UNIVERSITY OF CAPE COAST

STOCK MARKET INTEGRATION IN WEST AFRICA

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BY

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature…………………………………. Date………………

Name: Lydia Ama Azika

Supervisors' Declaration

I hereby declare that the preparation and presentation of the dissertation was supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Supervisors' Signature………………………………… Date………………..

Name: Dr. Daniel Agyapong

ABSTRACT

The study focused on the integration of stock exchanges within West Africa using a Non-linear Auto Regressive Distributed Lag (NARDL). Market capitalizations as a percentage of GDP of the various markets within the region were obtained from the World Development Indicator (2014) and used to determine whether the markets move in the same direction both in the long and short runs. The empirical results indicated that market capitalization for the various countries was I(1) and I(0). The short run estimations showed some form of relationship between the stock exchanges but the relationships were not clear as to the nature of the direction. In the long run there exist a relationship only between the Ghana stock exchange and the Bourse Regionale des Valeurs Mobilieres stock exchange. No long run relationship exists between the Ghana stock exchange and the Nigeria stock exchange. The study further recommended that investors should embark on cross listings and portfolio diversification since there is the presence of potential gains due to the absence of information asymmetry and low transaction cost within the Ghana Stock Exchange, the Nigeria Stock Exchange and the Bourse Regionale des Valeurs Mobilieres Stock Exchange. The major stock exchange bodies should also embark on fostering the establishment of stock exchanges as well as their integration within ECOWAS.

KEYWORDS

Integration

Stock market

West Africa

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DEDICATION

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encouragement during my period of study. I am very much grateful.

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ADF	Augumented Dickey Fuller
ASEA	African Securities Exchange Association
AU	Africa union
BRVM	Bourse Regionale des Valeurs Mobilieres
CUSUM	Cumulative Sum of Recursive Residuals
CUSUMSQ	Cumulative Sum of Squares of Recursive Residuals
ECOWAS	Economic Community of West Africa States
GDP	Gross Domestic Product
GSE	Ghana Stock Exchange
GSE-CI	Ghana Stock Exchange Composite Index
JSE	Johannesburg Stock Exchange
NARDL	Non-linear Autogressive Distributed Lag
NEPAD	New Partnership for Africa's Development
NSE	Nigeria Stock Exchange
OAU	Organization of Africa Unity
PP	Phillip-Perron
SADC	Southern African Development Community
WACMIC	West Africa Capital Market Integration Council
WAMU	West African Monetary Union
WDI	World Development Indicator

CHAPTER ONE

INTRODUCTION

The integration of stock exchanges around the globe has received remarkable attention by researchers. The current issue pertaining to the introduction of the currency union within Economic Community of West Africa States (ECOWAS) has necessitated for the integration of the various financial sectors of the sub regions within the bloc. The integration of these financial sectors has led to certain interventions to facilitate this by creating the enabling environment. The setting up of the West Africa Capital Market Integration Council (WACMIC) in 2013 was a major intervention to help integrate countries within West Africa. The council targeted integrating these markets by 2016. The need for integrating stock exchanges has various theoretical underpinnings including the new growth theory which advocates for the creation of new markets for investors to invest.

Studies that focused on the extent to which stock exchanges within West Africa are integrated are minimal but most studies considered Africa countries at large which in some cases also included West African countries. However, the findings of previous studies were inconsistent with the findings of this work which could largely be attributed to the approaches adopted by these previous works.

Background to the Study

The Stock market of a country is an integral part of that economy in question and for that matter its importance and roles cannot be overemphasized. Adjasi and Yartey (2007) conducted a study showing the relationship between stock market and economic growth. The study established a positive

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relationship between the growth of an economy and its respective stock market within Africa. It was found that in the long-run a 1% increase in the ease at which the markets trade leads to approximately 3.7% increase in growth within that particular economy. This is an indication of how important a stock market is to an economy. Therefore, there is much evidence to focus on the development of stock exchanges. With lots of effort put in place to help in the development of this sector, it has led to remarkable results since stock exchanges especially within Africa has shown a tremendous change that is comparatively it looked different decades ago and will surely differ years from now (Hearn & Piesse, 2005).

The rapid changes in many emerging stock exchanges included increasing the degree of openness of domestic financial markets to foreign investors thereby intensifying their interdependences. For instance, NEPAD (New Partnership for Africa's Development), AU (Africa union) formerly known as OAU (Organization of Africa Unity) and SADC (Southern African Development Community) focused on the benefit of integrating many Africa small markets with South Africa being the central hub in other to attract major foreign investment (Hearn & Piesse, 2005). The African Securities Exchange Association (ASEA) was also established to ensure the development of more African stock market and to improve the competitiveness of the already existing ones. The current initiative which is the introduction of the WACMIC in 2013 was aimed at fostering the integration of stock exchanges within West Africa. The main focus of the council is to help create the enabling environment in other to expand these markets by enhancing the attractiveness of the markets to foreign investors and to ensure cross border listing. To help in expanding stock

exchanges, linkages between stock exchanges are encouraged to help reduce the issue of high transaction cost, trade barriers and the inefficiency of these markets even though it has its own consequences.

According to Hooy and Goh (2007) stock markets are extremely integrated incorporate finance if there is less opportunity to acquire assets at a lower cost across borders in the sense that many investors have the opportunity to bid for prices of assets which in the long run will push prices rather up. This implies that integrating of stock exchanges has its limit with which if exceeded, can pose threats. Also, the integration of financial markets per se is said not to have any positive effect. However, certain positive effects largely depend on certain thresholds such as the development of domestic financial sector and the quality in domestic institutions (Masten, Coricelli, & Masten, 2008). In other for countries to benefit from financial globalization with respect to growth and stability, countries need to meet those threshold conditions if not the country is likely to encounter financial crisis and lower growth rate (Chinn & Ito, 2006).

