Asymmetric Shocks, Real Exchange Rate Distortions and Options for the Second Monetary Zone in West Africa

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Bringing Rigour and Evidence to Economic Policy Making in Africa

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Contents

List of tables
List of figures
List of abbreviations
Abstract

1. Introduction 1

2. Macroeconomic indicators of the WAMZ region 4

3. Brief review of related literature 6

4. Methodology 11

5. Findings 16

6. Conclusion 28

Notes 30

References 31

Appendix 34

List of tables

1a:	Results of error correction model for Nigeria and Ghana	17
1b:	Results of error correction model for Sierra Leone and The Gambia	18
2:	Correlation of RER misalignments of the four countries of WAMZ	22
3a:	Results of macroeconomic effects of RER misalignments and RER volatilities on growth in Nigeria and Ghana	24
3b:	Results of macroeconomic effects of RER misalignments and RER volatilities on growth in Sierra Leone and The Gambia	24
4a:	Results of macroeconomic effects of RER misalignments on money supply in Nigeria and Ghana	26
4b:	Results of macroeconomic effects of RER misalignments on money supply in Sierra Leone and The Gambia	27
A1:	Summary of major macroeconomic indicators in WAMU countries: 2015	34
A2:	Correlation of inflation rates among WAMU countries from 1998 to 2013	34

List of figures

1. Nigeria's RER, ERER and misalignment 20
2. Ghana's RER, ERER and misalignment 20
3. Sierra Leone's RER, ERER and misalignment 21
4. The Gambia's RER, ERER and misalignment 22

List of abbreviations and acronyms

BEER	Behavioural Equilibrium Exchange Rate
BOP	Balance of Payment
DEER	Desired Equilibrium Exchange Rate
DID	Difference-in-difference
ECOWAS	Economic Community of West African States
ERER	Equilibrium Real Exchange Rate
ERPI	Effective Relative Price Index
FDI	Foreign Direct Investment
FEER	Fundamental Equilibrium Exchange Rate
NEER	Nominal Effective Exchange Rate
REER	Real Effective Exchange Rate
RER	Real Exchange Rate
RTA	Regional Trade Agreement
TOT	Terms of Trade
UEMOA	Union Economique et Monetaire Ouest-Africaine (French for WAEMU)
WAEMU	West African Economic and Monetary Union
WAMZ	West African Monetary Zone

Abstract

The West African Monetary Zone (WAMZ) has continued to set targets of monetary integration for member states without success. With 2020 set as the new deadline for the attainment of monetary integration in the zone, it is not clear how the feasible this deadline is. It is clear that there are distortions that possibly affect not only the feasibility of enacting the union but also the potential outcome should the leaders decide to ram through the unification without due consideration to these factors. One such factor is exchange rate alignments. This study therefore investigates the presence of real exchange rate misalignments and the effects of such on the macroeconomic stabilities of the WAMZ countries. Due to paucity of data, the study captures only four of the six countries that make up WAMZ – Nigeria, Ghana, The Gambia, and Sierra Leone. It finds that there are misalignments of real exchange rates in all the four countries. These manifest mostly as real exchange rate (RER) overvaluation in two of the four countries, and as RER undervaluation in the other two countries. The RER misalignments and volatilities affect macroeconomic behaviours of the member countries in various ways and to varying degrees. We evaluate the diverse ways these misalignments affect macroeconomic policies and behaviour of the countries and their implications on the integration effort. The study concludes that efforts at stabilizing the macroeconomic fundamentals that determine RER in the WAMZ member states, beginning with monetary policy tools, will be important steps towards instituting a sustainable monetary union.

JEL Classification: E02, F15, F31, F33, F36

Keywords: West African Monetary Zone; Real Exchange Rates, RER Misalignments, Monetary Integration

1. Introduction

In recent years, member countries of the Economic Community of West African States (ECOWAS) have shown renewed commitments towards realizing the goals of integration. For a long time, ECOWAS has been accused by different stakeholders of adopting a top-down approach to regional integration that has alienated the people of the region, resulting in missed deadlines. One such deadline, the adoption of a regional currency, has been shifted a number of times. In response, and as part of the effort to rectify earlier anomalies, the ECOWAS Secretariat, with the mandate of Heads of State of the member countries, announced that it would henceforth pursue a goal of achieving integration of people and not just of states. Consequently, it set new deadlines for a number of the regional objectives. One deadline pertains to the adoption of a regional currency by all member countries, though this deadline has previously been shifted several times.

Given that about eight Francophone ECOWAS countries are already under a single currency, the six Anglophone countries—The Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone—agreed on a fast-track process that would integrate their monetary operations under an arrangement referred to as the West African Monetary Zone (WAMZ). The operational plan is to merge the Anglophone and Francophone zones afterwards. But this is hinged on 'significant progress' being made in realizing some broad convergence criteria by countries in the second monetary zone including but not limited to single digit inflation rate, budget deficit not exceeding 4% of GDP, credit to government not exceeding 10% of previous year's revenue, and real exchange rate stability.

Having missed a couple of earlier deadlines, there is need for careful consideration of all possible options for the ECOWAS countries to meet their target. Currently, there are serious questions about the economic viability or sustainability of the proposed second monetary zone. The question is not whether with a strong political will a single currency can be rammed through by the set deadline. Rather, the key question, at least from a macroeconomic point of view, is whether it should happen. The European Union is the only known model that proceeded from an integration of the factor and commodity markets, and finally capped with a single currency. ECOWAS has followed this model to integrate some of its product and factor markets. But success in this area has been very limited and the hope is that monetary integration would help settle the rest of the unresolved issues and facilitate the integration of all markets. Thus, it can safely be argued that presently, the case for single currency rests squarely on

its prospective impacts rather than from observed demand. Without question, this is problematic.

But whether the effects are prospective or derive from current demand, there is a set of macroeconomic fundamentals identified in the literature that matter for the viability and sustainability of a single currency project (Masson & Patillo, 2001). Table A1 in the appendix summarizes the position of the different WAMZ countries on some of the fundamentals and indicators. The table is quite instructive regarding the extent of divergence of the macroeconomic indicators and the nature of the shocks impacting on the six economies as at the end of 2015. Some of these indicators (like inflation rate) relate directly to the broad convergence indicators while others (like output growth and government finances) relate to internal dynamics of economic stability and growth that underpin the capacity to meet the regional obligations.

The economies concerned are mostly small, mono-product and susceptible to diverse internal and external shocks. The Nigerian economy, with nearly 78% of the population of the WAMZ, precariously hangs on the shaky global oil market. The Gambia, Guinea and Liberia are small, fragmented economies with a very high debt overhang. Liberia, still rebuilding after a long civil war, has a debt overhang that is three times the size of its annual national output. Inflation rates were still double digits in Ghana and Sierra Leone as at 2015, but single digit in Nigeria and Guinea for the same year. There exist, therefore, fluctuations in these indicators. Current account balance remains decidedly negative for all the countries in the region (though Nigeria can sometimes bail itself out with oil funds). Apart from the problem of the small sizes of the economies in question, the challenge of being susceptible to shocks translates to bumpy growth. This poses greater threats to the consideration of a monetary union. Correlation of inflationary shocks among the countries, as presented in Table A2 in the appendix, is quite varied and evidently, other shocks are asymmetric. Savings and investment have been quite unstable, and for many countries in the region, considered insufficient for sustained growth and stability. Overall, casual observation would suggest that much of the macro fundamentals seem to be misaligned, with little convergence, and could potentially threaten the ultimate success of the proposed monetary union.

A number of studies have concluded that the monetary union is not sustainable, yet the political authorities in the zone are bent on achieving it nonetheless. Thus, it is not clear whether it is relevant to interrogate the possibility or sustainability of the proposed monetary union. It is, however, important to query why several deadlines have been missed and what needs to change if future deadlines (especially the 2020 monetary union deadline) are to be met. Therefore, this study picks a part of the convergence criteria to enquire into the nature and implications of real exchange rate misalignments for the common monetary framework in particular and the regional integration project as a whole. There is need for going beyond merely examining the convergence criteria to look at the deeper macroeconomic structures of the countries and their implications for the long-term integration framework being sought by ECOWAS and towards which the WAMZ is a step.

More specifically, this study focuses on the asymmetric shocks, exchange rate distortions, and implications for policy harmonization in the zone. A number of studies that are available on this subject matter are either outdated, not focused on WAMZ or discuss real exchange rate distortions without linking the subject to the issue of monetary integration of the zone. This is why this study examines the nature and covariance of the shocks; RER volatility and misalignment, as well as the implications of these for broad macroeconomic policy on a country-by-country basis. The study also adopts a methodological innovation. By integrating macroeconomic fundamentals of each of the countries in the sub-region in a real exchange rate model, it is able to simultaneously capture the implications of the varied movements and shocks that affect each country in a manner that could give a broad picture. This differs from the item-by-item modelling and analyses that have been used by several works on the subject matter. Consequently, the study is able to present a fresh perspective that could help decisions, not only on potential risks of initiating the integration (which may be underrated or exaggerated by individual indicator analysis), but also on what need to be done if the possibilities of forming a union will hold in the nearest future. So far, discussions that relate to the insistence on forming a union are hardly captured by existing studies.

