists unto the long-run as shocks over time moved from 1.5 percent to 15 percent from the short-run to the long-run. The shocks' impact of ODA on RGDP doubled from 239 percent to 422 percent. The magnitude of variation strongly showed that ODA shocks on RGDP are massive in selected the WAMZ countries. Also, the shock of IBRD loans on RGDP varies from 11 percent to 49 percent in the long-run.

**Table 4.** Variance Decomposition

Period	S.E.	LNRGDP	LNFDI	LNODA	LNIBRD	LNPOP
1	0.652488	100.0000	0.000000	0.000000	0.000000	0.000000
2	1.271292	99.93804	0.012789	0.004325	0.016019	0.028831
3	2.428016	97.41794	0.015924	2.396432	0.113680	0.056021
4	4.203779	97.37616	0.032951	2.326110	0.180649	0.084131
5	6.974515	96.69431	0.060714	2.873774	0.262352	0.108848
6	11.24242	96.33591	0.087167	3.117116	0.330590	0.129213
7	17.94600	95.95804	0.107101	3.409601	0.381740	0.143517
8	28.14285	95.59643	0.126382	3.694344	0.425559	0.157283
9	43.70905	95.21364	0.142370	4.010963	0.464519	0.168504
10	67.27201	94.94762	0.156297	4.221197	0.496733	0.178149

Source: Eviews 9

**Figure 2.** TOG = f (FDI, ODA, IBRD, POP)

Source: Eviews 9

**Table 5.** Impulse Response Function

Period	LNFDI	LNODA	LNIBRD	LNPOP
1	0.000000	0.000000	0.000000	0.000000
2	0.004201	-0.001565	0.005137	0.008303
3	-0.009565	0.042778	0.013136	0.009045
4	-0.009079	-0.007070	0.000609	0.004453
5	-0.004583	0.006554	0.006428	-0.001209
6	-0.003793	-0.003267	0.008405	-0.009744
7	-0.002068	0.014957	0.010099	-0.015688
8	0.001459	0.032713	0.012133	-0.019964
9	0.006254	0.038532	0.012385	-0.020247
10	0.009468	0.041170	0.012897	-0.016663

Source: Eviews 9

Furthermore, we computed a geometrical analysis of the impulse responses of TOG to one standard deviation shock generated from FDI inflow, ODA inflow, and IBRD loan inflow. TOG positively responds to one percentage shock from FDI, ODA, and IBRD loans. In **Figure 2**, the result shows that FDI, ODA, IBRD loans have positive shock impact on TOG.

Numerically, the one percentage standard deviation shocks in FDI, ODA, and IBRD loans in the 3rd year caused negative 0.9 percent, positive 4.2 percent, and positive 1.3 percent respectively changes on trade % GDP. It is observed that FDI had a negative shock impact and ODA and IBRD loan had a positive shock on trade size. In the 10th year, the shock impact of FDI, ODA, and IBRD loans on trade size was positive at 0.9 percent, 4.1 percent, and 1.3 percent respectively. The result shows that percentage change in FDI, ODA, and IBRD causes a

0.9 percent drop in TOG, a 4.3 percent rise in TOG, and a 1.3 percent rise in TOG respectively. From the result, shocks caused by FDI, ODA, and IBRD tend to be dissimilar as different magnitude was experienced in **Figure 2** and **Table 5**.

Similarly, the degree by which TOG in WAMZ countries responds to the shocks in exogenous inflows is illustrated using variance decomposition in **Table 6**. The obvious question in variance decomposition is that variance decomposition indicates the amount of information each variable contributes to the other variables in the autoregression. It determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables.

From **Table 6**, the 3rd year to 10th year, FDI inflow shock vary from 52 percent to 103 percent, ODA inflow shock varies

**Table 6.** Variance Decomposition

Period	S.E.	LNTRD	LNFDI	LNODA	LNIBRD	LNPOP
1	0.095714	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.117893	99.16955	0.126993	0.017628	0.189869	0.495962
3	0.144353	89.00424	0.523797	8.793856	0.954708	0.723398
4	0.157331	90.12684	0.773976	7.604876	0.805200	0.689103
5	0.162123	90.29586	0.808804	7.325330	0.915479	0.654522
6	0.166031	90.05563	0.823375	7.023310	1.129168	0.968520
7	0.168722	88.34663	0.812336	7.586945	1.451714	1.802380
8	0.174210	83.73783	0.768976	10.64256	1.846755	3.003878
9	0.180666	78.48499	0.834811	14.44423	2.187060	4.048907
10	0.187335	73.63909	1.031850	18.26403	2.508056	4.556980