Notwithstanding threat associated with integrating stock markets, there are enormous benefits of integrating stock exchanges. Integrating of stock exchanges considering the rapid development in telecommunications and computer technology and the widespread of using the internet has been considered as important tools for making stock markets practically and institutionally more integrated. These tools enable investors, agents, traders, and all participants in stock markets to have the access to information, and consequently the ability to manage their portfolios more efficiently.

Statement of Problem

As ECOWAS aspires to form a currency union, it requires the integration of the financial sector (Mundell, 1961). The stock market is an integral part of the financial sector and as such the integration of the whole financial sectors depends largely on the integration of the stock market within the sub-region. It is however crucial to note that African stock market with respect to their integration has received less attention as compared to stock markets in advanced continents due to its under developed nature and market illiquidity. There has been considerable improvement, rapid growth and liberalization in a number of African countries stock markets over the past years (Otchere & Senbet, 2010). For instance, the adoption of the automated Trading Systems in Ghana, Nigeria, Kenya and other countries coupled with the establishment of the WACMIC in 2013 are expected to help foster the integration of stock markets within West Africa. The WACMIC was established to help setup a harmonized regulatory environment for easy trading of financial assets across the region as well as to encourage cross border listing, trading of assets and integration of the stock markets in the sub region.

It remains a daunting task to conclude that African stock markets are integrated and therefore enjoying the associated benefits of integration or still segmented. Whereas some studies like Ntim (2012), Agyapong (2014), and Ncube and Mingiri (2015) concluded that Africa markets are still segmented, Boamah (2014) concluded that there exists partial integration among Africa stock exchanges. There are varied conclusions about the integration of stock markets in Africa. With improvement in technology and introduction of new regulations, there is no guarantee that these conclusions would persist into

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future. The methodological approaches used by the previous studies could be questioned in the sense that economic variables in general considering their nature don't exhibit a linear trend and for that matter linear approaches could be said not to give a true reflection of results. Therefore, it is of importance to assess the level of integration among West African stock exchanges since not much attention has been studied on the region using a non-linear approach.

Purpose of the Study

The general purpose of the study was to examine the integration of stock exchanges within West Africa. The study sought to establish if the stock markets within West Africa specifically the Ghana Stock Exchange, Nigeria Stock Exchange and the Bourse Regionale des Valeurs Mobilieres stock exchange are integrated.

Research Objectives

Specifically, the study seeks to;

1. Examine the long-run relationship between stock exchanges in West Africa.

2. Assess the short-run relationship between stock exchanges in West Africa.

Research Hypotheses

This following research hypothesis to be tested:

1. H_0: There is no long-run relationship between stock exchanges in West Africa

    H_1: There exists a long-run relationship between stock exchanges in West Africa

2. H_0: There is no short-run relationship between stock exchanges in West Africa

H_1: There exists a short-run relationship between stock exchanges in West Africa

Significance of the Study

The study would aid individual as well as institutional investors in taking investment decisions. Investors would be much informed on the wide range class of assets in which they can consider for their portfolio formation. Also, it would aid them identify assets that are negatively related in other for them to diversify risk. It would as well inform the government on how important stock exchanges are and therefore should consider their operation and factors that affects the market and those that the market affects in taking decisions.

The integration of stock exchanges if any are very crucial and that policies and regulations surrounding it should be handled with caution. This is because of spillover effect that domestic economies encounter due to their interdependence with foreign exchanges. The findings of the study would indicate the level of integration among West African exchanges and it would further inform policy decision making as to whether the markets are fully integrated or certain issue need to be reconsidered.

Delimitations

The study considered stock exchanges within West Africa that is the Ghana Stock Exchange (GSE), Nigeria Stock Exchange (NSE) and the Bourse Regionale des Valeurs Mobilieres (BRVM) Stock Market. The BRVM is a regional block exchange which is made up of other West African countries namely Benin, Burkina Faso, Guinea Bissau, Coted'lvoire, Mali, Niger, Senegal

and Togo. The exclusion of the other stock exchanges was due to the unavailability of data on those stock markets. The study relied on only market capitalization of these stock exchanges.

Limitations

The study was limited to just three stock exchanges within West Africa. Even though most of the West African countries operate stock exchanges, most countries were excluded from the study due to unavailability of data. This limitation can impede on the generalization of the study with regards to the whole of West Africa.

Definition of Terms

Below are the meanings of variables that were considered in the research;

Stock market: is a market that deals in the buying and selling of securities such as bonds and shares.

Integration: is the co-movement of two or more exchanges in the same direction.

Organization of the Study

This study is made up of five (5) chapters. Chapter one provided the background information of the study, problem statement, objective research, significance and purpose of the study, research questions, delimitations, limitation and scope of the study. The chapter as well defines the terms used in special ways in this study.

Chapter two provided the review of theoretical perspective and empirical findings by other researchers regarding the integration of stock exchanges.

Chapter three was the research methodology. This captured the research design, instrumentation of data collection, sample and sampling procedures and tools for data analysis.

Chapter four represented the results and discussions. It presented the data collected from the field and summarizes them via tables. The chapter also discussed the findings of the study relative to the empirical literature.

Chapter five also represented the conclusion and recommendations. The chapter again summarized the major findings of the study; relevant recommendations were made based on the findings, as well as suggestions for future studies included.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The study investigated the integration of stock exchanges within West Africa. This chapter focused on reviewing related literature as well as considering the theoretical perspectives for the need of integrating stock exchanges.

Contemporary Issues in the Development of Stock Exchanges Within Africa

In most developed economies, financial markets have undergone remarkable changes and has also rapidly integrated the more due to number of interrelated factors. Such factors include but not limited to the internationalization of the markets, the introduction of new actors especially institutional investors within the markets as well as the introduction of more products which allows for bigger investment opportunities (Ntim, 2012). Across the globe, stock markets integration has received considerable attention by researchers, policy makers and finance specialists for a number of reasons. Levine (2001) noted that, integration of stock markets promotes domestic savings, investment and have the potential of affecting total factor productivity and economic growth positively.