Therefore, the broad objective of this study is to investigate the nature and effects of shocks on four out of the six economies of the second monetary zone in West Africa. This covers the period 1981–2015 with a view to ascertaining the effects of such shocks on the broad economic and monetary environments of the countries and possible effects on the proposed monetary union. The specific objectives are:

a) To estimate the time path of the equilibrium RER conditional on the fundamentals in the sample countries and generate the distortions to the real exchange rate (if any).
b) To estimate the extent of misalignments and volatility for these countries.
c) To evaluate the impact of these distortions on the monetary policies of the WAMZ member countries.

2. Macroeconomic indicators of the WAMZ region

Table A1 summarizes some macroeconomic fundamentals of countries in the WAMZ region as at 2015. The populations of these countries range from 1.98 million for The Gambia to 178.7 million for Nigeria. This difference in population also translates to much difference in the volume of economic activity across countries. For example, Nigeria's GDP of $493.8 billion is more than 12 times that of the next largest economy (Ghana) and over 550 times the size of Gambia's.

In nearly all the countries, the government is a very important player. Government revenue as a share of output ranges from 7.2% in Nigeria, to 32.3% in Liberia; while government expenditure to GDP, which stands at 11.0% in Nigeria is as much as 43.7% in Liberia. In effect, while Nigeria has the lowest government finance to output ratio, Liberia has the highest. Most other countries fall somewhere in between these two. Expectedly, government expenditure is consistently higher than government revenue across board. Unweighted average government expenditure to GDP ratio stands at 25.8% compared to 19.2% government revenue to GDP. Beyond indicating the critical place of government in output, the numbers in Table A1 also show the scarcity of development resources almost across board. Only Liberia and Nigeria recorded positive but single-digit growth in exports in 2015. The rest of the countries recorded negative growth in exports, with Sierra Leone recording as much as -25% export growth in 2015. By contrast, three of the countries (The Gambia, Guinea and Nigeria) had positive growth in imports, while the rest (Ghana, Liberia and Sierra Leone) experienced negative growth, by as much as -26.7% in Sierra Leone. This shows in the current account balance – all the WAMZ member countries had negative current account balance, rising to 34.7% of GDP in Liberia.

Both monetary policy and trade within the region have not yielded optimal outcomes either. For most countries of the WAMZ region, it appears the most important aim of monetary policy is achievement of price stability. Expectedly, monetary policy targets in the region seem very similar across board. What vary are the approaches and outcomes. The Gambia has the lowest inflation rate, but this has been achieved through restrained monetary policy, which limited government borrowing and kept exchange rate stable. Guinea has been pursuing high expansionary monetary policy, which resulted in an average 86.7% increase in money supply within the 1986-2011 period (Balogun, 2014). The Gambia and Liberia maintained single digit inflation rates for the period 2000-2013, while Nigeria and Sierra-Leone had double digit

inflation rates (13% and 10.5%, respectively) between 2000 and 2013. As at 2015, Ghana and Sierra Leone had the highest inflation rates in the region at 17.7% and 10.1%, respectively. There is lack of data on intra-group trade within the WAMZ region but, owing to long-term association (the UEMOA region, for example, has had a very long monetary union), trade relations in ECOWAS appear to be better than in other sub-regions in Africa. Notably too, most countries in the WAMZ region have relatively high levels of openness. Trade to GDP ratio in Sierra Leone averaged 22% between 2005 and 2012, while those of Ghana and Nigeria were quite similar at about 33% and 34%, respectively.

Available studies suggest a possibility of asymmetric shocks in the region. Ekong and Onye (2012) found the correlations in supply and demand shocks among the West African countries to be asymmetric. The size of the Nigerian economy exacerbates the challenge of shock management, as shocks and distortions emanating from the country's financial and monetary decisions have the capacity to torpedo overall direction of the rest of the region. According to Etta-Nkwelle et al. (2012), the size of demand shock in Sierra-Leone is 0.41 compared to 0.12 for Nigeria, 0.11 for Gambia and 0.16 for Ghana. The speed of adjustment is also very low for Sierra-Leone (0.44) compared to at least 0.8 for the other three.

3. Brief review of related literature

Studies on the evaluation of feasibility or otherwise of monetary unions have multiplied since the heydays of the European Union. The idea that some convergence criteria have to be met before the establishment of monetary unions has also held sway for a long time. In this review, we look at some works that have examined regional integration. We also examine some empirical works on the derivation of long-run equilibrium real exchange rate and the implications of distortions.

One of the few studies that adopted real exchange rate approach to assessment of regional integration project was Masaki (2009). The paper evaluated integration in the West African sub-region. Building on the understanding that over the years, owing partly to the fixation of the CFA Franc to the Euro and the appreciation of the Euro since 2001, WAEMU countries have experienced relative exchange rate appreciation that could have impacted on their competitiveness, the study set out to calculate the real effective exchange rate (REER) for WAEMU countries from 1999 to 2006 using quarterly data and comparing these with those of their neighbours. The study used three variables to calculate the REER, namely, the nominal exchange rate, trade weights for each trading partner as well as domestic and foreign price indices of each pair of countries. The study was slightly unique in that it calculated the REER from only exports data and was able to vary trading partners' weights from one quarter to another. It thereafter disaggregated each REER into two – the nominal effective exchange rate (NEER) and effective relative price index (ERPI) – components.

The study found that, contrary to widely held belief that WAEMU REER has appreciated substantially over time, it was mostly stable over the sample period relative to those of its neighbours, especially those of Nigeria, though the country had a depreciating NEER. It also found that only the NEER component of WAEMU REER appreciated much over the sample period. The study also found that the transition patterns of WAEMU REER were correlated among member countries but completely different from those of WAMZ countries. Given the observed uncorrelated REER in the two monetary zones, the study concluded that while members of WAEMU were not negatively affected by a common currency, the integration of WAEMU and WAMZ may be a significant drain on ECOWAS economies.

The WAEMU region has a single currency, but also seems to have some issues of asymmetry of shocks. A recent IMF (2013) study shows that business cycle synchronization within the WAEMU and between the WAEMU and the euro area

remains limited. WAEMU countries are highly susceptible to various exogenous shocks, many of which are asymmetric. Analysis suggests that the capacities of WAEMU economies to absorb such shock are very limited compared to those of other monetary areas. The study suggests that a fiscal policy has very important role to play in addressing both symmetric and asymmetric shocks.

Bawumia (2002) examined the feasibility of a monetary union in West Africa using a CGE model. The study notes that the WAEMU is one of the longest existing monetary unions in the world. It also lists some of the conditions for the actualization of the WAMZ, including an independent common central bank, prohibition of the public sector from receiving central bank financing, pooling of foreign exchange reserves, and the establishment of a stabilization and cooperation fund from which members could draw to offset temporary balance of payments challenges. The paper concluded that on the basis of the time-table for meeting the convergence criteria relative to actual performance of the member countries, it was not feasible to meet the WAMZ targets in 2004. It noted that the time-table for the actualization of the goals of the WAMZ would have to be extended to enable countries meet the requirements. With the benefit of hindsight, it is clear that the predictions of the paper were correct, as the WAMZ deadline was moved beyond 2004.

Ekong and Onye (2012) examined the feasibility of proceeding with the proposed common currency in West Africa by adopting a multivariate Structural Vector Autoregressive (SVAR) model. The focus of the study was examining symmetry, magnitude and variance decomposition of four underlying structural shocks (external shocks, domestic supply shocks, domestic demand shocks and exchange rate shocks) as a precondition for forming an optimal currency era. The study treated the entire West African area as one, even though the Francophone countries were already in the WAEMU single currency, while the WAMZ area was in the process of estblishing its own currency. The result showed, among other outcomes, that there was low potential for factor mobility, intra-regional trade and openness across West African countries.

Omilola (2011) examined the extent to which African RTAs had met the necessary conditions for success. His work concluded that African RTAs had not met most of the desired conditions required for successful RTAs. This view is also supported by Nnanna (2006), who undertook a comparative analysis of the efforts by Africa as well as the challenges to economic and monetary union, and noted that it was important to nurture strong institutional frameworks and integrate trade and financial markets to support a common monetary policy. The study agreed that African economic groupings do not, ex-ante, satisfy the traditional OCA criteria. Some of the factors listed to affect African RTAs include low intra-group trade, commodity dependence, especially for exports, weak structural complementarity among African economies, multiple, duplicative and overlapping membership and consequent protocols, regional and domestic political instability, over-ambitious integration goals, and weak infrastructure. The study noted that most African RTAs were generally inefficient, with doubtful returns to member countries. The paper suggests that one reason why these RTAs are maintained is because of potential positive support in integration with the

rest of the world. But the paper expresses doubt that even this basic expectation could be met through the RTAs.