Source: Eviews 9

**Table 7.** Multilateral Trade

Period	LNFDI	LNODA	LNIBRD	LNPOP
1	0.000000	0.000000	0.000000	0.000000
2	0.003905	0.002869	-0.003941	-0.003357
3	-0.011962	0.020334	-0.027914	-0.005683
4	-0.019164	0.081924	-0.012571	-0.010663
5	-0.008623	0.048509	-0.002219	-0.016133
6	-0.005146	0.008435	0.015615	-0.020946
7	-0.015576	-0.031617	0.021632	-0.025686
8	-0.030049	-0.016873	0.025344	-0.031795
9	-0.032287	0.005933	0.027133	-0.039178
10	-0.026387	0.022187	0.033198	-0.046042

Source: Eviews 9

**Table 8.** Variance Decomposition

Period	S.E.	LNMLT	LNFDI	LNODA	LNIBRD	LNPOP
1	0.168738	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.209733	99.88569	0.034668	0.018714	0.035308	0.025621
3	0.241306	97.56419	0.271909	0.724209	1.364876	0.074812
4	0.268786	87.86251	0.727475	9.873577	1.318776	0.217665
5	0.286083	85.99576	0.733023	11.59093	1.170144	0.510151
6	0.298560	86.26645	0.702749	10.72223	1.347946	0.960625
7	0.312994	85.08466	0.887096	10.77653	1.704147	1.547565
8	0.325074	83.48428	1.676831	10.25987	2.187693	2.391332
9	0.335171	81.48336	2.505296	9.682373	2.713232	3.615737
10	0.344831	78.79712	2.952467	9.561487	3.490176	5.198753

Source: Eviews 9

from 879 percent to 1,826 percent, and IBRD loan inflows shock vary from 95 percent to 250 percent. The variation observed in **Table 6** portrays that the shock impact of the FDA on TOG does not fade out in the long-run. The shocks in **Table 6** show a positive pattern.

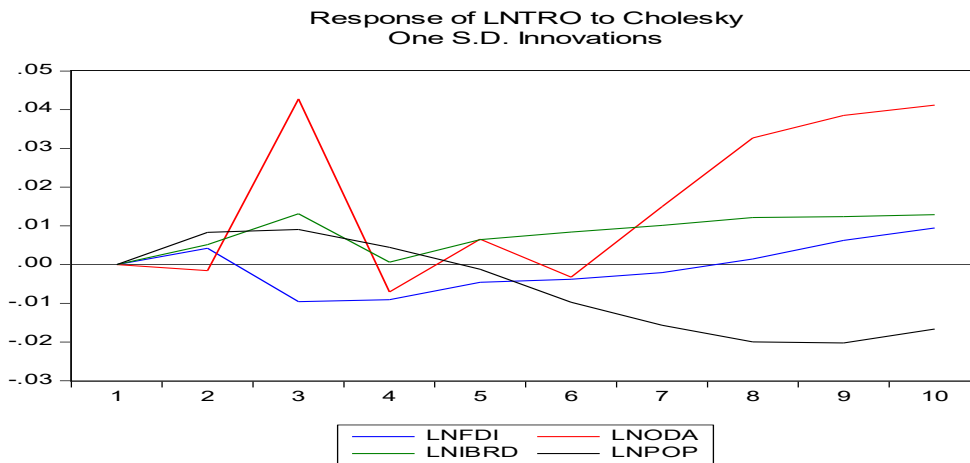
Multilateral trade (MLT) is a proxy obtained from World Bank data on merchandise of export within the region. The shock impact generated from FDA is minimally positive. From the 3rd year to the 10th year, the impact of the shock of the FDA on MLT is shown in **Table 7**. From **Table 7**, FDI inflow shock is between -1.1 percent to -2.6 percent, ODA inflow shock on MLT is between 2.0 percent to 2.2 percent; and IBRD loans on MLT shock are between -2.7 percent to 3.3 percent. These shocks produced non-similar shock on MLT because ODA inflow and IBRD inflow produced positive shock on MLT and FDI inflow generated negative shock on MLT. The result implies that shock is not similar.

