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## Regional Financial Integration: Evidence from Stock Markets in the West African Monetary Zone

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### Introduction

One of the unresolved issues facing Africa in the twenty-first century is the challenge posed by achieving stronger integration. The challenge for the Economic Community of West Africa States (ECOWAS) sub-region is of particular interest due to its heterogeneous socio-cultural and economic characteristic and the need to achieve a monetary union. While efforts have focused on migration and accelerating direct trade links (see Njinkeu 2009), regional integration could be enhanced through other channels as well. Thus, the need to explore further channels to accelerate the pace of integration cannot be overemphasized.

To achieve stronger integration and economic union within the ECOWAS sub-region, the West African Monetary Zone (WAMZ) was established in 2000 to harmonize the macroeconomic policies of its member countries. A merger is anticipated between the WAMZ and the West African Economic and Monetary Union (UEMOA) once the WAMZ becomes a single monetary zone. At present, WAMZ member countries are the Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone. Among these countries, Nigeria and Ghana have very sizeable stock markets. The integration of both stock markets and the implication it holds for integration in the sub-region, however, has not been given adequate attention in the literature.

The integration of financial markets has been argued to have the potential to enhance economic integration (see Ogun and Adenikinju 1992; Kim and Singal 2000; Agathee 2008). Others like Harris (2008) have also argued that market efficiency is likely to increase with greater integration. While the evidence around these issues is mixed, providing further evidence from the WAMZ, would be useful to the debate on how to enhance regional integration in the ECOWAS sub-region.

The objective of this chapter, therefore, is to test for the efficiency of stock markets in the WAMZ and, also, to examine if they are co-integrated. If the markets were efficient and co-integrated, it would imply that their integration would improve their efficiency, which would in turn enhance regional integration (Harris 2008). On the other hand, if they were efficient and not co-integrated, it would imply that the markets would be better off not being integrated and, hence, would hamper regional integration; as it would not be desirable for national government to pursue policies of achieving integrated financial markets within the sub-region.

The chapter is arranged into five sections. Section one is the introduction which highlights the research problem, gap from the literature and objectives of the chapter. Section two presents the conceptualization and reviews-related empirical and theoretical literature. The research methodology is discussed in section three, while the results from data analysis are discussed in section four. Lastly, the summary and conclusion are presented in section five.

## Literature Review

### *Conceptualization*

There is a close link between the concepts of regional and economic integration. The concept of economic integration generally refers to growing economic ties among countries, while regional integration extends to public sector activity, such as the coordination of economic policies (Ogun and Adenikinju 1992). In relation to financial markets, integration refers to a process of unifying markets and enabling convergence of risk-adjusted returns on the assets of similar maturity across the markets (Harris 2008).

Recently, and coupled with the wave of globalization, there has been a shift from bank-based capital market development to a more holistic approach that aims at globalizing the securities' market as well as other financial institutions with banks (Kim and Singal 2000). One reason that makes capital markets the focal point of the shifting emphasis, as argued by Popiel (1990), is their ability to mobilize long-term savings for financing entrepreneurs, encourage broader ownership of firms and improve the efficiency of resource allocation through competitive pricing mechanism. Demircug-kunt and Levine (1996) also argued that apart from these primary benefits, globalizing stock markets would ensure efficient financial intermediation, bring further gains to the various economies and also bring about a shift from debt to equity financing across countries ( see Tella and Adesoye 2008).

Stock market Integration is generally seen as beneficial as it increases the probability to attract inward portfolio investment, boost domestic savings and improve the pricing and availability of capital for domestic investment (Jefferis 1995; Kenny and Moss 1998). Integration of stock markets, however, could also bring about increased exposure of countries to increased vulnerability and external shocks, which could hamper desired benefits from integration (see Kim and Singal 2000; and AfDB 2008). Further complications could include exchange and interest rates volatility and strong capital outflows which could have adverse effect on economic growth.

On efficiency, there are three variants: the Weak form (when security prices reflect all information found in past prices and volume); the Semi-strong form (when security prices reflect all publicly available information); and Strong form (when security prices reflect all public and private information). These components constitute the efficient market hypothesis: a theory that argues that capital markets are efficient in reflecting information about individual stocks and about the stock market as a whole (Fama 1965). The least form of efficiency is the weak form, and is the aspect considered in this chapter.