By contrast, Nnanna (2006) suggests that despite the non-compliance to the OCA criteria, African countries have not completely lost out in their attempts at economic and monetary union arrangements. The paper notes that such positive phenomena as expanded trade, macroeconomic stability, sustained growth and fiscal prudence have become more entrenched in Africa on account of economic and monetary union arrangements. This positive outlook is also shared by Poldermans and Philippe (2008), who studied financial integration in the region and came to the conclusion that the strong diversity in most of ECOWAS socioeconomic and financial characteristics was not a reason to give up on financial integration. They believe that though the scorecard for financial sectors at national and regional levels suggests a weak framework, there is a strong hint of optimism and that improvement initiatives could be taken without first fixing the big picture, especially as relates to boosting intra-regional trade. The study notes that the below-potential financial sector performance in ECOWAS causes the region to possibly lose 1% to 2%of GDP growth per annum and that this is a big incentive to improve competitiveness and fix the problems.

On the determination of equilibrium real exchange rate, a number of methodologies have been used. Appendix Table 2 summarizes some of the methods that have been used in the literature. Hooper and Mann (1989) and Blundell-Wignall and Browne (1991) spearheaded the works on fundamental determination of the real exchange rate. The identified fundamentals are real interest rate (differentials) and current account imbalances. The model asserts that shocks that drive the exchange rate away from the fundamentals will ultimately release it back to the levels projected by those variables. A major problem that has tugged at the heart of empirical research is the issue of appropriate definition of the concept of "equilibrium" in the measurement and analysis of the real exchange rate. Four related but distinct concepts have emerged in the literature and have continued to be applied in recent studies:

1. The PPP approach, which holds that RER for a given country ought to remain constant all through while nominal exchange rate adjustment will instantaneously make up for any price differential between a country and its trading partners (Elbadawi and Soto 1994).

2. The Equilibrium Real Exchange Rate (REER) concept of Edwards (1989) which seeks to estimate an inter-temporal time path of the equilibrium RER predicated upon both the current and anticipated values of the fundamentals.

3. The Fundamental Equilibrium Exchange Rate (FEER) is associated with Williamson (1993), and assumes behavioural specifications of the fundamentals, thereafter deriving the equilibrium RER in the context of a bigger model given the assumed path of the fundamentals.

4. The fourth concept of RER—the desired Equilibrium Exchange Rate (DEER)—is attributed to Bayoumi et al. (1994) and stresses the fact that equilibrium RER concept is first and foremost associated with a set of "desired" macroeconomic objectives. Stryker (1990) applied the PPP to equilibrium exchange rate determination for the export of agricultural commodities in Ghana. He obtained the RER and compared it with the NER, and concluded that over-valuation of the national currency became a problem when exchange controls were strongly enforced (alongside expansionary monetary policies)—a situation that resulted in unmanageable inflationary pressures.

These approaches and others have been used in recent studies, both for Africa and other developing nations. Ali et al. (2015) adopted the behavioural equilibrium exchange rate (BEER) approach to measure misalignment in Nigeria for the period 2000-2014 and found 0.17% overvaluation. Musyoki et al. (2012), using the REER approach to measure misalignment, found overvaluation for Kenya for the period June 1993–December 2009. Palic et al. (2014), using the PEER approach to measure misalignment in Croatia, found four periods of overvaluation and three periods of undervaluation of exchange rate. Schroder (2013) found that misalignment to either side reduced economic growth. The study was done for 63 developing countries, and based on the findings, suggested that exchange rate should be consistent with internal and external balances. Similarly, Ibrahim (2016) applied the generalized method of moments (GMM) for Nigeria and found lower misalignment during flexible exchange rates and higher misalignment during the fixed exchange rate regime. The study also found that misalignment negatively impacted economic growth, corroborating the findings of Schroder (2013).

Recent studies (Ali et al., 2015; Musyoki et al., 2012. Brixiova et al., 2013; Palic et al., 2014; Hosni and Rofael, 2015) seem to favour the use of the co-integrating error correction model. Earlier studies of Aron and Ayogu (1995), Edwards (1994), Soludo and Adenikinju (1997), all showed preference for the error-correction mechanism in the determination of equilibrium exchange rates. Soludo and Adenikinju (1997), for example, applied the co-integration error correction model to the determination of the equilibrium real exchange rate in Nigeria. They thereafter calculated the misalignment values. They then found that misalignment series have significant negative impact on manufacturing investment. Elbadawi and Soto (1994) and Baffes et al. (1997) estimated equilibrium RER for Chile, Cote d'Ivoire, and Burkina Faso, four SSA countries and three other developing countries using the co-integration ECM. In each case, it was found that the difference stationary values of the fundamentals were significantly correlated with the equilibrium RER and that the sustainability of the former depended highly on the values of the latter.

The relevance of this work derives from the fact that:

1. Even though a lot has been done with respect to deriving the real exchange rate (and sometimes estimating the distortions arising from it), the relationship of the

RER to regional integration has hardly been explored. Meanwhile, it provides a potentially important handle that could give insight over and above the individual variable assessment that is regularly adopted by studies on regional integration.

2. Most of the works in the literature took a micro approach to the estimation of both the equilibrium RER and impacts of its distortions on the economy.

3. A number of other works that focused on regional integration did not link them directly to macroeconomic fundamentals in the manner captured by the equilibrium real exchange rate.

4. Methodology

Nature of the variables

We follow the Salter-Swan definition of RER of the mono product, non-industrial developing country as the relative price of tradeables to non-tradeables, and assume a three-sector (and three-commodity) economy consisting of exportables, importables and non-tradeables (Hinkle and Nsengiyumva, 1999; Elbadawi and Soto, 1994; Soludo and Adenikinju, 1997; Baffes et al., 1997; 1999, among others): The international prices of tradeables are assumed exogenous (the familiar small country assumption). Domestic price of tradeables is given as:

$$P_t = P_t(e, t_x, t_m, P_x^*, P_m^*) \tag{1}$$

while that of non-tradeables is given as

$$P_N = P_N(P_x, P_m, P_n).\left({}^{A}/_{Y} - g\right) + g_N.g \tag{2}$$

where, PT is price of tradeables, PN is price of non-tradeables, e is the nominal exchange rate, tx is taxes on exports, tm is import taxes, Px, Pm and Pn are domestic prices of export, import and non-tradeables respectively, while (*) represents their foreign counterparts, A/Y is the absorption to output ratio, g is government expenditure, while gN is the proportion of these expenditures that goes to non-tradeables. Our exchange rate equation thus becomes:

$$e = e\left({}^{P_T}/_{P_N}\right) = e\frac{(e, t_x, t_m, P_x^*, P_m^*)}{(P_x, P_m, P_N).\left({}^{A}/_{Y} - g\right) + g_N.g} \tag{3}$$

Here we assume also that the TOT variables (Px*, Pm*, Px, Pm) are captured by variations in the current account balance (Pikoulakis, 1995). Net capital flows as a

ratio of output (KF/GDP) and expected exchange rate (et+1- et) define private sector absorption as main actors in the capital flows equation, while fiscal policy reflecting in the BOP accounts as either autonomous or accommodating transactions represents our gN. We, however, decompose the former into long-run and short-run capital inflows, portfolio investment and FDI. Our exchange rate equation therefore becomes:

$$e = e\left(LK_F/_Y, SK_F/_Y, FDI/_Y, t_x, t_m, g_N, g, e_{t+1}, -e_t\right) \quad (4)$$

Interest rate differentials (r-r*) have been identified in the literature as affecting the real exchange rate. High domestic interest rates relative to world rates impact on the real exchange rate by increasing the cost of doing business within an economy. The direction of flow of foreign capital is also largely a function of the nature and size of this differential. Following Elbadawi and Soto (1994), we proxy tx and tm by volume of exports and imports as ratio of GDP which we define here as EXM. This is justified on two grounds:

a) The difficulty of obtaining good time series data on tx and tm in West Africa.

b) EXM may account, not only for explicit commercial policy, but also for implicit factors such as quotas, and exchange controls that affect trade significantly.

We bring in public debt to output ratio and political instability (the latter proxied by recorded civil and industrial unrests) as country-specific instability factors. The hypothesis here is that debt servicing is a leakage on the development resources of a region. Besides, debt becomes a liability of the national governments in integration and may remain a veritable avenue for foreign pressure in the affairs of the region. On the nominal front, recommendations for devaluation are often based on the non-sustainability of deficits, and public debt and frequent changes in regime also mean frequent changes in the fundamentals of exchange rate. Most models in the literature incorporate interest rate differentials which will lead to depreciation of the real exchange rate. However, the intuition is that it goes to shape the movement of capital (of all forms) in and out of the domestic economy. With the explicit inclusion of the BOP components of foreign direct investment, and short/long-run capital flows, we expect that this may not be an effective option to take.