The nature of the shock of the FDA on MLT implies the shock is persistent in the long-run. In **Table 8**, FDA shocks on

MLT vary from 3rd-10th years is given as: FDI shock vary from 27 percent to 29 percent, ODA shock varies from 72 percent to 956 percent, and IBRD loan shock varies from 136 percent to 349 percent. The shock is positive and showed that a strong impact on the MLT outcome of WAMZ in the long-run.

To further understand how shocks from FDA affect WAMZ, we shocked trade openness (TRO) by one percentage standard deviation shock in FDI inflow, ODA inflow, and loans from IBRD. TRO was employed to deepen the understanding of the behaviour of the FDA on trade in the WAMZ countries. TRO illustrated in **Figure 3** showed that FDA shock on TRO is somewhat similar.

The numerical values in **Table 9** depict the shock impacts emanating from the response of TRO to the FDA. **Table 9** specifically illustrates that in the long-run e.g. the 10th year, FDI shock on TRO is 0.09, ODA shock on TRO is 4.1 percent, and IBRD loan shocks on TRO is 1.2. The values presented in **Table 9** showed the response of TRO to one percent standard deviation shock in the FDA is similar in the long-run.



**Figure 3.** TRB = f (FDI, ODA, IBRD, POP)

Source: Eviews 9

**Table 9.** Impulse Response Function

Period	LNFDI	LNODA	LNIBRD	LNPOP
1	0.000000	0.000000	0.000000	0.000000
2	0.004201	-0.001565	0.005137	0.008303
3	-0.009565	0.042778	0.013136	0.009045
4	-0.009079	-0.007070	0.000609	0.004453
5	-0.004583	0.006554	0.006428	-0.001209
6	-0.003793	-0.003267	0.008405	-0.009744
7	-0.002068	0.014957	0.010099	-0.015688
8	0.001459	0.032713	0.012133	-0.019964
9	0.006254	0.038532	0.012385	-0.020247
10	0.009468	0.041170	0.012897	-0.016663

Source: Eviews 9

**Table 10.** Variance Decomposition

Period	S.E.	LNDTRO	LNFDI	LNODA	LNIBRD	LNPOP
1	0.095714	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.117893	99.16955	0.126993	0.017628	0.189869	0.495962
3	0.144353	89.00424	0.523797	8.793856	0.954708	0.723399
4	0.157331	90.12684	0.773976	7.604877	0.805200	0.689104
5	0.162123	90.29586	0.808804	7.325331	0.915479	0.654522
6	0.166031	90.05563	0.823376	7.023310	1.129168	0.968520
7	0.168722	88.34662	0.812336	7.586945	1.451714	1.802380
8	0.174210	83.73783	0.768976	10.64256	1.846755	3.003878
9	0.180666	78.48499	0.834811	14.44423	2.187060	4.048909
10	0.187335	73.63908	1.031850	18.26403	2.508056	4.556983

Source: Eviews 9

**Table 10** illustrates the level of persistence and presence of FD inflows shock on trade openness. FDI inflow shock persists in the long-run. FDI shock varies from 52 percent in the short-run to 103 percent in the long-run. Similarly, ODA inflow shock has an undying effect on capital inflows, ODA inflow shock from 879 percent to 1,826 percent and IBRD loans inflow shock moves from 95 percent to 250 percent. This implies that the impact of the shock does not die out (fade out) as FD inflows are received in the long-run.