Again, Tai (2007) posits that integration contributes to financial stability by enhancing competition and efficient allocation of resources, and a further reduction in the cost of capital and stock price volatility. In addition, integration among stock markets provides opportunities for risk sharing among the markets (Marashde & Shrestha, 2010 as cited in Kapingura, Mishi, & Khumalo, 2014).

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Prior to the introduction of more stock exchanges in Africa, the continent could only boast of five (5) exchanges in sub-Saharan Africa and three (3) in North Africa. Later, new stock exchanges emerged in Malawi, Ghana, South Africa, Uganda, Zambia, and Nigeria and so on. Currently there are nineteen (19) stock markets in Africa. These spurring out of stock exchanges could be hugely attributed to the stock markets relationship with economic growth since stock markets are expected to induce domestic savings as well as improve the number of investments made (Levine, 2001). Other studies (Phillips & Hansen, 1990; Saikkonen, 1991; Ying 2004) argue that this notion of stock market enhancing the growth of a country might not be so with developing counties especially where most stock exchanges are inefficient. Therefore, it is not feasible to develop stock exchanges due to frequent political instability, high transaction cost and poor financial structure among most Africa countries.

Undoubtedly stock markets in Africa perform tremendously in terms of return. At the later part of 2004, stock exchanges of Ghana, Kenya, Uganda, Egypt, and Nigeria were surprisingly regarded to be the world's best performing market (Databank, 2004).

Overview of the Ghana Stock Exchange (GSE)

The development of the stock exchange within the Ghanaian economy dated way back before its inception. The GSE as at the time of its inauguration in July 1989 was a private company limited by guarantee under Ghana's companies' code, 1963. The exchange later changed its status in April 1994 to a public private company limited by guarantee. The key objectives for the establishment of the exchange was to provide a common platform for the sale

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and purchase of bonds, stocks, shares and other securities as well as the investment of money. Also, the market is to control the granting of quotations on the securities in the market. Again, it is responsible for cooperating with the associations of stockbrokers and international exchanges and to make the necessary information available to them. The market has no doubt been performing remarkably well both domestically and internationally even though it was hit by a deteriorating economic condition in 1995 to 1999.

Since its inception with trading commencing on November 1990, the Ghana stock exchange has recorded very high composite index (GSE-CI) in certain periods reaching as high as 7,469.04, 10,931.36, 10,431.64 and 7,185.05 in 2004, 2008, 2009 and 2010 respectively (GSE monthly annual report).

Overview of the Nigerian Stock Exchange (NSE)

NSE is one of the fastest growing stock exchanges in Africa and it's adjudged to be the third largest stock exchange in Africa in terms of its market capitalization. It is the first to be established in West Africa and the sixth in Africa. It was formerly known as the Lagos stock exchanged in 1960 when it was formed. In the 1997 the name was later changed to the Nigeria stock exchange. The exchange can boast of 180 listed companies and a total market capitalization of N 10.16 trillion as at June 2016. The NSE operates on an automated trading system. This system facilitates foreign investors trading on the exchange as well as enhancing cross border listings.

Overview of the Bourse Regionale des Valeurs Mobilieres (BRVM) stock market

The BRVM also known as the Ivory Coast Stock Exchange for the purpose of this study (ICE) is a regional stock market serving mainly some

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francophone countries within West Africa and it's among the world's most successful integrated regional exchanges. These integrated countries are Benin, Burkina Faso, Guinea Bissau, Cote D'voire, Mali, Niger, Senegal and Togo. The establishment of this integrated market dates way back to the setting up of the West African Monetary Union (WAMU) in 1993. However, operations began in the 1998. The mission of this institution was to promote the markets among the regional bloc, to help disseminate relevant information and as well to organize the operations of the security market. The exchanges operate entirely on an electronic platform. The exchange experienced a 17.77% increase in terms of composite index in 2015 making it part of Africa's top performing index to most foreign investors. In 2015, market capitalization accounted for $12.8 billion making it the sixth best security exchange in Africa.

Theoretical Review

The need for the integrating of stock exchanges could be buttressed with various economic and financial theories. This study however focused on one economic theory which is the new growth theory.

The new growth theory, an economic theory, stipulates that the desires and unlimited needs of humans drives them to yearn for more profit which fosters productivity and in the long run boast economic growth (Romer & Chow, 1996). The eagerness to earn for profit improves economic growth in the sense that as individuals pursue for more profit their per capital GDP increases leading to an overall GDP incremental. Cortright (2001) posits that, with the eagerness to reap higher profit individuals scout for more opportunities elsewhere especially when the profit in one area diminishes. The theory also

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focuses on positive externalities as well as spillover effect that an economy would derive when new inventions are developed.

Putting this in the context of this study, individual investors will opt for more opportunities in new markets when the profit in the old market diminishes. With this regard, if the markets are segmented investors would hardly look out for opportunities in international markets due to high transaction cost, trade barriers, currency differentials and different prices for particular assets across borders (Nelson, 1997). Considering the integration of the markets it will necessitate investors having the opportunity to invest in the other markets where trade restrictions have been removed coupled with the fair pricing of assets on these markets. If investors are able to take advantage of this opportunity, then per capital GDP will increase which will transcend into the growth of the economy (Solow, 1994). With this argument the theory supports the creation, development and broadening of financial sectors.

Empirical review

The integration of stock exchanges has become an interesting area of study for most researchers. Al-Nasser and Hajilee (2016) conducted a study on the integration of emerging markets of Brazil, China, Mexico, Russia and Turkey into the global developed markets of US, UK and Germany. In other to determine both the short-run and long-run relationships between these markets the bounds test or co integration as well as the vector error correction model was adopted. Monthly returns from each stock market covering the periods 2001 to 2014 was used for the study. The study found a short run relationship between the emerging markets and that of the developed markets. However, in the long run, the emerging markets showed a significant relationship with that of the

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market of Germany only. The focus of the study was however on the integration of emerging and developed markets which is defers from considering the integration of emerging markets. Also, the use of one technique (linear approach) doesn't justify the conclusion since other approaches could reap diverse results.