### ***Empirical Literature***

Since the early 1990s, studies (e.g., Ogun and Adenikinju 1992) have noted that of all the groups in the world, Africans trade the least with each other. And despite the establishment of economic communities at the sub-region, more efforts needed to be made to accelerate the pace of integration. Though their study related more to trade unions, they concluded that Africa stood to gain if markets were integrated. And so, in providing evidence on the role of markets in enhancing growth, Rousseau and Wachtel (1999) examined the relationship between equity markets and economic growth in Africa using the vector auto-regression model. The panel data covered 47 countries, including Nigeria, from 1980 to 1995. It was found out that the stock market promotes economic performance by providing an exit mechanism to venture capitalists; offers liquidity to investors that encourages international diversification and portfolio flows; and provides firms with access to permanent capital which can then be placed in large, indivisible projects.

In a different study, Kim and Singal (2000) investigated the effect of market opening on stock market returns, volatility and market efficiency for selected emerging markets. The study covered 27 countries, including Nigeria, and employed autoregressive conditional heteroskedasticity (ARCH) and generalized autoregressive conditional heteroskedasticity (GARCH) models for analysis. The study found out that stock returns increase immediately after market opening but tend to decrease subsequently.

Agathee (2008) tested for interdependence between the Mauritian stock market and six African equity markets, namely Botswana, Malawi, Namibia, South Africa, Zambia and Zimbabwe, using weekly stock market indexes from January 2000 to September 2007. From the Granger causality test used for analysis, it was found out that there was a unidirectional causality between Zimbabwe and Mauritius. This implies that, short-term movements from the Zimbabwean stock exchange were likely to influence the short-term performance of the Mauritian stock exchange. Though the results for others were not significant, the Johansen co-integration tests showed that there was a co-integrating relationship between Mauritius and the selected stock markets. In a study on the determinants of savings in Nigeria, Nwachukwu and Egwaikhide (2007) noted that the error correction model could also be very useful in estimating co-integration relationships.

The African Development Bank (AfDB) in its 2008 report presented a cross-sectional analysis on regional financial institutions (RFIs) in three sub-regions: the Common Market for Eastern and Southern Africa (COMESA), the Arab Maghreb Union (UMA), and Central African Economic and Monetary Community (CEMAC). Relying on that report, this section highlights the progress of regional integration in the selected regions.

The long-term objective for COMESA is to create a single market in financial services to support its regional integration. Though progress was made in modernizing national financial institutions, the overall conclusion from the report was that COMESA was still lagging behind in achieving financial integration. The objective of the UMA (Arab Maghreb Union comprising Algeria, Morocco, Tunisia, Mauritania and Libya, established by a Treaty in 1989) is to establish a free trade agreement (FTA), harmonize customs duties and regulations, and ultimately create a Common Market. The UMA anchored its financial integration on the following: the harmonization of monetary and fiscal policies, financial and legal regulations, supervisory systems, and monetary systems (AfDB 2008). These efforts were to be complemented by the creation of a common bank (i.e., the Bank of Maghreb) for investments and trade. However, the financial sector of the UMA had not been achieved as expected.

The core objective of CEMAC is to create a Common Market. Among other measures, this would be achieved by promoting regional economic and financial integration among its member states. However, the financial system of CEMAC is still relatively underdeveloped, insufficiently diversified, and dominated by the banking sector. It is also unevenly distributed among member states, with nearly one-third of the banks located in Cameroon. The banking sector also holds over 85 per cent of financial assets and liabilities, while the non-bank financial sector is small and operates almost exclusively at the national level.

In summary, the overall assessment in the report was that the progress in RFIs in the regions had been slow and had to be accelerated. The reasons for the slow progress was attributed to: divergent macroeconomic situations and an uneven level of bank soundness across member countries; a lack of political commitment to RFI; a lack of adequate capacities (human and financial); overambitious and ill-defined objectives and time frames; weak regional institutions charged with managing the integration process; lack of coordination between national and regional strategies; and conflicting regional obligations due to multi-organization membership of some countries.