## Part 2: ADF Convergence test

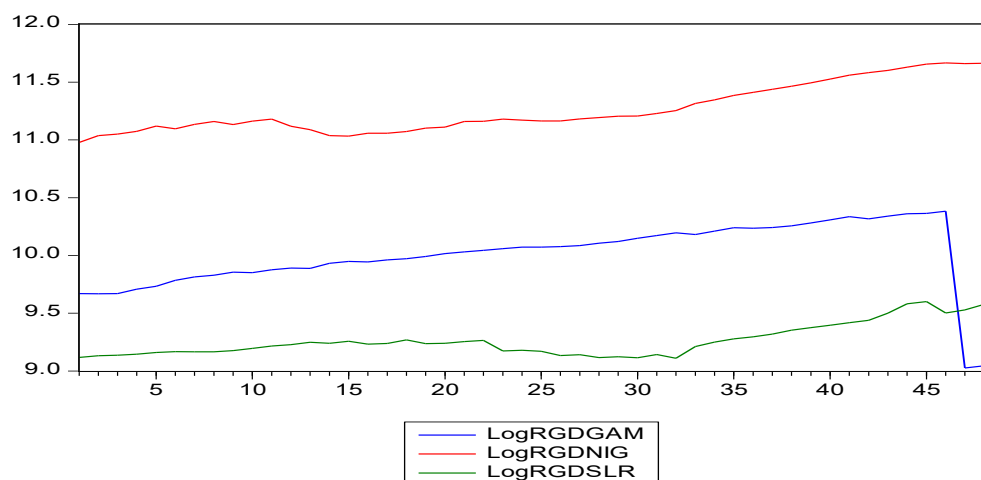
ADF convergence test is carried out to determine the potential WAMZ has to achieve convergence. The attainment of convergence is a functional prerequisite for the implementation of Eco EMU in WAMZ and indeed ECOWAS is

empirically required to implement single currency Eco. The empirical justification for the use of ADF convergence test is based on its capacity to capture the existence of divergence and convergence in the long-run.

Two fundamental theory squares well to provide the theoretical justification for the application of the ADF convergence test to determine the state of convergence in WAMZ. They are viz; ex post OCA theory and the priestly modified gradualist approach of WAMZ. These theories could be leveraged upon to examine how convergence in WAMZ. It is priestly because it gives hope for ex post convergence.

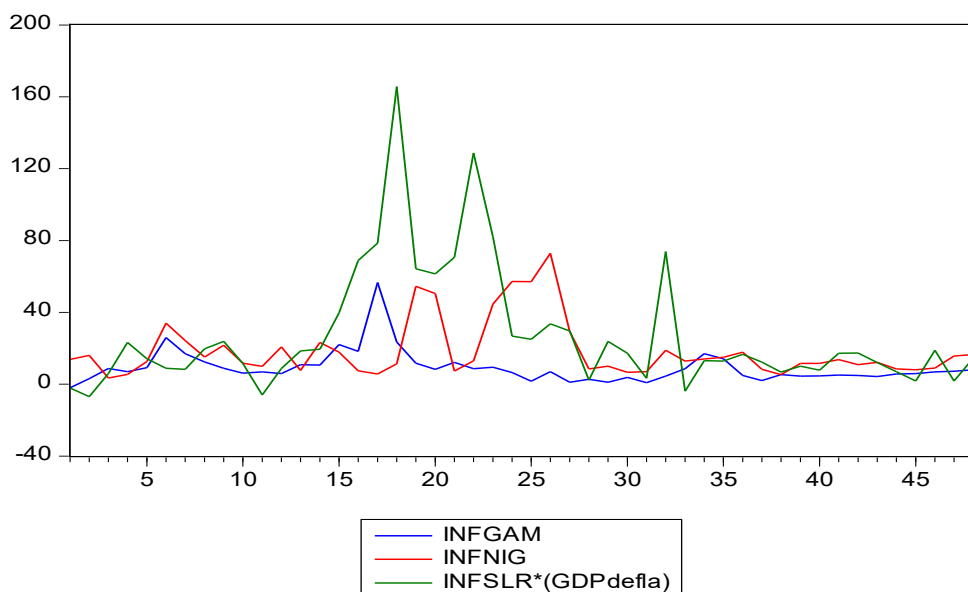
In line with the Macroeconomic Convergence Criteria (MCC) of WAMZ, this paper considered two key primary targets such as GDP and Inflation targets. Hence, does





**Figure 4.** Trend of Log RGDP for Gambia, the; Nigeria, and Sierra Leone

Source: Eviews 9



**Figure 5.** Log RGDP for Gambia, the; Nigeria, and Sierra Leone

Source: Eviews 9

**Table 11.** MCC in WAMZ as at 2018

Variables	At least 2 year period of MCC Sustainability (leader) $Y_{j,k}$	Non-convergent Country (follower) $Y_{i,k}$	Convergence Hypothesis Test $Y_{j,k} - Y_{i,k}$
RGDP	Gambia, The	Nigeria, Sierra Leone	$RGDP_{GAM} - RGDP_{NIG}$ $RGDP_{GAM} - RGDP_{SLR}$
Inflation	Gambia, The	Nigeria, Sierra Leone	$INF_{GAM} - INF_{NIG}$ $INF_{GAM} - INF_{SLR}$

Source: Culled from ECOWAS/WAMA/WAMI (2017): Status of Macroeconomic Convergence

convergence exist in GDP targets and Inflation targets in WAMZ?