Tam (2005), scrutinized the integration of emerging markets into the developed markets. However, the selection of countries to represent the emerging and developed markets was different from that of Al-Nasser and Hajilee's views (2016). The study used markets of six countries including USA, Canada, UK, India, Malaysia and Singapore. The study used multiple tests (Johansen, VAR-ECM, and Engle-Granger) to determine this level of integration. The study indicated that the markets are segmented with the exception of India which was positively related to the other markets. The findings of this work contradicted with that of Al-Nasser and Hajilee (2016). This could be largely attributed to the different countries sampled for the study and the multiple test adopted by Tam (2005).

Chancharat (2008), in his thesis work studied the Thai stock market in context of global stock market integration using an econometric analysis. The study focused on the integration of the Thai stock market with its major trading partners which were USA, Australia, Hong Kong, Indonesia, Japan, Korea, Malaysia, Philippines, Taiwan and the UK. The empirical results showed no long run relationship between the Taiwan stock exchange and the other stock exchanges.

Heilmann (2010) in a summer thesis work studied the linkages between stock markets using co integration approach. The study conducted was based

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on the use of weekly data on 8 east and Southeast Asian stock prices indices as well as that of the USA. The work argued that using co integration Regression Augumented Dickey Fuller test was not enough to conclude on a long run relationship between stock exchanges but however applying Johanssen cointegration approach was the best method to make any conclusions. The findings of the study were that the Asian stock exchanges influenced the US stock market in both the long and short run with Korea exerting much influence. Upon further investigation the study found out that there was a change in the level of co integration relationship especially between US and Japan as a result of the Asian financial crisis in the 1997/1998 era. Integration as a whole can be said to countries based as well as time varying based on the finding of most researchers. The results of this study were somehow in line with that of the other works used the same countries.

Hongbo (2012) conducted a study on international market linkages and their interdependencies. The focus of the study was on the China stock exchange and the world stock markets following the study by Nasser and Hajilee (2016) but after China's appointment to the World Trade Organization in 2001. The study found out a decrease in the level of segmentation between the China stock exchange and that of the world due to certain financial liberalization policies adopted by the country. The findings of this study were however an evidence from the findings of Al-Nasser and Hajilee (2016) who found a relationship between the China stock market and the world market of US, UK and Germany.

Ying (2004) using co integration approach analyzed the integration of the capital markets among China, Hong Kong, Singapore, Taiwan, Japan, UK and US. The focus was however on the stock market. The finding of the study

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was contrary to that of Hongbo (2012). This can be due to the time varying nature of market integration. The study identified that the Shanghai Stock Exchange was globally segmented. The study argued that the market was integrated to the world market prior to the 1997 hence the decline in the level of integration was attributed to social-economic, cultural and geographical reasons.

Arouri and Jawadi (2009), investigated stock market integration among emerging countries. The focus of the study was on stock exchanges in Philippines and Mexico similar to works of Al-Nasser and Hajilee (2016) and Chancharat (2008). These countries were characterized as emerging and the world capital market over a life span of three decades. The study adopted the nonlinear approach of co integration. The findings of the study indicated that the emerging markets were identified as nonlinearly integrated into the world market. However, the degree of integration for Mexico was very high as compared to the Philippines stock exchange. The study further indicated that integration as a process in nonlinear, asymmetric and time-vary.

Researchers didn't only concentrate on the integration of international developed and emerging markets but however the focus sequentially shifted to the emerging and the underdeveloped markets especially within Africa.

Marashedeh (2006), in a thesis work investigated the integration of the financial markets of the MENA (Middle East and North Africa) countries namely Egypt, Turkey, Jordan and Morocco. ARDL co integration approach was determined using monthly time series of stock market price indices for each country. The stock markets within the MENA region were found to be efficient and integrated with each other in the long run implying that the markets move

in the same direction. The results from the granger causality test indicated a unidirectional causality between the stock markets of Turkey, Morocco, US and the UK to Egypt. Also, from the markets of Germany and US to Turkey form the UK and turkey to Jordan as well as from Germany to the stock market of Morocco. With this level of integration, invested can increase their investment portfolio by investing in international markets.

Boamah (2014), considered the integration of 11 African stock markets and its relation to world markets. This was due to the significance of integrating stock markets to aid in financial decisions regarding portfolio diversification, cost of capital, risk sharing, market efficiency, and macro-economic policy. The paper used the multifactor asset pricing model covering 1997-2013. The study concluded that there exists partial integration among Africa markets since the world, emerging and African markets factors influences significant premium of risk on the African markets. He also noticed the sensitivity of the study to the period of investigation indicating that integration changes over time.

Ncube and Mingiri (2015), used Johansen and Julius co integration approach to determine the level of integration among five selected Africa stock exchanges. The study used monthly data from 2000 to 2008. The study also conducted a granger causality test to determine the causality links among the markets. The findings of the study were in line with other studies conducted in Africa that the markets are still segmented. However, the study found out that the markets in Africa are generally developing and improving. The study also further analyzed the integration of these markets into the international markets. It concluded again that Africa markets respond to changes in the international markets. Africa markets used for the study were South Africa, Botswana,

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Namibia, Mauritius and Nigeria and that of the developed markets included Germany, Japan and the USA.

Ntim (2012), investigated why Africa stock markets should formally harmonize and integrate their operations. The study concluded that formally harmonizing of stock exchanges within Africa might help improve their information efficiency since irrespective of the growth in number and size of exchanges within Africa the markets are deemed to be small, fragmented and illiquid.

Adam and Gyamfi (2015), also adopted a Kalma filter time varying approach to investigate the integration of Africa stock markets into the world markets. The study used data from 2002 to 2011 for eleven Africa countries and the world markets. The African countries included Botswana, Ivory Coast, Egypt, Ghana, Kenya, Mauritius, Morocco, Namibia, Nigeria, South Africa, Tunisia and Zimbabwe. The study also used MSCI ALL Country world index as a proxy to represent the global portfolio. The study identified that Africa market are not integrated with the global market even though it was found out that the level of integration has improved after the 2008/2009 financial crisis.