### ***Theoretical Issues***

As noted in Harris (2008), there is considerable evidence that both stock markets and banks contribute to long-run economic growth. The argument, according to Harris, however, is that the efficiency of a stock market could be higher in the context of a regional financial centre than when concentrated to serve a specific

country. Thus, measuring integration and efficiency is therefore important for ascertaining the benefit of integration. The degree of financial market integration, however, can be measured using different approaches and there is no widespread agreement about a particular measure (Baele *et al* 2004). For instance, Walti (2006) argued that while the *de jure* approach measurement of financial market integration relies on the implementation of liberalization policies on financial markets, the *de facto* measure focuses on the outcomes of such liberalization, the volume of equity flows, foreign direct investment, and on the return on asset prices.

There are also other methods for measuring integration such as using correlation index, autoregressive distributed lag model, Vector autoregressive model, Augmented Engle granger co-integration tests, error correction model, among others (Alagidede 2008). Though these methods have their strengths and weaknesses, the error correction model has the advantage of measuring the short and long-run relationship connecting two or more variables in a single equation.

Similarly, while efficiency can be tested econometrically using various models, it is premised on the theoretical work of Fama (1965): the efficient market hypothesis (EMH). The EMH has three variants: the weak form, the semi-strong form and the strong form. The weak form, however, offers the theoretical framework to test for efficiency in this paper because of its simplicity which can be expressed in a simple random walk model. The weak-form efficiency is represented as

$$P_t = P_{t-1} + \text{Expected return} + \text{random error } t \text{ ————— (2.1)}$$

Where  $P_t$  is the current stock market prices and  $P_{t-1}$  is its lagged value following an AR(1) process. Since stock prices only respond to *new* information, which by definition arrives randomly, stock prices are said to follow a random walk. The next section describes how these methods were estimated and the data collected.

### Research Methodology

Stock market data for Nigeria and Ghana were collected daily on a 5-day-weekbasis from 5 November 2007 to 3 July 2009 from African Business Research Limited (ABRL). The choice of this period enables the analysis to provide findings that would give insight on stock market efficiency and integration within the context of the recent global financial crisis. Ghana and Nigeria were selected because they are the major stock markets in the WAMZ sub-region.

Following Fama (1965), the weak form efficient market hypothesis was used as the theoretical framework for efficiency; hence, the autoregressive model of order one (AR,1) was used for the estimation. The model is presented below:

$$NSE_t = \hat{a}_1 + \hat{a}_2 NSE_{t-1} + e_{t1} \quad (3.1)$$

$$GSE_t = \hat{a}_0 + \hat{a}_1 GSE_{t-1} + e_{t2} \quad (3.2)$$

Where  $NSE_{t-1}$  and  $GSE_{t-1}$  are the previous values of the Nigerian and Ghanaian stock market prices respectively.

For the co-integrating relationship, error correction model (ECM) adapted from Nwachukwu and Egwaikhide (2007) was employed because of its strength in providing estimates for short-run and long-run relationship in a single equation. The model is specified below:

$$\Delta NSE_t = \hat{a}_0 + c(NSE_{t-1} - n_2 GSE_{t-1}) + n_1 \Delta GSE_t + \hat{\epsilon}_t \quad (3.3)$$

Where  $\hat{\epsilon}_t$  is the residual term and  $H$  is a symbol used to denote first difference of the variables. The coefficient  $c$ , has an *a priori* expectation of a negative sign and is used to test for long-run equilibrium between the NSE and the GSE. On the other hand, the coefficient,  $n_1$ , shows the short-run equilibrium connecting both variables. The study raised two hypotheses. They are specified in their null form below:

Hypothesis One:

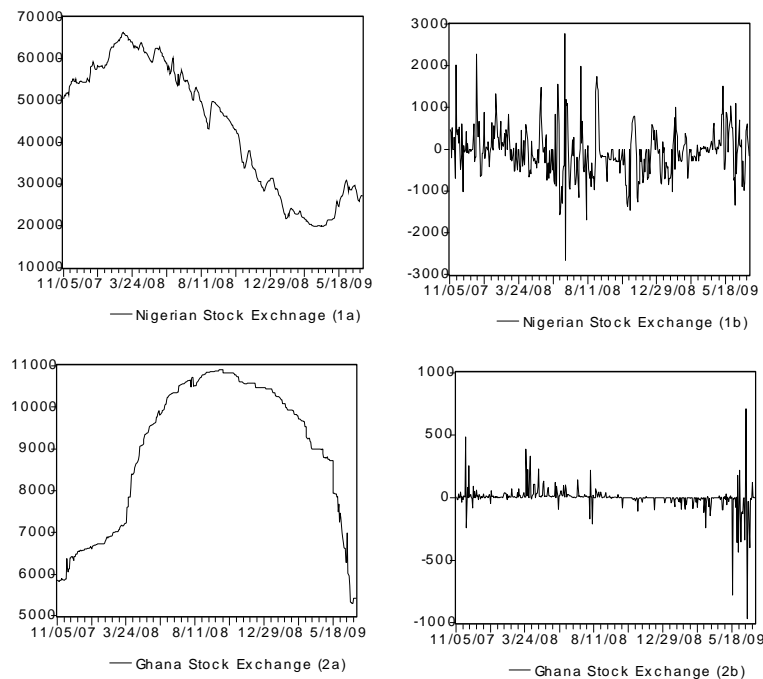
$H_0$ : stock markets in the WAMZ are not efficient

Hypothesis Two:

$H_1$ : stock markets in the WAMZ are not integrated

Equation 3.1 and 3.2 were used to test the first hypothesis for Nigeria and Ghana respectively, while equation 3.3 was used to test the second hypothesis.

**Figure 1:** Trend of Nigerian and Ghanaian Stock Exchanges: 2007 - 2009



## Results and Discussions

The trends of the Ghanaian and Nigerian stock markets for the sample period are presented in Figure 1. The trend to the left shows movement of both stock markets while the trend to the right shows their frequency.

The left trends shows that the Nigerian stock market witnessed a quick rise in the early period but declined slowly over the sample period, while the Ghanaian stock market increased slowly then declined faster within the same period. In the right hand side, the Nigerian stock market exhibited higher frequency and spikes across the sample period, unlike the Ghanaian stock market that exhibited high frequency at certain periods only. This trend implies that the Nigerian stock exchange was more vulnerable to the crisis as well as to domestic issues, while the Ghanaian stock market was less vulnerable.

To estimate the models, it is required that a unit root test be conducted to ascertain stationarity of the variables. The result shows that both variables are stationary at first difference; which is a requirement for estimating error correction model with two variables. The stationarity result is presented in the Appendix.

### Test of Hypotheses: Test for Efficiency

The result for test of efficiency in Nigerian stock exchange is presented in Table 1.

**Table 1: Weak Form Efficient Market Hypothesis (EMH) - NIGERIA**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000353	0.000279	-1.263436	0.2071
NSE(-1)	0.453448	0.042905	10.56863	0.0000
R-squared	0.205817	Mean dependent var		-0.000634
Adjusted R-squared	0.203974	S.D. dependent var		0.006487
S.E. of regression	0.005788	Akaike info criterion		-7.461522
Sum squared resid	0.014438	Schwarz criterion		-7.442719
Log likelihood	1617.419	F-statistic		111.6958
Durbin-Watson stat	2.145387	Prob (F-statistic)		0.000000

*Source:* Eviews Output (Researchers Estimation)

The probabilities for the t and f statistic values are significant as they are less than one per cent. This implies rejection of the null hypothesis while the alternative is accepted, indicating that the Nigerian stock exchange is weak form efficient. On the other hand, the result for the weak form efficiency test of the Ghanaian stock exchange is presented in Table 2.