**Table 11** portrays leading economies and the following economies in selected convergence criteria.

It is based on the information presented in **Table 9**, that ADF structural break unit root test is conducted to determine expost convergence. Our interest in the convergence in WAMZ will centre on determining the possibility of WAMZ to achieve convergence.

It is pertinent to note that The Gambia is used as a leader convergent country and Nigeria and Sierra Leone were employed as follower non-convergent country. The Gambia

was selected base on its ability to reach MCC targets consistently in two successive periods in inflation targeting and RGDP targets.

The rules for testing convergence are given as viz;

- (i)  $\delta < 0$  and  $\alpha < 0$  presence of catch up or stochastic convergence
- (ii)  $\delta = 0$  and  $\alpha < 0$  cointegrated and Long run convergence
- (iii)  $\delta = 0$  and  $\alpha = 0$  presence of divergence
- (iv)  $\delta < 0$  and  $\alpha = 0$  loose catch up (as in Baafi, 2018)

**Table 13** showed that convergence and divergence exist in WAMZ in terms of RGDP and Inflation targeting, however,

**Table 12.** OLS Regression Table: Aggregative ADF structural Breakpoint Test for Convergence

Variables	RGDP	Inflation	ADF Unit Test t-statistics
CNG	0.257850 (0.4596)	0.066955 (0.5372)	
CSG	-0.297675 (0.1176)	0.019982 (0.8965)	
TEXGN	1.54E-11(0.1800)	3.34E-11 (0.1843)	
TEXGS	-1.70E-10 (0.2402)	7.94E-10 (0.0106)	
ZGN(-1)	0.783265 (0.0000)		0.709128 (0.9911)
ZDGS(-1)	0.756562 (0.0000)		-0.835557 (0.7991)
DVGN <i>Dummys</i> trucBrk	-0.074401(0.0144)	-0.057159 (0.3576)	
DVGS <i>Dummys</i> trucBrk	-0.025403 (0.3436)	-0.205412 (0.0039)	
ZGN(-2) lag	0.0144 (0.2169)		
ZDGS(-2) lag	0.803349 (0.0266)		
FNG(-1)		0.451551(0.0058)	-4.063376 (0.0026)
FSG(-1)		0.051118 (0.7235)	-2.545975 (0.1125)
FNG(-1)		0.027909 (0.8539)	
FSG(-2)		0.275390 (0.0641)	

Source: Eviews 9. Where; TEXGN and TEGS is total trend exogenous inflows for Gambia and Nigeria and Gambia and Sierra Leone, ZGN(-1) and ZDGS(-1) is log of difference between log RGDP of Gambia and Nigeria, Gambia and Sierra Leone, ZGN(-2) and ZDGS(-2) is lagged of difference between log RGDP of Gambia and Nigeria, Gambia and Sierra Leone. FNG and FSG is log of difference between log inflation of Nigeria and Gambia, Sierra Leone, FNG(-2) and FSG (-2) is lagged of difference between log inflation of Nigeria and Gambia, Sierra Leone and Gambia.

**Table 13.** Decision Rule for Convergence

Variables	At least 2 year period of MCC Sustainability (leader) $Y_{j,k}$	Non-convergent Country (follower) $Y_{i,k}$	Convergence Hypothesis Test $Y_{j,k} - Y_{i,k}$	Decision Rule
RGDP	Gambia, The	Nigeria, Sierra Leone	$RGDP_{GAM} - RGDP_{NIG}$ $RGDP_{GAM} - RGDP_{SLR}$	Divergence Catch up Convergence
Inflation	Gambia, The	Nigeria, Sierra Leone	$INF_{GAM} - INF_{NIG}$ $INF_{GAM} - INF_{SLR}$	Long run Convergence Long run Convergence

Source: Prepared by the Author

there is the divergence between Gambia and Nigeria and convergence between the Gambia and Sierra Leone in terms of RGDP targets. While, in terms of inflation, there is long-run convergence.