Agyapong (2014), also considered the integration of stock exchanges within the West Africa monetary zone. The study adopted the use of both linear and non-linear approach of co integration. The study used data from the Ghana and Nigeria stock exchanges to represent the zone since data for the other stock exchanges were not available. From the result of the linear approach it was evidenced that the Ghana and the Nigeria stock exchanges are not integrated. The study further recommended that due to the segmented nature of the markets

within the region it is appropriate for investors to diversify risk associated with investments.

Agyei-Ampomah (2011), also considered the integration of stock exchanges within Africa as well as its relationship with global indices. The study analyzed data of ten (10) African countries over the period 1998-2007. The findings of the study were in line with previous works indicating that the markets in Africa are still segmented from each other. With its relationship with the global market, it was also identified to be segment in spite of major structural adjustment that had taken place in Africa markets.

Conclusion

The chapter considered literature on the integration of West Africa countries by looking at the overview of the Ghana stock exchange, the Nigerian stock exchange as well as the Bourse Regionale des Valeurs Mobilieres (BRVM) stock market. It further considered theoretical frameworks that buttressed the need for integrating stock exchanges within West Africa. The chapter lastly reviewed some related works on the integration of stock exchanges which included the countries of interest for the study. In a nut shell, most of the literature found the markets within Africa to be segmented.

It can be deduced from previous works done on this area of investigation that, just a few of the studies concentrated on the integration of stock exchanges within West Africa**.** Most of the studies focused on the integration of African countries at large which included West African countries. However, the motivation for considering the integration of solely West Africa countries which is the introduction of the common currency (eco) is different from considering African countries in general. Again, most of the studies considered modelling

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linear approaches to examine the extent of integration which theoretically macroeconomic variables are found to be non-linear in nature making it appropriate to adopt a non-linear method.

CHAPTER THREE

RESEARCH METHODS

Introduction

The purpose of this chapter is to elaborate on the systematic procedures and methodology that is employed in this study. The chapter therefore explained the research design adopted for the study, data sources and description, model specification, definition of variables, estimation techniques, a priori expectations and post estimation tests.

Research Design

This study adopts the positivist philosophy. In the framework of positivist philosophy, the study used quantitative research design using econometric techniques to analyze integration between the stocks exchanges in West Africa. The positivist paradigm helps to operationalize concepts so that they can be measured, formulate hypotheses and then test them rigorously. This paradigm is deemed appropriate for the study due to its rational proof/disproof of scientific assertions, assumption of a knowable and objective reality. It allows quantitative study of economic phenomena. Objectivity, reliability and generalizability of findings are its key strengths.

Model Specification

In order to determine the level of integration between the stock exchanges in West Africa the Non-linear Autoregressive Distributed Lag (NARDL) approach was adapted to aid in finding both the long and short run relationships. The Non-linear ARDL assumes a non-linear relationship between unequal economic variables. This approach aids at modeling variables which are not equal in that a change in one variable doesn't cause an equal change in

another. The use of NARDL for the purpose of this study implies that the markets of the respective countries under study are unequal and hence the relationship might be non-linear in nature.

Data Type and Sources

The study used secondary data. Specifically, the study used quarterly data of market capitalization as a percentage of Gross Domestic Products (% GDP) from 1994 to 2015. Market capitalization was used for the study since it gives the total market value of outstanding shares of all listed companies in a particular stock market. It generally shows how shares on the stock exchange are performing. The stock market capitalization for each country was obtained from the World Development Indicators (WDI). The countries used for the study were those who a well-functioning stock market and the other West African countries excluded from the study due to unavailability of data.

Unit root test

Before conducting co-integration tests, it is imperative to test for unit root in order to determine the order of integration of the variables. To determine the time series properties of the variables the Augmented Dickey Fuller (ADF) test was employed in order to avoid a spurious regression. The theoretical background of the ADF test has been explained using the following model (Dickey & Fuller, 1981).

$$\Delta X_t = \alpha X_{t-1} + x_t{'}\delta + \beta_1 \Delta X_{t-1} + \beta_2 \Delta X_{t-2} + ... + \beta_p \Delta X_{t-p} + v_t .... \ (1)$$

Where X_t is the time series variable at time t, $x_t{'}$ are optional exogenous regressors which may contain constant and trend, $(\alpha = \rho - 1), \delta, \beta$ are parameters to be estimated and p is the lag length, v_t is the error term which

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is assumed to be white noise. According to the above model, the null hypothesis for testing unit root (stationarity) can be expressed as follows

$$H_0 : \alpha = 0, \qquad \text{where } \alpha = \rho - 1$$

$$H_1 : \alpha < 0.$$

The null hypothesis is that the series is non-stationary or the series contains unit root whiles the alternative hypothesis indicates the series is stationary and no unit root problem exists. If the null hypothesis is rejected, it means X_t is stationary and it is known as I (0) variable. If the series is non-stationary, then the series should be differenced and tested for higher integration. Having established the order of integration of the variables, co integration tests were conducted by applying the Non-linear Autoregressive Distributed Lag (NARDL) approach.

Lag length test

After testing for the stationarity levels of the variables, the next step was to consider the lag length of the variables jointly. The optimal lag length of a time series can be chosen by considering the Akaike's Information Criterion (AIC), Final Prediction Error (FPE), Schwarz Information Criterion (SIC) and the Hannan-Quinn information criterion (HQ) just to mention a few. The test helps to identify the maximum lags of a dependent variable to include in the time series model estimation. The lag refers to the number of periods back that has an effect on the estimation.

Bound tests

Before we conducted the NARDL, the bounds test was determined to aid in findings both the long and short run relationship between the variables.

The null hypothesis of no co-integration, H_0: $\lambda_1 = \lambda_2 = \lambda_3 = 0$ was tested. The hypothesis was examined using the standard F-statistic test as suggested by Pesaran and Pesaran (1997). The decision rule is that if the computed F- statistic is less than the lower bound critical value, then the null hypothesis of no co integration will not be rejected. In the event that the F-statistic falls within the lower and upper bound critical values, the result is inconclusive, and if the F-statistics is higher than the upper bound, we reject the null hypothesis of no integration implying the existence of integration.

