

PhD Viva Voce Presentation

By

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**Financial Markets Integration in West African
Monetary Zone: An Empirical Analysis**

Purpose of the Study

- The study developed an alternative approach to introducing common currency in the West African Monetary Zone (WAMZ) using integration of financial markets as a basis.

Research Problem

- (1) **The Basis/Background:**
- (2) **The Research Setting:** In 2000, five Anglophone countries in ECOWAS, resolved to adopt a common currency to promote trade and investment. It was also to prepare the way for a possible single currency adoption within ECOWAS. The single currency (ECO) is expected to be used alongside the CFA franc, already used by 8 France colonized countries in the region.
- (3) The initial date set to introduce the ECO was in 2003, during which it was expected that members have met the conditions for take off. Unfortunately, the 2003 set date did not work; neither did 2005 and 2009, as member countries did not fulfill the conditions necessary for take off. This clearly indicates that meeting the criteria is becoming increasingly impossible.

Research Problem

- (1) ***Prior Research Efforts:*** Previous studies have proposed the ex-ante and ex-post approach to common currency formation, but failed to look at the critical role of financial market integration.
- (2) ***The Research Gap:*** *The established and addressed gaps fail to point out the significance of the financial markets and indicators as the basis for all economic activities in the region.*
- (3) **Why Address Research Gap:** Addressing the gaps is essential as it would offer an alternative way to starting a common currency in a region.

Significance of the Study

- ❖ **Major Contribution of the study:** The use of convergence criteria is not sufficient condition for the introduction of a single currency in a region, but how integrated the financial markets for the members are.
- ❖ **Theoretical framework:** The study refined the optimum currency area theory, by incorporating the attainment of financial market integration as a base for common currency adoption.
- ❖ **Policy/Practical Implications:**
 - **Research Finding 1:** *Financial markets in the zone are partially integrated.*
 - **Implications:** The policy strategy of WAMZ commission is to advice countries to implement policies geared toward increasing regional integration.
 - **Research Finding 2:** *Shocks from the developed markets into the zone are received differently by the different markets in the zone.*
 - **Implications:** There are differences in market characteristics and behaviours which is a sign of a segmented markets. So any policy should be to address this differences prior to the introducing the common currency.
- ❖ **Theory/Methodology:**
 - **Research Finding 3:** *ARDL approach assumes a linear relationship, but it's used in most cases to analyze financial data instead of nonlinear method.*
 - **Implications:** It is imperative to employ nonlinear method in analyzing financial market data which have been found to assume nonlinear in theory.

Literature Review – Theoretical Review

- The theory of institutionalism supports the view of integration. It emphasises on the socio-economic gains from the formation of common institution.
- Furthermore, the Optimum Currency Area theory (Mundel,1961), the New OCA (deGrauwe,1992;Tavlas,1993) explain the steps to formation of currency union.
- **The view in the OCA is re-echoed by the *law of one price*; it argues that – prices, returns etc should be comparable across the zone, if markets are integrated. There is also the possibility of spillovers.**

Literature Review – Empirical Review

- **Financial integration & single currency**
 - The Optimum Currency Area theory – argues in favour of full economic integration prior to OCA formation; or employ the ex-ante and ex-post approach to maintain and admit new member countries within a zone.
 - There is less emphasise on the use of financial markets integration, although there is sufficient evidence of the critical role of this market in predicting the nature of an economy(Levine & Zervos, 1998; Claessen, 2001; Richtev & Wahl, 2011; Sireh-Jallow, 2013).
- Areas of financial integration include stock /bond market, money market, foreign exchange market integration as well as the harmonization of pay systems.
 - Non of these has been considered under the approach for introducing the common currency.
- The findings in Frankel and Rose (1998), Nnanna (2006) suggest the ex-ante and ex-post of currency area formation – meaning, let us introduce the currency, adjustment would come eventually. However, such move eventually hurts the zone in the long run.

Literature Review – Empirical Review Cont.

- Previous studies (Adubi, 2002; Bawumia, 2002; Balolgun, 2007; Battey et al, 2009) have focused on country specific foreign exchange markets.
- Similarly, Yartey and Adjasi (2007), Ezeoha et al (2009) have focused on the importance of stock markets in predicting economic crises and promoting economic growth.
- These studies have not focused on the relationship among the markets in the zone. *Previous studies had not focused on the relevance of financial markets for single currency introduction.*

Literature Review Cont.