### Key Findings

1. WAMZ is susceptible to one percentage shock in FD inflow. The dynamical changes in FDA persist in the long run with dual role positive shock and negative shock on WAMZ. This implies the existence of asymmetry in WAMZ
2. FDA in WAMZ in line with its financial integration (capital account liberalization pillar III) generates ex post divergence in GDP growth target and ex post convergence in the inflation target.

## DISCUSSION OF FINDINGS

The findings in this study are consistent with Harvey and Cushing (2015). Hence, WAMZ is not a potential candidate for EMU. The implication is that Eco currency might not be practicable and might not guarantee the required economic values to WAMZ.

More so, the guarantee Jurak (2007) and Bayoumi and Eichengreen (1994) promised is not present in WAMZ. Thus, the presence of shock asymmetry implies that WAMZ does not possess a stable environment to adopt Eco EMU owing to the nature of a weak productive climate. Available evidence could

not squarely determine whether post-Eco EMU is insulated from asymmetric shock based on the findings of Belke and Gros (1998).

The realization of Macroeconomic Convergence Criteria remains empirical questionable. Thus, since RGDP divergence and Inflation convergence exist in WAMZ. The application of Eco currency in WAMZ could be extremely impossible.

It is imperative to recall that five strategic pillars were adopted in WAMZ. The financial integration pillar rather than being a curative factor could produce dual shock in concert to the various attendant manifestations of the FDA.

A high FDA could throw up structural impediments for the implementation of a common monetary policy administration. This problem could affect the possibilities of giving up individual countries' monetary policy independence which is key in a common currency and EMU.

## CONCLUSION

WAMZ's ex ante conditions should be taken into consideration than its ex post conditions. WAMZ in the long-run has asymmetry shock and in the long-run WAMZ's cannot realize some of its MCC targets ceteris paribus. This study adopts the pessimistic position that monetary union is susceptible to shocks (Grauwe, 2011) and that EMU is often plagued with asymmetric shocks (Haque, Mathieson, and Sharma, 1997). Krugman (2014) explored the negatives of cross border movement of capita movement from core to periphery

as the major causative to the effect of the shock which could explain the existence of asymmetric shock in the ECO EMU. This study also aligns with the findings of Chang and Velasco (2000) that financial integration is windows of volatility; causes the concentration of capital flow, misallocation of capital and pro-cyclicality movement and cross border flow brings about financial repression (Fieldstein-Horioka puzzle, 1980; Gourinchas and Jeanne, 2006; Lucas paradox, 1990; Stiglitz, 2000).

## RECOMMENDATION

We recommend dual currency usage in the implementation of the WAMZ ECO currency system. This recommendation has become imperative based on the problem of asymmetry shock and the problem of WACB in smoothening unwarranted economic problems. ECO should serve as an international reserve currency replacing the dollar forex system in WAMZ, while individual countries' currency should be used for domestic transactions. West African Currency Board should manage ECO, while Central Banks of WAMZ countries should manage an individual country's currency. We believe this process will unarguably introduce some level of monetary policy decency in WAMZ EMU viz-a-viz in terms of policy coordination, exchange rate administration and debt management, etc.

WAMZ should build a competitive climate. Competitiveness of the WAMZ region can offer Post Eco EMU stability and resilience in the long run. To succinctly put empirical shreds of evidence do suggest that many things matter with competitiveness (Porter, Delgado, Ketels & Sterns, 2016). According to Dijkstra, Amoni, and Kozovska (2011) attainment of regional competitiveness is assuredly a frontier required to guarantee the attainment, sustainability, and inclusiveness of convergence criteria with a particular reference to the right mix of available resources in the long run. Much so that competitiveness guarantees the organic responsiveness of firm's growth to respond to dynamical changes through the competitive and innovative product she offers and the accruable diffusion of new ideas (Audretsch, Coad, and Segarra, 2013: 745; Delmar, Davidsson, and Gartner, 2003) are optimally imperative for post-Eco EMU.

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