Besides, a more realistic approach to the explanation of the role of interest rate in such developing countries as we have in the second monetary zone may not be in terms of explaining it from the perspective of user cost of capital alone. Much more than that, they serve as indicators of country risk factor. Having incorporated other balance of payments components, we might complete the cycle with the explicit inclusion of capital flight in our model. Capital flight is particularly important here,

given the nature of the economies under consideration. Capital movement out of the region first leads to paucity of funds, raising the cost of the little left for productive purposes. To that extent, there is a relationship with user cost of funds. But much more, we can relate to the BOP constraint to growth theory and consider that higher country/regional risk may make the relationship unsustainable. High risk-content for a region, given overall capital base, could then be a self-sustaining factor that creates persistent capital movement, and this in turn leads to further paucity and higher costs of capital. Under such circumstances, funding regional integration and offsetting the costs to domestic economies of the union becomes a lot more difficult. The widening gap between foreign and domestic interest rate leads to exchange rate depreciation. Our final exchange rate equation, expressed in logs becomes:

$$\log e_{it} - \log e_{it-1} = \alpha_0 - \alpha_1 \log EXM_{it} + \alpha_2 \log\left({}^{g}/_{Y}\right)_{it} - \alpha_3 \log\left({}^{D}/_{Y}\right)_{it} + \alpha_4 \log\left({}^{LK_F}/_{Y}\right)_{it} + \alpha_5 \log\left({}^{SK_F}/_{Y}\right)_{it} + \alpha_6 \log\left({}^{FDI}/_{Y}\right)_{it} + \alpha_7 \log\left({}^{FPI}/_{Y}\right)_{it} - \alpha_8 \log CF_{it} - \alpha_9 C_{it} + \mu_t \quad (5)$$

The sum of X and M (EXM) is expected to impact negatively on exchange rate through the influences of the various exogenous shocks on domestic TOT. g/Y (government consumption expenditures) which proxies for government propensity to spend on non-tradeables is expected to positively impact on RER as it raises the relative price of non-tradeables, and thus appreciates the RER. The BOP components, LKF (long-run capital flow), SKF (short-run capital flow), FDI (foreign direct investment), FPI (foreign portfolio investment) and CF (capital flight) are all expected to also have positive impacts, while the instability factors D/Y (public debt to output ratio) and C (civil unrest – a dummy) are expected to have negative influences on RER. μ_t is the error term satisfying all the assumptions on the stochastic random variable (Gujarati and Porter, 2008). Subscript i in the variables denotes the individual countries under study.

ERER and deviations of RER from ERER

Following the leads by Edwards (1989), Baffes et al. (1997), Elbadawi and Soto (1994), Soludo and Adenikinju (1997), Montiel (1999), and Schroder (2013), among others, we specify an inter-temporal co-integration error correction model (ECM). Aside from its ability to simplify an otherwise complex theoretical framework to simple equation terms, it has the advantage of providing a powerful framework for separating long-run and short-run effects of variables on the RER. It also avails a simple computation of its equilibrium level. The error correction term incorporates the forward-looking sources of RER dynamics.

Several other techniques to the generation of sustainable fundamentals for the estimation of the equilibrium RER have been developed (Baffes et al., 1997; 1999).

One method in the literature is the Beveridge-Nelson (B-N) decomposition technique. The B-N technique assumes that each of the fundamentals follows a univariate ARIMA (P, 1, q) process, with the AR and MA components generating stationary fluctuations about an underlying random walk. This work shall, however, not use the B-N technique as it becomes unnecessary if and when co-integration is established (Baffes et al., 1999). Another technique takes an ex-ante approach to modelling of the permanent components of the fundamentals. It proceeds by generating counterfactual simulations of the values of the fundamental on the basis of a priori theory and knowledge of country specifics. It is closely related to the desired RER concept, though it aims more to reflect the reality of the values of these fundamentals. One of the advantages of this method is that it breaks the implicit assumption of zero misalignment within sample, which the other two methods based on time series adopt. Again, time series decomposition and moving average methods make it difficult to distinguish persistent but unsustainable changes. To a large extent also, it can be used to look into potential effects of changes in the fundamentals, especially for those that may be under policy control. One final method that can be of interest to this work is the estimation of the long-run parameters of the ERER using the actual series on the fundamentals and applying the Johansen procedure to extract the common stochastic trend. This study shall use all the approaches outlined here (except the B-N technique) and compare the results. We shall also estimate misalignment using both and assess their policy implications. For the dummy, Coups, we shall use the Halvorsen and Palmquist (H-P) methodology for dummy parameter estimation in the calculation of the ERER. (The H-P methodology takes the antilog to base e of the estimated parameter and subtract 1 from it).

We take misalignment to be the percentage difference between RER and its estimated equilibrium value. Soludo and Adenikinju (1997) estimated misalignment using the equation

$$M_{it} = \frac{EREER_i - RER_i}{RER_i} 100 \qquad M_i = \frac{EREER - RER}{RER}.100 \tag{6}$$

For volatility, we follow the leads by Mlambo et al (2013) and use the standard error of the RER estimated from a first order autoregressive equation. Our function becomes

$$RER_i - EREER_i = \beta_1 (RER_{it-1} - EREER_{it}) + \mu_1 \tag{7}$$

If we denote Equation 7 by et, then Vt becomes √[(Q2). et], i.e., Standard Deviation of e_t.

Assessing cross-country distortions and their impacts

To assess the effects of RER misalignment and volatility on the selected macroeconomic fundamentals, we estimate reduced form equation for the fundamentals, which incorporate the RER distortion variables, i.e.,

$$X_{it} = X_{it}(M_{it}, V_{it}, B_{it}, \mu_i) \tag{8}$$

where, X_{it} represents the relevant macro fundamentals (e.g., money supply, fiscal deficits, etc.) of the various countries under evaluation. In this study, the macroeconomic fundamentals being considered are money supply, fiscal deficit, current account deficit and growth. This means that Equation 8 will be considered as four equations in one, where X_{it} will be considered in separate equations as MS (Money Supply), FD (Fiscal deficit), CAD (Current Account Deficit), and GDPR (Economic Growth). Also, M_{it} represents the misalignment variable derived from previous equations, while V_{it} is the volatility variable derived from Equation 7. In the same way, B_{it} is a vector of other relevant explanatory variables derived from theory and known to impact the X_t set of variables. Equation 8 will be estimated using OLS. Stationarity tests on the variables will be conducted using the Augmented Dickey Fuller (ADF) approach. For co-integration tests, the study will use the Johansen approach. These approaches are considered most suitable for stationarity and co-integration tests, respectively.

In addition to the above, standard statistical analyses are used to test for the significance and implications of different levels of distortions and their implications for the entire region. For example, we use correlation analysis to find out the relativity of the various real exchange rates distortions among the countries and the size of the correlation coefficient in order to give a back-of-the-envelope measure of the costs associated with a country's integration with the other.

Sources of data and data transformations

Data used for the estimations are sourced from the International Financial Statistics of IMF, various issues of IMF World Economic Outlook, the UNCTAD Handbook of International Trade and Development, and the African/World Development Indicators. Data from the sources above are usually on annual basis. This study had intended to explore the option of collecting quarterly data from the central banks of the various countries in order to have higher frequency data for all the variables covering from 2000 to 2014. However, we were unable to secure quarterly data on most of the variables as earlier hoped. As a result, instead of quarterly data from 2000 to 2014, the time scope of the study was extended to cover the period 1980–2015 (36 observations). Estimations for this study were carried out using the EViews (Econometric Views) software package.

5. Findings

This study aims to provide insight into some factors contributing to WAMZ's inability to meet macroeconomic convergence. It offers a complementary evaluation of medium to long-term sustainability challenges that may arise from possible integration, their implications and possible means of tackling them. By taking a fundamentals approach to real exchange rate analysis and relating these to countries' participation in the monetary union, it is able to measure traditional variables that go into convergence criteria discussions and the extent to which they go to resolve or exacerbate challenges emanating from those narrowly chosen for measuring convergence.

One of the major concerns of this study is to estimate equilibrium real exchange rate for each of four out of the six countries in the WAM Zone – The Gambia, Ghana, Nigeria and Sierra Leone. Unavailability of data for Guinea and Liberia ruled out the option of a panel analysis of the zone, which could have made generalized inference on the WAMZ more probable. The final estimations for the individual countries in the zone represent a modified version of Equation 5 based on the macroeconomic environments prevalent in each of the modelled economies. In modifying the models for each of the countries, variables were adjusted or altogether dropped to reflect relevance in the determination of real exchange rate in the particular country being modelled.

Major determinants of RER among the WAMZ countries

Ex-ante tests stationarity tests using Augmented Dickey-Fuller (ADF) method indicate that about all variables for each country are integrated of order 1, i.e., I(1). Follow-up tests also show co-integration among variables in each country's dataset. Consequently, the error correction modelling (ECM) approach is adopted.

The results of the error correction model of real exchange rate for Nigeria and Ghana are as presented in Table 1a.

Table 1a shows that the major determinants of real exchange rate in Nigeria are balance of payment, total trade, and government consumption expenditures, conforming to a priori expectations. For Nigeria, positive balances of the capital and current accounts led to the appreciation of the real exchange rate, while increases in government consumption expenditures led to depreciation of the same. A possible explanation to the observed effect of increases in government consumption expenditures on real exchange rate movement is that such expenditures tend to

increase the propensity to consume foreign goods. Usually, this results from an entrenched preference of foreign goods, exacerbated by paucity of local alternatives. On the other hand, increases in the volume of total trade by Nigeria appreciate the real exchange rate of the country. This is most likely through oil sales, as the results also show that the balance of payments position of the country puts negative pressure on the real exchange rate. Understandably, the final accounts regularly show negative balance of payments, particularly after netting out import payments for services and capital flows. While the balance of trade regularly turns positive for goods, overall balance of payments has been more consistent in the red. The ECM coefficient is quite low, showing slow adjustment to long-run equilibrium in the Nigerian model.