Nonlinear ARDL model

The new growth theory advocates for the creation of new investment opportunities for investors. From this perspective the new stock market would be the inclusion of other stock exchanges to a particular market creating a wider market for investing. The nonlinear form of the ARDL model is specified below:

$$\Delta GSE_t = \alpha_0 + \alpha_1 GSE_{t-1} + \alpha_2 ICE_{t-1} + \alpha_3 NSE_{t-1}^+ + \alpha_4 NSE_{t-1}^- +$$

$$\sum_{i=1}^{q} \emptyset_{1i} \Delta GSE_{t-i} + \sum_{i=0}^{p} \emptyset_{2i} \Delta ICE_{t-i} + \sum_{i=0}^{m} \emptyset_{3i} \Delta NSE_{t-i}^+ +$$

$$\sum_{i=0}^{n} \emptyset_{4i} \Delta NSE_{t-i}^- + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{ (2)}$$

Where GSE= Ghana stock exchange, NSE= Nigeria stock exchange and ICE= Ivory Coast stock exchange and u_t = error term. While, α_i and ϕ_{ti} are the parameters to be estimated and q, p, m, and n represent the lag order.

From the above specification, the magnitude of the long run relationship between positive shocks in NSE and GSE is shown by ϕ_{3i} whereas the long run relation between negative shocks in NSE and GSE is captured by ϕ_{4i}. Both coefficients are expected to have positive signs, but they are not anticipated to

have similar magnitude, $\phi_{3i} > \phi_{4i}$, since positive changes in NSE will have higher effect on GSE as compared with the negative changes in NSE (Ibrahim, 2015).

Post estimation test

To ensure the goodness of fit of the model, the diagnostic and stability tests are also conducted. Pesaran and Pesaran (1997) suggested that conducting stability test is of great importance. The study conducted various stability test to ensure that the model was properly estimated. The CUSUM, the CUSUM of squares, serial correlation test and the heteroskedasticity test of the variables were all conducted to assess the stability of the model.

Tools for Data Analysis

This study employed both descriptive and quantitative analysis. Charts such as graphs and tables were presented to aid in the descriptive analysis. Unit root tests was carried out on all variables using Augmented Dickey-Fuller (ADF) and Philip-Perron test to ascertain their order of integration in order to avoid the problem of spurious regression. Furthermore, the study adopted the NARDL econometric methodology for co-integration to obtain both short-run and long-run parameters of the variables involved. All estimations were carried out using E-views 9.0.

Summary

This chapter developed and presented the methodological framework suitable for conducting the study. Quarterly time series data on Market Capitalization as percentage of GDP of the respective countries from 1994 to 2014 were employed for the study. The NARDL model was employed to investigate the relationship of the stock exchanges in West Africa both in the long and the short runs.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

Introduction

This chapter was devoted to the presentation and discussion of the results and findings of the study. It began with discussions on the descriptive statistics of the relevant variables and stationarity properties of the time series employed in the study. The results for Augmented Dickey-Fuller (ADF) was presented and followed by discussion of the test for co-integration using NARDL approach. All the results are discussed in relation to the hypotheses of the study.

Descriptive Statistics

The study computed the summary statistics of the variable involved in the study and the statistics are presented in Table1. From Table 1, it could be observed that all the variables have positive average values. The summary statistics indicated that among the selected African stock markets, Nigeria has the highest mean value (20.493) whilst Ghana has the lowest of (11.259). Thus, on the average, NSE'S contribution to GDP is about 20% annually, while GSE's and ICE'S contribution to the GDP is 11% and 18% respectively.

Based on the standard deviation, the Ivory Coast Exchange is the most volatile whilst Ghana is least volatile. In addition, the results indicated that all West African stock markets are skewed to the right indicating that there are greater chances of positive returns.

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Table 1: *Summary Statistics*

	GSE	ICE	NSE
Mean	11.259	17.450	20.493
Median	9.077	13.652	18.061
Maximum	34.886	40.824	51.002
Minimum	2.047	.235	4.016
Std. Dev.	7.809	13.504	10.875
Skewness	1.630	.283	.992
Kurtosis	5.122	1.773	3.852
Jarque-Bera	14.497	1.750	4.467
Probability	.001	.417	.107

Authors Computation, Azika (2017)

Trends in GSE, NSE and ICE

From Figure 1, the market capitalization as a percentage of GDP for all three West African countries exhibit up, down, non-linear trends. However, ICE's market capitalization (% of GDP) has for some years been higher than that of GSE and NSE specifically between the years 1995 and 1999, 2000 and 2002 and from 2003-2007. Beyond this period, a decreasing constant trend has been recorded till 2015. ICE recorded its highest value of about 40% in 2007 similar to that of the NSE.

NSE on the other hand recorded negative values in 1994 to 1997 and shoot up to about 30% in 1998. Between 1998 through to 2000, much more decreasing values were recorded as compared to ICE and GSE. Till date, a bit more stable values have been recorded with its highest peak also in 2007, 2013 and 2015.

For Ghana, the market Caps % of GDP recorded a very low value in 1993 shooting up and hitting its highest figure of about 35% in 1994 beyond which it has exhibited a downwards trend up to date. From the Figure, it is evident that, the best performing stock market from 2008 to 2015 in terms of its contribution the Gross Domestic Product is the NSE, followed by ICE whiles GSE is the least contributor to GDP.