**Table 2:** Weak Form Efficient Market Hypothesis (EMH) - Ghana

Dependent Variable: GSE

Method: Least Squares

Sample(adjusted): 11/07/2007 7/03/2009

Included observations: 433 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.79E-05	0.000292	-0.301414	0.7632
GSE(-1)	-0.170326	0.047464	-3.588498	0.0004
R-squared	0.029011	Mean dependent var		-7.52E-05
Adjusted R-squared	0.026758	S.D. dependent var		0.006151
S.E. of regression	0.006068	Akaike info criterion		-7.366838
Sum squared resid	0.015872	Schwarz criterion		-7.348036
Log likelihood	1596.920	F-statistic		12.87732
Durbin-Watson stat	1.999362	Prob(F-statistic)		0.000371

*Source:* Eviews Output (Researchers Estimation)

Likewise, the t and f statistics are significant as their probability values are below one per cent. Thus, the null hypothesis is rejected while the alternative is accepted, implying that the Ghanaian stock exchange is also weak form efficient. Empirical evidence, therefore, supports that the WAMZ stock markets are weak form efficient. Therefore, it is expected that their efficiency will increase if both markets are integrated. Evidence of no integration would thus imply that, the efficiency of both markets would not be sustained if they were integrated. This brings us to the test of the second hypothesis.

#### Test of Hypotheses: Test for Co-integration

The error correction model result is presented in Table 3.



**Table 3: Error Correction Model Result**

Dependent Variable: D(NSE)

Method: Least Squares

Sample(adjusted): 11/06/2007 7/03/2009

Included observations: 434 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000622	0.000312	-1.993790	0.0468
RES(-1)	-0.001518	0.001892	-0.802318	0.4228
D(GSE)	0.007579	0.052042	0.145624	0.8843
R-squared	0.001493	Mean dependent var		-0.000623
Adjusted R-squared	-0.003140	S.D. dependent var		0.006483
S.E. of regression	0.006494	Akaike info criterion		-7.229135
Sum squared resid	0.018173	Schwarz criterion		-7.200980
Log likelihood	1571.722	F-statistic		0.322308
Durbin-Watson stat	1.092696	Prob(F-statistic)		0.724649

*Source:* Eviews Output (Researcher's Estimation)

The short-run coefficient ( $D(GSE)$ ) is positive but not significant. This implies that, the NSE and GSE are likely to respond in the same direction to short-run shocks. Though the result is statistically significant, the extent of response would, however, depend on their size and other domestic factors. On the other hand, the long-run coefficient ( $RES(-1)$ ) has the expected *a priori* negative sign, but is also not significant. This implies that though there is the tendency for the NSE and the GSE to be co-integrated (be at equilibrium in the long run), distortions in the short run are not likely to be corrected in the long run to bring about integration. Thus, the null of the second hypothesis is accepted while the alternative is rejected, implying that, stock markets in the WAMZ are not integrated.

### Summary and Conclusion

The conclusion to be drawn from this chapter is that though stock markets in the WAMZ are efficient in the weak form, they are not integrated. This implies that while the integration of markets is necessary to enhance regional financial integration,

the WAMZ stock markets would become less efficient if integrated; hence, it would be better to operate both markets as separate entities. Another implication is that investors would prefer to invest in both markets as separate markets and would not like to invest if the markets were integrated. Therefore, the integration of financial markets would not be likely to bring about the desired increased integration in the sub-region as the benefits from investing in such markets would not be likely to be sustained if the markets are integrated. Thus, policies need to be put in place to ensure that WAMZ member countries tilt the operation of the financial markets towards integration and in addressing the factors that limit the efficient operation of their capital markets so as to enhance the pace of regional integration in the ECOWAS sub-region.

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## Appendix

### 1: Stationarity Test Results

#### (Ai) NSE At Levels

ADF Test Statistic	0.081291	1% Critical Value*	-3.4476
		5% Critical Value	-2.8685
		10% Critical Value	-2.5704

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

#### (Aii) NSE At First Difference

ADF Test Statistic	-12.73863	1% Critical Value*	-3.4476
		5% Critical Value	-2.8685
		10% Critical Value	-2.5704

\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

## (Bi) GSE At Levels

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ADF Test Statistic	-0.166764	1% Critical Value*	-3.4476
		5% Critical Value	-2.8685
		10% Critical Value	-2.5704

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\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

## (Bii) GSE At First Difference

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ADF Test Statistic	-24.65698	1% Critical Value*	-3.4476
		5% Critical Value	-2.8685
		10% Critical Value	-2.5704

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\*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation

Sources: Eviews Output (Researchers Estimation)