Table 1a: Results of error correction model for Nigeria and Ghana

NIGERIA			GHANA		
Determinants	Coefficient	t-Stat	Determinants	Coefficient	t-Stat
Balance of Payment	0.005968	2.6877	Govt Debt	-0.092043	-1.3517
Govt Debt	0.044774	0.7452	Capital Flight	-0.022363	-1.0896
Capital Flight	0.007601	0.3180	Foreign Direct Invest.	0.004883	0.1766
Total Trade	-0.223006	-3.1887	Govt Consumption Expenditures	-0.057572	-0.7655
Govt Consumption Expenditures	0.297926	4.8236	Total Trade	-0.086024	-4.9921
Net Foreign Invest.	-0.014558	-0.5963	Gross Output	-0.482635	-4.2529
ECM(-1)	-0.001021	-2.4296	ECM(-1)	-0.425637	-3.6019
Constant	0.010966	0.3912	Constant	2.216972	5.5602
R-squared	0.957671		R-squared	0.885865	
Adjusted R-squared	0.898411		Adjusted R-squared	0.797093	

The key determinants of the real exchange rate in Ghana are total trade and gross output (Table 1a). The signs of the two determinants conform to a priori expectations. Increase in both output and trade lead to appreciation of the real exchange rate. These two are important domestic fundamentals that increase the country's ability relative to the rest of the world. Following the Balassa-Samuelson proposition, increase in output can result in either increase or decrease in real exchange rate depending on whether the growth is in the area of tradeable or non-tradeable goods (Asea and Mendoza, 1994; Mihaljek and Klau, 2003; Harberger, 2003; Rodrik, 2008). Clearly, Ghana's output growth seems to engender growth in the tradeable goods sector, making available more products for international trade within the Ghanaian economy. At 42.6%, the speed of adjustment of Ghana's real exchange rate to its long-run equilibrium position is very high.

As in the Nigerian model, public debts, capital flight and foreign direct investment are insignificant, but unlike Nigeria, government consumption expenditure is not significant in RER determination in Ghana. Public debt in Ghana appreciates the real exchange rate, likely indicating more prudent use of such resources. Likewise, public expenditure appreciates the real exchange rate in Ghana, though this is statistically insignificant. It is difficult to find greater difference between any two

immediate neighbours on factors like public expenditure and debt as exists between Nigeria and Ghana. There is a sharp contrast in the use of public resources, whether borrowed or earned, leading to contrasting outcomes. Ghana's public resources (both expenditure and debt) seem to provide important support to domestic real exchange rate appreciation, while Nigeria's expenditure and debt seem to bolster real exchange rate appreciation. The significance of debt on both countries is weak, in part because the days of the debt overhang are over and output growth seems to have dwarfed the high impact that debt had on these economies over time. However, though insignificant, there remains an important statement on the contrasting use to which debt facilities and other public funds are put in the two countries. Saheed and Sani (2015) pointed out that the nature of projects financed with debt instruments matters in the determination of the kind of relationship between public debts and real exchange rate. This means that using debt instruments to finance productive and/or infrastructural capital projects will not exert the same effect on real exchange rate as applying the same instruments to finance consumption. Lin (1994) made the point a little differently, indicating that public debt has a negative effect on real exchange rate in an economy with relatively higher capital elasticity of output, and the inverse effect in an economy with relatively lower capital elasticity of output.

Table 1b presents the results of the error correction models of the real exchange rate for Sierra Leone and The Gambia.

Table 1b: Results of error correction model for Sierra Leone and The Gambia

SIERRA LEONE			THE GAMBIA		
Determinants	Coefficient	t-Stat.	Determinants	Coefficient	t-Stat.
Govt Debt	-0.2671	-0.7536	Govt Debt	0.0637	0.9563
Total Trade	-0.2530	-1.5175	Total Trade	-0.1471	-1.3425
Foreign Direct Invest	0.0368	1.3058	Foreign Direct Invest	0.0525	1.8145
Gross Output	-0.6806	-2.0369	Govt Consumption Expenditures	0.2512	2.7635
Govt Consumption Expenditures	0.6698	2.2658	Net Foreign Assets	0.0192	0.5766
Capital Flight	0.0123	0.2674	Gross Output	0.4672	2.8968
Civil Unrest	0.2947	3.0379	ECM(-1)	-0.0003	-0.7693
ECM(-1)	-0.0004	-3.1802	Constant	-0.0545	-4.2469
Constant	0.0474	0.1742			
R-squared	0.7036		R-squared	0.7030	
Adjusted R-squared	0.5212		Adjusted R-squared	0.5644	

Sierra Leone takes a bit of the characteristics of both Ghana and Nigeria. As in Ghana, output appreciates the real exchange rate, but as in Nigeria, government expenditures depreciate it. Contrary to Ghana and Nigeria though, civil unrest plays a critical role in the determination of the real exchange rate in Sierra Leone – and it significantly depreciates it. Civil unrest does not only increase a country's vulnerability, both internally and externally, it lowers productivity and increases

unproductive debt. And Sierra Leone's unrest was not only long; it was equally destructive. It seems to have left a long-lasting mark on the country's economic fundamentals. The flow of official development assistance would have gone a long way to ameliorate these impacts, but they still remain significant for macro fundamentals, as shown in Table 1b. Meanwhile, total trade appreciates the real exchange rate. Consistent with the findings in Ghana, and contrary to those of Nigeria and The Gambia, debt appreciates the real exchange rate in Sierra Leone, indicating positive use of debt funds. Total trade also appreciates the real exchange rate. Even though these latter effects are statistically insignificant, they are notable and useful in understanding the broad character of the fundamentals of Sierra Leone.

In The Gambia, output growth, foreign direct investment and government expenditures all depreciate the real exchange rate – the only case where all three factors reinforce one another among the four countries of the study. Most likely, this is partly because of the country's size and overall vulnerability to external influences and shocks. Clearly, where vulnerabilities are high, even factors such as government expenditure and foreign direct investment may not always produce the best results for a country, and that seems to be the case for The Gambia. Such potential determinants as public debt, total trade and net foreign investment, included in the model, were not statistically significant. Expectedly, though insignificant, public debt and net foreign assets depreciate the real exchange rate (much the same way as government expenditure) in The Gambian economy. Trade, mostly because it is managed by the private sector, has the opposite effect.

RER misalignments among the WAMZ countries

For this study, understanding the determinants of real exchange rate in each country of WAMZ is only a step towards the determination of the level of misalignment. Meeting the convergence criteria of the zone implies that each of the countries should strive towards reducing the level of real exchange rate misalignment. For each country and over time, there should be convergence of actual real exchange rate with the equilibrium real exchange rates obtained from the fundamentals.

Figure 1 is a graphical presentation of Nigeria's actual and fitted (equilibrium) real exchange rates (panel 1) and misalignment of the real exchange rate from its fitted trends (panel 2). Between 1991 and 1999, actual real exchange rate figures did not deviate much from equilibrium real exchange rate values. However, between 2000 and 2003, large undervaluation shocks were quickly followed by large overvaluation shocks – ranging between 15% and 20%. Up until 2011, when another major overvaluation occurred, deviations in later years were much lower, and kept mostly within the ±5% range. In all, Nigeria recorded an average real exchange rate misalignment of about 1.1% overvaluation. The real exchange rate overvaluation figure mirrors the nominal exchange rate overvaluation figure of 0.17% by Ali et al. (2015) for the period between 2000 and 2015. Nigeria's record of 1.1% RER overvaluation in this study is

a significant improvement since Agu (2002) found much higher misalignments in the 1970s through the 1990s. The period 2000–2003 corresponded with a period of both political and economic transition and the adjustments that followed the re-introduction of democracy and which preceded the country's historically high growth as democracy and capitalism were ingrained.