Figure 1: *Trend in GSE, NSE and ICE*
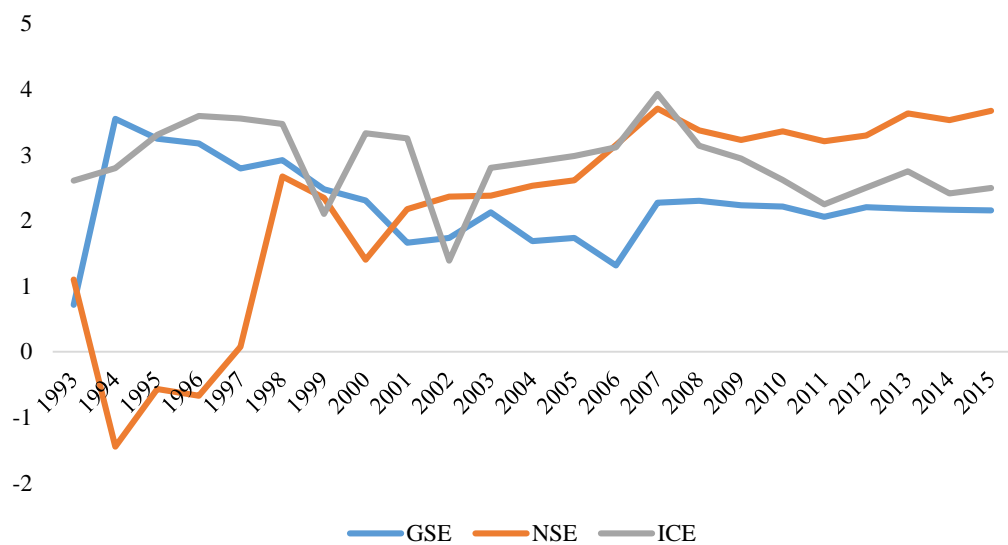
Authors' construct, Azika (2017)

Unit Roots Tests for the Level of Stationarity of All the Variables at Levels

The Augmented Dickey Fuller (ADF) and Phillips Peron unit root tests results were presented in Table 2. The null hypothesis of the presence of unit root in the Ivory Coast stock exchange (ICE) variable at levels cannot be rejected in both the ADF and PP test with intercepts only and with or without intercepts and trends. It indicated that at 5 percent significant level, ICE is non-stationary at level and needs to be differenced. On the contrary, the results

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indicate that at 5% level of significance, NSE is stationary at levels under both the ADF and PP test when both intercepts and trend are included.

Table 2: *Unit root Results (Level Series)*

	ADF			PP		
Variables	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	None
GSE	$.071*$	$.138$	$.177$	$.044**$	$.010**$	$.177$
NSE	$.031**$	$.048**$	$.173$	$.031**$	$.052***$	$.239$
ICE	$.789$	$.081*$	$.788$	$.104$	$.909$	$.916$

***, **, * indicates 1%, 5% and 10% level of significance respectively.

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This implies that the NSE variable is stationary at level hence has an order of integration of I (0). For the third variable, GSE is non-stationary at levels under the ADF test. That means that the null hypothesis of the presence of unit roots in the GSE variable at levels cannot be rejected using the ADF test. However, with the PP test, at 5% the GSE variable is stationary at levels when intercept and trend are included in the model. Hence this variable can be confirmed to be I(0) variable. From the results presented in Table 1, it can be deduced that two of the variables NSE and GSE are I(0) variables whiles ICE is non-stationary at levels and needs to be differenced. Table 2 presented the ADF and PP unit root test for all variables at first difference.

Unit Roots Tests for the Level of Stationarity for All the Variables at First Difference

From Tables 3, the results depict that using both the ADF and the PP test; the ICE is stationary at first difference. This is manifested by the p- value

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which is less than 5%. With these results, it can be confirmed that ICE is I (1) variable unlike the other two variables, GSE and NSE.

Table 3: *Unit root Results (First Difference Level)*

	ADF			PP		
Variables	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	None
GSE	.000***	.000***	.005***	.000***	.000***	.000***
NSE	.000***	.000***	.000***	.000***	.000***	.000***
ICE	.000***	.000***	.000***	.000***	.000***	.000***

***, **, * indicates 1%, 5% and 10% level of significance respectively.

Authors Computation, Azika (2017)

The time series properties of the data indicated that all the other variables except ICE are non-stationary at level series as reported by both the ADF and the PP. However, from Table 3 at first differences all variables are stationary. This therefore justifies the use of the NARDL approach to co-integration unlike the other convention approaches which require that the variables be integrated of order one that is I (1).

Lag Length Selection for The Variables

Table 4 shows the results of the lag length selection test. The study used a lag of four, as chosen by the Final Prediction Error (FPE), Schwarz Information Criterion (SIC), Hannan-Quinn information criterion (HQIC).

Table 4: *Lag Selection Criteria*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-195.545	20.899	239447.8	20.900	21.049	20.925
1	-168.719	42.356*	37370.63	19.023	19.620	19.124
2	-161.126	9.592	47408.50	19.171	20.215	19.348
3	-154.937	5.864	81283.58	19.467	20.958	19.719
4	-128.636	16.611	23132.02*	17.646*	19.585*	17.974*

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* Indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level). FPE: Final Prediction Error. AIC: Akaike Information Criterion SC: Schwarz Information Criterion. HQ: Hannan-Quinn information criterion

Adding more lags increases the penalty for the loss of degrees of freedom (Brooks, 2008). Hence, the above-mentioned criteria concur that the maximum lag length for the endogenous variables is four. This is done to indicate how many periods back can we link the effect of the integration of one country's stock market with that of another country stock market in this case (Ghana, Nigeria and Ivory Coast).

Bounds Testing for Non-Linear Co-integration

In estimating the nonlinear model, in which GSE is the dependent variable, the computed F-Statistic is 9.09 which is greater than both the upper bound critical values at 5% level of significance using restricted intercept and no trend. This implies that the null hypothesis of no co-integration can be rejected, and that there is a long-run relationship between GSE, NSE, and ICE.