- The works of Korsu and Daboh (2012), Ofanson et al (2010) looks at country specific money market issues in the zone
- Allen, Babus and Carlets (2009); Reinhardt and Regoff, (2009) document the money market as agent of financial crises in an economy, citing the supprime crises. However, this was not related to the currency area formation.
- On spillover effect, the literature documents works on transmission effect within the Eurozone, and on Asian markets (Hartmann, Manganelli & Monnet, 2004; Ehrmann & Fratzscher, 2004).
- Previous studies in the zone (Houssa, 2008; Verdier, 2010) documents issues of drift from one market to the other, but this is not linked to common currency introduction.

LITERATURE REVIEW CONT.

- From the literature, it was realized issues on regionalization, integration and convergence in a currency area are well documented.
- What was lacking were:
 - Using financial market integration as the bases for starting a currency area;
 - The absence of study on intra-market spillover effects in the zone;
 - Test of capital mobility in the zone;
 - No alternative model proposed for adopting the single currency in the zone.
 - Unavailability of inter-market spillover effects from the developed markets into the zone;
- *These gaps have been addressed by conducting the study of financial market integration in the zone.*

The Research Methodology

- Research design & Approach – A positivist and objectivist rather than interpretivist approach was used. Design was Causal.
- Data type and sources:
 - Monthly financial data of:
 - Stock price indices as proxy for the stock market
 - SDR as proxy for FX market
 - Interest rates (policy rate) proxy for money market
 - Change in consumer price index proxy for inflation.
 - Gross savings/GDP and gross capital formation/GDP
 - Financial market integration means cointegration among variables
 - Source: Emerging & Global Stock Markets Factbook; IFS; World Bank, Nigeria and Ghana Stock Exchanges
- Data Period : Dec. 1990:01 – 2012:06.

Theoretical Model

The study analyses was done within the Cointegration frameworks – more specially:

- a. AutoRegressive Distributed Lag (ARDL),
- b. Fractional Integration
- c. Brietung Rank Test for Nonlinear Cointegration
- d. Westerund Panel Cointegration
- e. Innovation Accounting, etc

The AutoRegressive Distributed Lag (ARDL) framework is specified as:

$$\Delta X_t = \alpha + \sum_{i=0}^m \gamma_i \Delta Y_{t-i} + \sum_{i=0}^n \beta_i \Delta Z_{t-i} + \sum_{i=0}^q \lambda_i \Delta W_{t-i} + \sum_{i=1}^p \delta_i \Delta X_{t-i} + \sum_{i=0}^r \mu_i \Delta V_{t-1} + aV_{t-1} + bX_{t-1} + cY_{t-1} + dZ_{t-1} + eW_{t-1} + \varepsilon_t$$

Where: \mathbf{X}_i , \mathbf{Y}_i , \mathbf{Z}_i , \mathbf{W}_i and \mathbf{V}_i represents the financial indicators of countries involved; \mathbf{m} , \mathbf{n} , \mathbf{q} , \mathbf{p} , \mathbf{r} are the lag lengths of variables determined by VAR method

To determine Cointegration, it is hypothesized that:

$$H_0 : a \neq b \neq c \neq d \neq e \neq 0$$

Research Methodology: Data Analysis

Research Question	Analysis Method	Reason for using a method
Q#1: Are financial markets in the zone integrated?	ARDL	ARDL takes sufficient numbers of lags to capture the data generating process in a general-to-specific modelling framework
	Fractional Integration	FI is an aspect of the “long memory” models that address the degree of persistence in a data
	Brietung Rank Test for Nonlinear Cointegration	Brietung Rank Test - Its power is that one does not have to be explicit about the exact functional form of the nonlinear cointegrating relationship
	Westerund Panel Cointegration	The tests take no cointegration as the null hypothesis and are based on structural dynamics so that they do not impose any common factor restriction
Q#2 : Is there a spillover effect within the zone?	Innovation Accounting	It is appropriate for testing transmission effect; test impulse response to shock.
Q#3: Do developments in advanced markets affect equally those in this zone?	Innovation Accounting	It is appropriate for testing transmission effect; test impulse response.
Q#4: Is capital mobile in the Zone?	DOLS Panel	Appropriate for linear estimation. It has the power to solve endogeneity problems. Appropriate for small sample size.