Figure 1: Nigeria's RER, ERER and misalignment

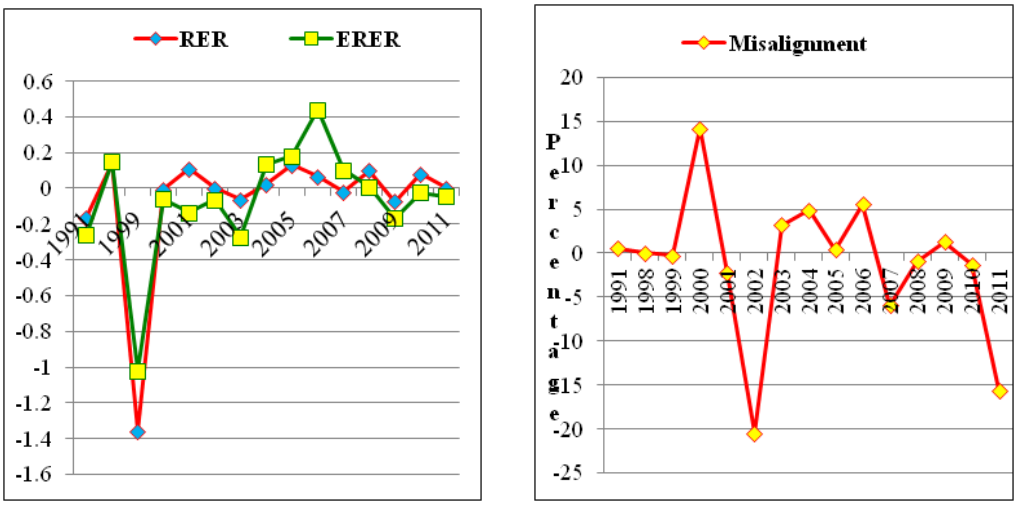
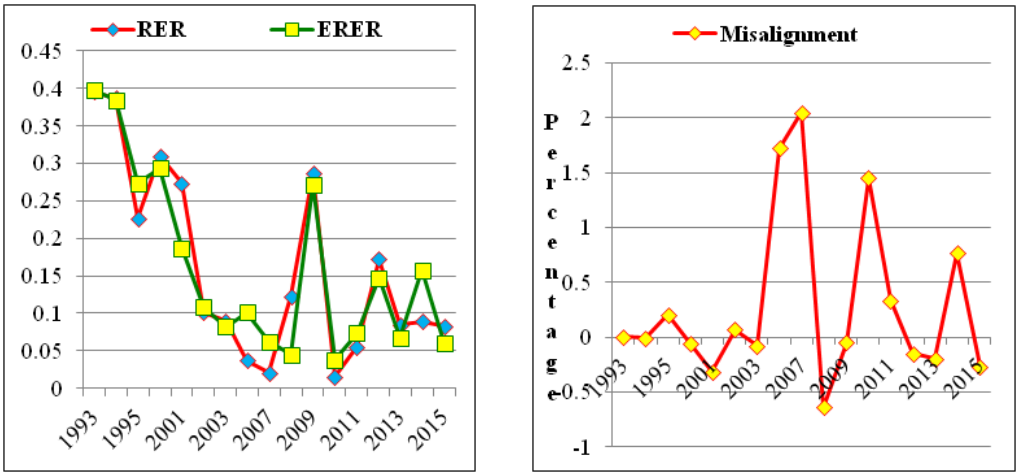


Figure 2 shows the performance of Ghana's actual and equilibrium real exchange rates as well as the misalignment position over the period under consideration.

Figure 2: Ghana's RER, ERER and misalignment

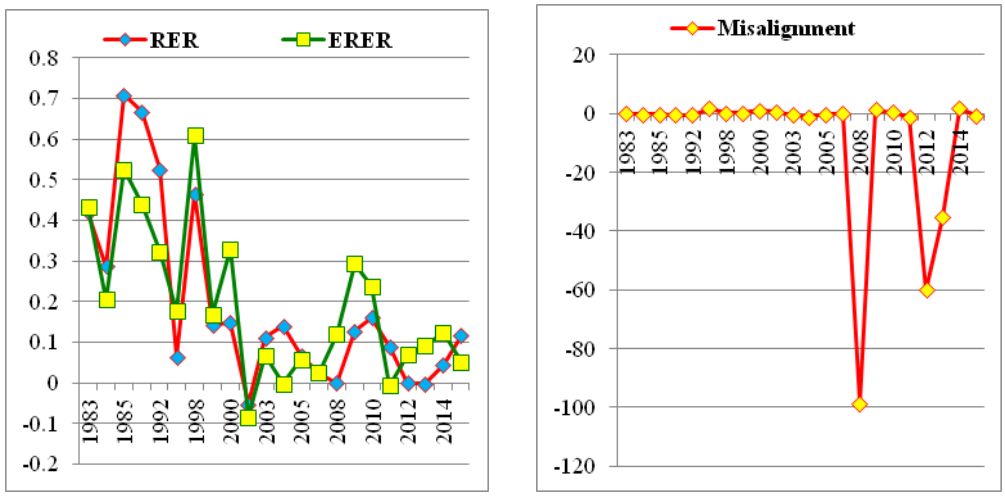


Ghana's real exchange rate seems to be one of the most stable in the WAMZ region; and this reflects in the alignment of its actual and equilibrium values.

Ghana's real exchange rate has been relatively stable when compared with the equilibrium real exchange rate. The country's real exchange rate was mostly undervalued between 2003 and 2015, but between 1993 and 2002, the real exchange rate oscillated closely around the equilibrium levels. In fact, the highest levels of real exchange rate misalignment for the country occurred mainly after the idea of a single monetary zone was considered for the West African countries in 2000. Nevertheless, even the sharpest real exchange rate misalignment recorded in Ghana's economy, which occurred in 2008, represents just about 2% RER misalignment. Within the study period, Ghana recorded an average misalignment level of 0.28% undervaluation, which is not a bad record for a country setting targets for monetary integration.

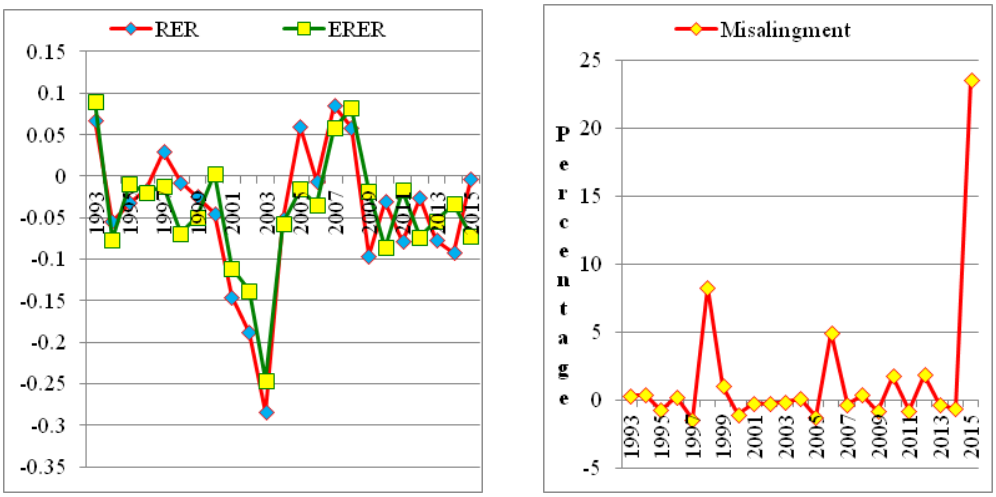
Sierra Leone has also been very stable in relative terms. Figure 3 shows the alignment of the actual and fitted real exchange rates (panel 1) and the misalignment over the study period (panel 2). Sierra Leone's real exchange rate stood almost at the same level with the equilibrium real exchange rate for most of the years before 2008. However, the few years of misalignment came very high and sharp. Real exchange rate misalignment was particularly high between 2008 and 2009 (98%) and between 2012 and 2013 (60%). The 2008 overvaluation may be connected to the global economic downturn of 2008/2009 fiscal year, which depressed demand for Sierra Leone's exports (particularly diamonds) and led to reduction of aggregate growth from about 7% the previous year to 3.1% in 2009. Recovery of growth in Sierra Leone was quite fast leading to reestablishment of normalcy in the following years. However, by 2013, an outbreak of Ebola took another major toll on economic activities in Sierra Leone, and particularly affected tourism, a critical sector of the economy. These few years of very high deviations from the equilibrium raised the study period average misalignment to 8.6%.

Figure 3: Sierra Leone's RER, ERER and misalignment



Besides Nigeria, The Gambia presents the next most unstable picture in real exchange rate misalignment from equilibrium among the four countries under study. This appears in both the number of years of deviation from the equilibrium and the value of such deviations. In three of the years – 1998, 2006 and 2015 – deviations from the equilibrium were as high as 8%, 5% and 24%, respectively. Given the country's dependence on the external sector, particularly tourism and re-exports to neighbouring countries, the 1998 surge may be connected to the resurgence of tourism following the dip that accompanied the 1994 coup. Likewise, the real exchange rate instabilities in 2006 and 2015 may be direct outcomes of growth trajectories of neighbouring countries, particularly Senegal and Guinea.

Figure 4: The Gambia's RER, ERER and misalignment



In sum, trends in the real exchange rate among countries of the West African Monetary Zone vary greatly. Table 2 presents the correlation of the misalignments of each country's real exchange rate from its equilibrium level based on the figures presented above.

Table 2: Correlation of RER misalignments of the four countries of WAMZ

	GAMBIA	GHANA	NIGERIA	SIERRA LEONE
GAMBIA	1.000000	0.395377	0.266484	0.447267
GHANA	0.395377	1.000000	-0.281202	-0.031493
NIGERIA	0.266484	-0.281202	1.000000	0.929374
SIERRA LEONE	0.447267	-0.031493	0.929374	1.000000

Nigeria's real exchange rate from its equilibrium level is correlated with only that of Sierra Leone. The correlation coefficient of 92.94 is the closest of all the coefficients in the table. All others fall below 50%. Indeed, only in two other instances does the real exchange rate misalignment of countries come close to 50% – that of The Gambia with Sierra Leone (at 0.45) and The Gambia with Ghana (at 0.39). Correlation of the real exchange rate misalignment in Nigeria and those of two of the other three countries is weak. With Ghana, which is the next largest economy among the potentially integrating countries, the correlation is a negative (i.e.,-0.28), while with the smallest economy (The Gambia) it is a mere 0.27. Similarly, Ghana's trends are negatively correlated to those of Sierra Leone (at -0.32).Though some of the countries are relatively stable (like Ghana and The Gambia), the unrelated misalignments of real exchange rates of the four countries point to potential challenges with alignment of macroeconomic fundamentals, which can pose serious problems with the management of regional integration.

Effects of RER misalignments and volatilities on the economies of WAMZ countries

The study examines the effects of real exchange rate misalignment and volatilities on macroeconomic aggregates of WAMZ countries. The focus of this section will be on money supply and broad output growth. It is assumed that movements in these two aggregates largely reflect the state of the rest of the macroeconomic aggregates. Regression estimates of the effects of real exchange rate misalignments and volatilities on economic growth in the four countries are shown in tables 3a (Nigeria and Ghana) and 3b (Sierra Leone and The Gambia). The results are controlled for the impact of such broad and important variables as output, trade, debt and government expenditures and other country/context-relevant variables across the four countries. The interest, however, is on the impact of the two exchange rate variables—misalignment and volatility—and subsequent discussions will reflect that.

Table 3a shows that economic growth is a decreasing function of real exchange rate misalignment and real exchange rate volatility in Nigeria. But for Ghana, the signs of the impact of the two variables directly contrast those of Nigeria. For both countries, the effects are not statistically significant for economic growth (except in Nigeria where volatility is marginally significant). This reflects, in part, the direction of real exchange rate misalignments for both countries. While Nigeria had RER overvaluation for most of the study period, Ghana had more undervaluation. So while exchange rate misalignment hurt growth in one country, it supported growth in the other. Ghana had much greater stability in the real exchange rate, and it seems the management of the fundamentals was structured in such a way as to enable growth. Volatility was marginal and so as to allow flexibility and not completely overwhelm business decisions through lack of predictability of movements in economic fundamentals. The same cannot be said of Nigeria over the study period.

Table 3a: Results of macroeconomic effects of RER misalignments and RER volatilities on growth in Nigeria and Ghana

NIGERIA			GHANA		
Determinants	Coefficient	t-Stat	Determinants	Coefficient	t-Stat
Real Exchange Rate	-1.2937	-3.3535	Real Exchange Rate	-0.6437	-2.6201
Govt Debt	-0.6582	-3.2023	Capital Flight	0.2169	1.7442
Total Trade	0.1926	1.2213	Total Trade	-0.8359	-1.1131
Govt Consumption Expenditures	0.6748	2.2877	Govt Consumption Expenditures	0.7251	1.4420
Domestic Investment	0.4832	3.2437	Domestic Investment	0.6598	1.4325
Money Supply	-0.5005	-1.5800	Money Supply	-1.7240	-1.3142
Inflation Rate	0.0270	2.0959	RER Misalignment	0.1170	1.0877
Foreign Direct Invest	-0.2089	-1.2868	RER Volatilities	6.9120	1.0614
RER Misalignment	-0.0127	-1.4541	ECM(-1)	-0.0005	-2.5391
RER Volatilities	-2.2841	-2.1914	Constant	-0.1745	-0.9969
ECM(-1)	-7.85E-13	-0.1376			
Constant	0.1012	1.4064			
R-squared	0.9748		R-squared	0.8274	
Adjusted R-squared	0.8826		Adjusted R-squared	0.6722	

Table 3b: Results of macroeconomic effects of RER misalignments and RER volatilities on growth in Sierra Leone and The Gambia

SIERRA LEONE			THE GAMBIA		
Determinants	Coeffic	t-Stat.	Determinants	Coeffic	t-Stat.
Capital Flight	0.1396	10.6026	Govt Debt	-0.0941	-2.0475
Govt Debt	-0.7343	-37.0668	Total Trade	0.2311	3.1041
Total Trade	0.1045	9.03845	Foreign Direct Invest	-0.0490	-2.0923
Net Foreign Inflows	-0.0919	-20.289	Real Exchange Rate	0.6377	3.3477
Govt Consumption Exp	-0.0932	-6.4614	Govt Consumption Exp	0.0913	1.2054
Balance of Payment	0.0099	8.5262	Domestic Investment	0.0234	1.1496
RER Misalignment	0.0010	6.2494	Inflation Rate	-0.0067	-1.9934
RER Volatilities	-0.1771	-1.5755	RER Misalignment	-0.0061	-1.4474
ECM(-1)	-8.06E-11	-6.6766	RER Volatilities	-3.8697	-3.4999
Constant	-0.0764	-3.8635	ECM(-1)	-0.0005	-0.9102
			Constant	0.1253	4.7155
R-squared	0.9998		R-squared	0.9317	
Adjusted R-squared	0.9986		Adjusted R-squared	0.8748	

Table 3b presents the effects of real exchange rate misalignment and volatility on the growth experiences of Sierra Leone and The Gambia. With the exception of misalignment in Sierra Leone, which has a positive impact on growth, the overall effect of real exchange rate instabilities is negative across the two countries (the impact of misalignment was positive on Sierra Leonean output growth but negative in The Gambia, while RER volatility had a negative effect on growth in the two economies). The depth of effect is equally higher in these two smaller economies than it is in Nigeria and Ghana. For example, the effects of misalignment across the two countries are

directly opposite but statistically significant, again indicating the relative over- and under-valuations existing in the two countries, which make exchange rate movements either an enabler or an inhibitor of growth. However, the effect of volatility in Sierra Leone is not statistically significant, just as the effect of misalignment in The Gambia is not very strong.

Theoretical studies have established a negative relationship between real exchange rate misalignment and economic growth, especially among developing countries. However, there are divergent views on this matter based on empirical studies. This study aggravates the argument by producing results that support both sides. On one hand, the results obtained for Ghana and Sierra Leone in this study agree with that of Musyoki et al. (2014) which shows that real exchange rate misalignment (RER overvaluation) greatly encourages economic growth in Kenya. On the other hand, the results for Nigeria and The Gambia agree with that of Diabate (2017), which shows that real exchange rate misalignment hampers growth in Cote d'Ivoire. One factor that explains varying relationships between real exchange rate misalignment and economic growth is the nature of misalignment observed in the economies (either more of overvaluation or more of undervaluation).

However, real exchange rate volatility represents the level of unpredictability of the exchange rate of an economy given its fundamental determinants and, therefore, its effect is usually negative as is the case in three of the four countries. Janus and Riera-Crichton (2015) insist that real exchange rate volatility should have a negative effect on growth. They conducted an empirical study of the OECD countries confirming this assertion. Ghana is an (and the only) exception among the WAMZ countries on this. We do not consider this result strange, given that the size of movement of fundamentals of real exchange rate or the movement of the actual from the equilibrium real exchange rate in Ghana over the study period are within comfortable bands of reason. They are very unlikely to destabilize business and economic managers in regular forecasts of major indicators. Of course, it is usually the case that for poor countries and in such volatile region as WAMZ, economic actors are likely to have developed some adaptive mechanisms for coping with volatilities such that 'normal' activities can still go on in the face of volatilities, particularly if business decisions factor them in. Where they are negligible, they are not expected to have considerable effects. Whatever the case though, the differing results of the four countries in both movements away from equilibrium and the effects of such movements present sources of asymmetric shocks and asymmetric responses of the individual economies, which have implications for how far a unification of economic and monetary activities can go.

A summary of the effects of the real exchange rate misalignment and volatility on money supply of the four countries is shown in tables 4a and 4b. As in the economic growth scenario, discussion of the results will focus on the effects on money supply, controlling for the set of macro variables also included in the equations. The modelling approach adopted is the general-to-specific, allowing a large number of explanatory variables at the initial point. In fact, the same set and number of variables were initially included in the individual countries' models, but some were dropped in the varying

iterations owing to multicollinearity or level of significance and sign of the resultant coefficients. In the final analysis, there are variations in the number of relevant variables for each country.

Table 4a: Results of macroeconomic effects of RER misalignments on money supply in Nigeria and Ghana

NIGERIA			GHANA		
Determinants	Coeff.	t-Stat.	Determinants	Coeff.	t-Stat.
Govt Debt	-1.2384	-28.424	Capital Flight	0.0517	2.2413
Real Exchange Rate	-2.3299	-38.668	Foreign Direct Investm	0.0138	0.3927
Total Trade	0.3508	22.195	Gross Output	-0.0494	-3.6214
Foreign Direct Investm	-0.2131	-15.941	Govt Debt	0.1144	1.1798
Gross Output	-1.6257	-30.172	RER Misalignment	0.0268	1.2573
Govt Consumption Exp.	0.9941	49.571	RER Volatility	3.1220	2.4072
Inflation	0.0455	38.287	Constant	-0.0914	-3.2091
Domestic Investment	1.0739	30.212			
Deposit Interest Rate	0.0535	27.467			
Lending Interest Rate	-0.0253	-16.688			
RER Volatility	-5.0127	-32.596			
RER Misalignment	-0.0128	-16.601			
ECM(-1)	-5.33E-12	-6.432			
Constant	0.2238	42.521			
R-squared	0.9998		R-squared	0.7661	
Adjusted R-squared	0.9972		Adjusted R-squared	0.6386	

Not only does Nigeria have very many variables affecting money supply, the impact of RER misalignment and volatility are negative, consistent with both their impact on output and a priori expectations. The results show that money supply in Nigeria is a decreasing function of both real exchange rate misalignment and volatility. Ghana presents the very opposite picture, with money supply being pro-cyclical with real exchange rate misalignments and volatilities. Again, the fact that Ghana has not only witnessed more undervaluation, but also other deviations like volatility have not been threatening, makes such results plausible. In Nigeria, the effects of both volatility and misalignment are statistically significant, whereas only the impact of RER volatility on money supply is statistically significant in Ghana.