Presentation and Analysis of Study Results

Research Hypotheses	Test Performed	Results of the Hypothesis tested
H1: financial markets in the zone are integrated	1. Test to determine if there is long run relationship among: <ol style="list-style-type: none"> a. FX markets in the zone. b. Stock market in the zone. c. Money markets in the zone. 	<ol style="list-style-type: none"> a. H1a is partially supported b. H1b is not supported; c. H1c is not supported
H2 : There is a significant spillover effect within the zone.	2. Test if events from one financial market diffuse into the others in the zone	H2 is supported
H3: Member countries respond in the same way to shock from advanced markets.	3. To determine if effect of shocks from the developed markets (USA, UK, China) is translated and received similarity by financial markets in WAMZ.	H3 is not supported
H4: There is capital mobility within the zone.	4. Test the presence of capital mobility within the Zone	H4 is supported

Presentation and Analysis Cont. (FX Market)

Table 1: ARDL Results of FX Market

Dependent Variable	Computed F-Statistic	Critical Value		Interpretation
		Lower Bound	Upper Bound	
GHX	11.93	2.62	3.79	Cointegration
GUX	7.66	2.62	3.79	Cointegration
GAX	5.71	2.62	3.79	Cointegration
NGX	2.31	2.62	3.79	No cointegration
LIX	0.80	2.62	3.79	No cointegration
SRX	5.95	2.62	3.79	Cointegration

The critical values are taken from Pesaran et al. (2001), unrestricted intercept and no trend with a five regressors denote rejecting the null at 5 percent level. The range of the critical value at 10 percent, 5 percent, 2.5 percent and 1 percent are 2.26 - 3.35; 2.62 - 3.79; 2.96- 4.18; and 3.41- 4.68 respectively.

Reject H_0 = No cointegration, if Computed F-statistic > Critical Value

Presentation and Analysis cont...

Table 2: ARDL Results of Money Market Integration

Dependent Variable	Computed F-Statistics	Critical Value		Interpretation
		Lower Bound	Upper Bound	
GAR	1.98	2.62	3.79	No cointegration
GHR	2.02	2.62	3.79	No cointegration
GUR	1.16	2.62	3.79	No cointegration
NGR	1.59	2.62	3.79	No cointegration
LIR	2.12	2.62	3.79	No cointegration
SRR	2.89	2.62	3.79	Cointegration

Table 3: ARDL Results of Stock Market Integration

Dependent Variable	Computed F-Statistic	Critical Value	Interpretation
NGI	1.4078	4.94(lower); 5.73(upper)	No cointegration
GHI	50.16	4.94 (lower); 5.73(upper)	Cointegration

Presentation and Analysis Cont..

Table 4: Fractional Integration Results of Money Market Rates					
Countries	d-value		Interpretation		
	GPHM	WM	VAR	Shock Duration	Stationarity
GAR	1.26	1.42	Infinite	Infinite	nonstationary
GHR	1.20	1.18	infinite	infinite	nonstationary
GUR	0.89	0.89	infinite	long-lived	nonstationary
LIR	0.57	0.69	infinite	long-lived	nonstationary
NGR	0.94	0.99	Infinite	long-lived	nonstationary
SRR	1.23	1.13	Infinite	Infinite	nonstationary

Table 5: Fractional Integration Results of Stock market index					
Countries	d-value		Interpretation		
	WM	GPH	VAR	Shock Duration	Stationarity
Ghana	1.09	1.10	Infinite	Infinite	nonstationary
Nigeria	1.09	1.06	Infinite	Long-lived	nonstationary

Presentation and Analysis Cont. (FX Market)

Table 6: Est. of FI parameters (GPH and Whittle Methods)

Countries	Foreign Exchange Market				
	d-value		Interpretation		
	WM	GPH	VAR	Shock Duration	Stationarity
Gambia	1.10	1.13	Infinite	Infinite	nonstationary
Ghana	1.08	1.06	Infinite	Infinite	nonstationary
Guinea	.92	.93	Infinite	Long-lived	nonstationary
Liberia	1.06	1.04	Infinite	Infinite	nonstationary
Nigeria	1.07	1.06	Infinite	Infinite	nonstationary
S. Leone	.75	.74	Infinite	Long-lived	nonstationary

Presentation and Analysis cont... (Rank Test)

Table 7: Non-linear Rank Test of Stock Markets

		Test with drift			Test with no drift		
Ho	H1	t-statistic	Critical Value		t-statistic	Critical Value	
			5%	10%		5%	10%
r = 0	r > 0	203.90	713.30	596.20	137.47	329.90	261.00
r = 1	r > 1	61.00	281.10	222.40	20.92	95.60	67.89
			r=0	r=0		r=0	r=0

Table 8: Non-linear Rank Test of Money Market

		Test with drift			Test with no drift		
Ho	H1	t-statistic	Critical Value		t-statistic	Critical Value	
			5%	10%		5%	10%
r = 0	r > 0	3580.75	3460.00	3177.00	5243.63	4954.00	4572.00
r = 1	r > 1	1568.54	2255.00	2025.00	3041.00	3429.00	3107.00
r = 2	r > 2	479.54	1360.00	1200.00	1331.86	2184.00	1972.00
r = 3	r > 3	171.15	741.10	627.80	455.82	1330.00	1158.00
r = 4	r > 4	57.29	329.90	261.00	147.75	713.30	596.20
r = 5	r > 5	11.04	95.60	67.89	46.22	281.10	222.40
			r=1	r=1		r=1	r=1