Money supply in the two other countries (Sierra Leone and The Gambia) is pro-cyclically related to real exchange rate deviations as in the case of Ghana. In both countries however, the effects are statistically insignificant, with the exception of volatility in Sierra Leone. The positive impact implies that these countries are not continually varying money supply to reflect movements in the real exchange rate of the country. This may signify the limited scope of responsibilities placed on the shoulders of monetary instruments in the countries involved, and largely reflect the huge diversities in approach to monetary policy setting and implementation in the three countries, and by extension, how much Nigeria differs from the rest. This also implies significant alignment of money supply with real exchange rate deviations in

the two countries and symmetry in the monetary policy approach of the two smaller countries with that of Ghana.

Table 4b: Results of macroeconomic effects of RER misalignments on money supply in Sierra Leone and The Gambia

SIERRA LEONE			THE GAMBIA		
Determinants	Coefficients	t-Stat.	Determinants	Coefficients	t-Stat.
Gross Output	-0.8337	-2.4908	Gross Output	0.5688	0.8159
Domestic Investment	-0.0334	-0.9609	Govt Consumption Exp	-0.4788	-1.5002
Inflation	0.0003	0.1546	Inflation	0.0191	2.0527
Govt Consumption Exp	-0.0328	-0.1530	Deposit Interest Rate	0.0348	1.8328
RER Volatilities	2.6969	2.4814	Lending Interest Rate	-0.0126	-1.1583
RER Misalignment	0.0007	0.4979	RER Misalignment	0.0008	0.2029
Govt Debt	-0.8192	-2.1761	RER Volatilities	3.1658	1.4755
Foreign Direct Investmt	-0.0889	-2.6896	Net Foreign Assets	-0.2456	-1.2732
Capital Flight	-0.0984	-2.3060	Foreign Direct Investmt	0.2401	2.7356
Constant	0.1757	3.2302	Total Trade	0.4128	2.0447
			Domestic Investment	0.0941	1.3309
			ECM(-1)	-0.0044	-2.2991
			Constant	0.1404	6.1171
R-squared	0.6282		R-squared	0.7601	
Adjusted R-squared	0.2564		Adjusted R-squared	0.4403	

Not many studies have looked at the effects of exchange rate volatility on money supply in African countries. In three countries of West Africa, clearly, higher volatilities were accompanied by higher money supply to accommodate variations. This is consistent with expectations and rational behaviour. Nigeria, however, differs. There is, therefore, asymmetry in the overall responses of macroeconomic fundamentals to real exchange rate misalignment and real exchange rate volatility in the four economies of WAMZ under study – Nigeria, Ghana, Sierra Leone, and The Gambia.

6. Conclusion

Real exchange rate misalignment is an important issue in the discussion of asymmetric shocks among the WAMZ member countries. The level of convergence or otherwise of the countries' real exchange rate to their equilibrium real exchange rates are important considerations in the move towards a single monetary zone anywhere, as should be the case for the West African Monetary Zone. However, consistent with the findings by Daboh (2010), this study establishes that there are non-negligible real exchange rate misalignments from equilibrium across the four countries. Clearly, the timing and size of the misalignments have varied with individual countries' experiences, given both the nature and sources of shocks to each economy. On that, findings from this study are that the largest misalignments fall after the 2000 period, which coincides with floating, contrary to Daboh's (2010) position that they occurred mostly pre-2000s, when many of the countries fixed their nominal exchange rates.

The findings also reveal that macroeconomic determinants of real exchange rate differ from country to country within the zone. The variation has great implications for the convergence of the economies of the member countries in the short run. While it may be difficult to insist on harmonizing the determinants of RER among the countries, it is important to bear in mind that their variations reflect the differences in the nature, size and composition of countries. Therefore, they have implications for the design of compensating mechanisms that would afford each country the space to be part of the union without necessarily being strangled. Given particularly that fiscal and other instrument policy harmonization may take a lot while longer, it is important that the design of compensation takes these differing determinants into account.

Equally though, the responses of both economic growth and money supply to the misalignments and volatilities have varied greatly and actually pose more source of concern for possible integration than just the shocks. Nearly all the countries in the zone float their currencies, leaving the exchange rate to join other instruments to adjust to monetary policy shocks. It seems that while most of the countries have adopted pro-cyclical monetary policy regimes that respond to changes in the real exchange rate, Nigeria has gone a relatively different route. Without doubt, this ought to be an issue of concern for monetary authorities of the concerned countries. Even without convergence criteria, the conception of a monetary union should imply that the countries involved should work towards similar monetary policy responses to destabilization, whether external or internal. This should be an irreducible minimum.

As the larger West African monetary union hopes to hang on an effective WAMZ monetary integration, it is important to harmonize the monetary policy reactions of the member countries. This is especially important as the nature of monetary policy reaction functions in place across the countries before the actualization of the monetary union will go a long way in determining the nature and size of new shocks that will be experienced by individual countries at the early stage of the monetary union. The harmonization of monetary and fiscal policy responses of countries to the macroeconomic environment is the easiest and fastest approach to the achievement of convergence among the countries. Other macroeconomic and demographic compositions of the WAMZ member countries may not easily converge in the short run.

For WAMZ, and indeed the larger ECOWAS regional integration, it is important to consider and make room for 'the Nigeria factor'. Nigeria is not only large and important in the region, it appears equally different, both in terms of macroeconomic variables and policy responses to changes in them. From factors affecting the real exchange rate to patterns of deviation of actual from equilibrium real exchange rate, Nigeria's patterns are different. Down to the consideration of the nature of influences of real exchange rate deviations to the policy responses to them, Nigeria behaves differently. If the country were to be a negligible entity among WAMZ or ECOWAS countries, there might not have been much reason for concern. But the sheer size of Nigeria makes its policy decisions critical for progress in the region. It seems a key concern of a supra-national regional institution for West Africa would have to include measures that can rein in Nigeria. For a country consisting nearly 80% of both GDP and population, transporting volatilities of the sort witnessed by Nigeria to them under prevailing fiscal and other macroeconomic conditions might produce immense negative shocks. Unless monetary integration comes simultaneously with fiscal integration (and this does not look the likely route being pursued by either ECOWAS or WAMZ), partners in the regional integration would likely suffer damages.

Notes

1. Data for Ghana's money supply variable are not I(1) variable according to the unit root test. Therefore, the conditions for an error correction model for Ghana's money supply model is not met.

2. Data for Sierra Leone's money supply variable are not I(1) variable according to the unit root test. Therefore, the conditions for an error correction model for Sierra Leone's money supply model is not met.

3. The difference in findings between the current work and that of Daboh (2010) could have been because of the difference in the data period for each study. Daboh's (2010) data ended in 2006, while the data for the current study extended to 2015.

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Appendix

Table A1: Summary of major macroeconomic indicators in WAMU countries: 2015

Country	The Gambia	Ghana	Guinea	Liberia	Nigeria	Sierra Leone
Population (m)	1.98	26.886	12.345	4.296	178.721	6.319
GDP ($b)	0.893	37.687	6.852	2.034	493.831	4.399
Inflation rate (End of period)	6.667	17.692	7.324	8.039	9.554	10.068
M(%Δ)	6.161	-1.167	10.817	-3.449	4.751	-26.726
X(%Δ)	-11.665	-8.389	-1.149	3.557	8.833	-25.002
Govt Rev/GDP (%)	21.718	19.169	18.999	32.255	7.192	15.653
GovExp/GDP (%)	28.189	23.898	27.842	43.652	11.035	20.05
Govt Debt/GDP (%)	91.637	70.819	53.019	39.207	11.503	43.758
CAB/GDP (%)	-15.219	-7.525	-18.697	-34.742	-3.126	-15.472

Source: WEO Databank, 2016.

Table A2: Correlation of inflation rates among WAMU countries from 1998 to 2013

	GAM	GHA	GUI	LIB	NIG	SRL	WAMU
GAM	1	-0.0396	-0.3055	-0.0839	0.5729	-0.0348	0.2736
GHA	-0.0396	1	-0.4779	-0.1139	0.5403	-0.6571	0.0823
GUI	-0.3055	-0.4779	1	-0.2556	-0.4060	0.4791	0.5017
LIB	-0.0839	-0.1139	-0.2556	1	-0.1491	-0.2488	-0.2497
NIG	0.5729	0.5403	-0.4060	-0.1491	1	-0.1945	0.4991
SRL	-0.0348	-0.6571	0.4791	-0.2488	-0.1945	1	0.3777
WAMU	0.2736	0.0823	0.5017	-0.2497	0.4990	0.3777	1

Source: Authors' calculation based on data from WEO Databank, 2016.

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