Table 9: DOLS Results of Capital mobility

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Savings	.06	.03	2.27	.02
C	.34	.11	3.02	.00
R-squared	.82	Durbin-Watson stat		1.66
Adjusted R-squared	.81			
F-statistic	105.84	Prob(F-statistic)		.00

* Dep: *Investment*

Discussions of Study Results

Research Hypotheses	Research Findings	Deductions from the Results
H1: Financial markets in the zone integrated	Financial markets in the zone are partially integrated	<ol style="list-style-type: none"> 1. Possible explanation of finding is the low intra-zonal trade. 2. Differences in macroeconomic policy and size of the economies. 3. Lesser cross listing, low inter-bank activities; rare inter-currency trade in the region.
H2 : There is a significant spillover effect within the zone.	There is spillover effect within the zone. Pair wise co-movement was observed	Some countries have closer ties through historical and economic alignment.
H3: Member countries respond in the same way to shock from advanced markets.	Member countries respond differently to shock from developed markets into the zone.	As major trading partners (USA, UK, China), shocks would be transmitted into the zone. However, response would differ due to differences in macroeconomic policy in the zone
H4: There is capital mobility within the zone.	Capital is mobile within the zone.	Free trade protocol may have promoted capital movement in the zone

Discussions of Study Results Cont.

Relationship of Research Findings to Other Research

Finding 1 and 2:

- **Capital Market:** Comincioli (1995) found stock markets as a predictor of growth; Marashdeh (2006) concluded integration of stock markets causes all risk factors to be traded at the same price. McCracken (2010) looked at stock market as tool for predicting recession.
- **Foreign Exchange Market:** Bawumia (2002) and other similar works (Balolgun, 2007; Akpokodje & Omojimite, 2009) looked FX market with respect to their respective countries. Sireh-Jallow (2013) indicates that countries forming an OCA should exhibit a stable long-run relationship in exchange rates;

Findings 3 and 4

- **Intra-Market** - Nguyen and Wu (2010) said shocks often diffuse from markets with leadership information. Verdier (2010) found a unidirectional linkage from one fragile country to its neighbours
- **Inter-Market** - Ehrmann and Fratzscher (2004) looked at spillover effect between the USA and Euro area.

Conclusions and Summary Cont.

Research Objectives	Research Hypotheses	Research Findings	Implication of Research Findings
To determine the nature of financial markets in zone	Financial markets in the zone integrated	Financial markets in the zone are partially integrated	<p><u>Policy/Practical Implications</u></p> <ol style="list-style-type: none"> 1. The policy initiative of WAMZ commission is to advice countries to implement policies to put the zone into a path of increasing regional integration. 2. Investors can exploit such opportunity to diversify risk. <p><u>Theoretical Implications</u></p> <ol style="list-style-type: none"> 1. The prescription in the OCA theory are driven/led by the financial markets, hence it is imperative to highlight on the activities of these markets than concentrative on just little aspect of it.
To test the effect of intra financial markets developments in the zone	There is a significant spillover effect within the zone.	There is inter-zone spillover over effect. However, responses differ from market. There were instances of co-movements between two countries	<p><u>Policy/Practical Implications</u></p> <p>Some of the countries were found to be closer to each other. Which means there is the need to replicate the activities that drew those two countries together throughout the zone.</p>

Conclusions and Summary Cont.

Research Objectives	Research Hypotheses	Research Findings	Implication of Research Findings
To test the effect of inter financial market developments from advanced markets into the zone	Member countries respond in the same way to shock from advanced markets.	Member countries respond differently to shock from developed markets into the zone.	<u>Policy/Practical Implications</u> Members in the zone are not immune to financial markets events in the zone. Responding to such events differently is a sign of disintegration which unsuitable for unification. Again, there is the need for deepening trade, cross listing, harmonizing exchange rate policies to promote integration of the economies
Test capital mobility in the zone	There is capital mobility within the zone.	Capital is mobile within the zone.	<u>Theoretical Implications</u> High capital mobility attest to the view in the free trade area theory – which says having a FTA should be an initial point for integration.

Conclusions & Summary Cont.

The **three** gaps in knowledge have been filled by the study as follows:

- The formation of a common currency area should be founded on financial market integration and not just by the meeting of convergence criteria. No prior studies has proposed an alternative model for adopting the single currency in the zone.
- The gap in knowledge about the nature of financial markets in the zone has been established. These markets are more segmented.
- The issue of capital mobility within the zone. No previous study tested capital mobility in the zone.