Table 5: *Bound test for Non-Linear Co integration*

Test Statistic	Value	Df	Probability
F-statistic	9.099	(5, 11)	.001
Chi-square	45.499	5	.000

Null Hypothesis: No long run relationship exists between the variables

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Short Run Relationship for Non-linear ARDL Model

Before focusing on the relationships between the countries, the basic characteristics of the estimation results is assessed to indicate how good the estimation was. These variables of interest included the R-square, adjusted R-squared, Durbin Watson and the probability value. From Table 6 the R-squared value is .864 which is close to 1. This was an indication that the model was fit for the study. The Durbin Watson from Table 6 was approximately 2.0 which lies within the preferred range of 1.5 and 2.5 again passing the fitness test of the model. The probability value of the F-statistic of .001 was significant at 5% also passed the goodness of fit test. Form all assessment the model was good to be continued with the interpretation of the relationship.

From Table 6 it can be seen from the probability values that there exists a significant relationship with both positive and negative changes in log of NSE considering their probability values of .006 and .0444. These probability values are both significant at a 5% significant level. The positive changes in the log of one lag of NSE would exert a 4.567 change in GSE whiles negative changes in the log of one lag of NSE will cause changes of 2.57 in GSE as is indicated by the coefficient values.

There also exist a relationship between the negative changes of the difference of one period back of NSE market capitalization and that of GSE exhibiting a negative coefficient of -5.33. This implies that any negative changes in DNSE (-1) would have an inverse relationship of 5.333 on GSE. The empirical evidence of a short run relationship between the GSE and the NSE is contrary to the finding of Agyapong (2014) who found no relationship between the two stock exchanges. The empirical establishment of the existence of a short run relationship between the NSE and GSE can be as a result of the establishment of the WACMIC to foster the integration of the region. Again, the boost in cross exchange trading in 2015 between Ghana and Nigeria by the ASEA could contribute to the level of integration among the markets.

Table 6: *Short Run Estimation using Nonlinear ARDL*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.750	1.760	-6.675	.000
LNSE_POS(-1)	4.567	1.331	3.431	.006
LNSE_NEG(-1)	2.570	1.129	2.276	.0444
DGSE(-1)	-.617	.146	-4.205	.001
DICE	.240	.070	3.400	.006
DICE(-1)	.237	.093	2.535	.027
DNSE_POS	1.377	2.371	.580	.573
DNSE_NEG	-.329	.989	-.332	.745
ECT(-1)	-0.533	2.093247	-2.548	.027
R-squared	.864	Mean dependent var		-.859
Adjusted R-squared	.765	S.D. dependent var		3.079
S.E. of regression	1.494	Akaike info criterion		3.943
Sum squared resid	24.54243	Schwarz criterion		4.391
Log likelihood	-30.425	Hannan-Quinn criter.		4.030
F-statistic	8.714	Durbin-Watson stat		1.975
Prob (F-statistic)	.001			

Authors Computation, Azika (2017)

Also, DGSE (-1) that is the first difference of the one lag of GSE has a relation with the current GSE that is the probability value of .001<.05 is

statistically significant. This implies that the current value of GSE market capitalization is influenced or is depicted by the difference of the previous year's market capitalization value. Again, GSE which is the dependent variable has a statistically significant relationship with the first difference of ICE as well as its lag of one that is ($.006<.05$) and ($.027<.05$) respectively. The estimation again shows a relationship between GSE and ICE which is also conflicts with the previous studies done.

The ECM represents the speed of adjustment to restore equilibrium in the dynamic model following a disturbance. The coefficient of the ECM for GSE is -0.533 implying that about 53 percent of deviation from the long-run equilibrium following a short-run shock is corrected in one month. However, it is statistically insignificant.

The three markets (GSE, NSE and ICE) can however be said to be integrated in the short run based on the estimation results. The results contradict with that of Ncube and Mingiri (2015), who concluded that the markets in Africa are still segmented. However, the findings are in line with Boamah (2014), who considered the integration of 11 African stock markets and concluded that there exists partial integration among Africa markets. A similar conclusion was drawn by Marashedeh (2006). He investigated the integration of the financial markets of the MENA (Middle East and North Africa) countries namely Egypt, Turkey, Jordan and Morocco using ARDL, the stock markets within the MENA region were found to integrated with each other in the long run implying that the markets move in the same direction. The study results are in consonance with Al-Nasser and Hajilee (2016) that conducted a study on the integration of emerging markets of Brazil, China, Mexico, Russia and Turkey

into the global developed markets of US, UK and Germany and found a short run relationship between the emerging markets and that of the developed markets.

Long Run Relationship for Non-linear ARDL Model

After estimating the short run relationship, the next step was to estimate the long run coefficients. The long-run coefficients of the nonlinear ARDL model reveled that Nigeria was highly insignificant but is positively and negatively related to the Ghana Stock Exchange that is both probability values of .485 and .551 are all greater than the significant value of .05. This result confirms the insignificant long run relationship between the Ghana stock exchange and Nigeria Stock exchange that was established by Agyei-Amponsah (2011) and Agyapong (2014).

Table 7: *Long Run Estimation of Nonlinear ARDL*

| Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.834	.199	14.268	.000
ICE	-.244	.111	-2.200	.041
NSE$^-$	.114	.161	.711	.485
NSE$^+$	.110	.182	.607	.551

Authors Computation, Azika (2017)

Similar to Agyei- Amponsah (2011), the study discovered that the long run relation between negative shocks in NSE and GSE is statistically insignificant whiles that of Ivory Coast Stock Market is significant at 5% exhibits a negative relationship with GSE at a probability value of .041. The results show that in the long run at a significant level of 5%, GSE exhibits a significant relationship with ICE but no relationship with NSE.

Stability Test

Pesaran and Pesaran (1997) suggests that, the test for stability of parameters using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) plots be conducted after model is estimated. This is done to eliminate any bias in the result of estimated model due to unstable parameters. The CUSUM plot is depicted in Figure 2.

Figure 2 depicts the plot of CUSUM for the estimated ARDL model. The null hypothesis is that the coefficient vector is the same in every period and the alternative is that it is not. The CUSUM statistics are plotted against the critical bound of 5 percent significance level. If the plot of these statistics remains within the critical bound of 5 percent significance level, the null hypothesis that all coefficients are stable cannot be rejected.

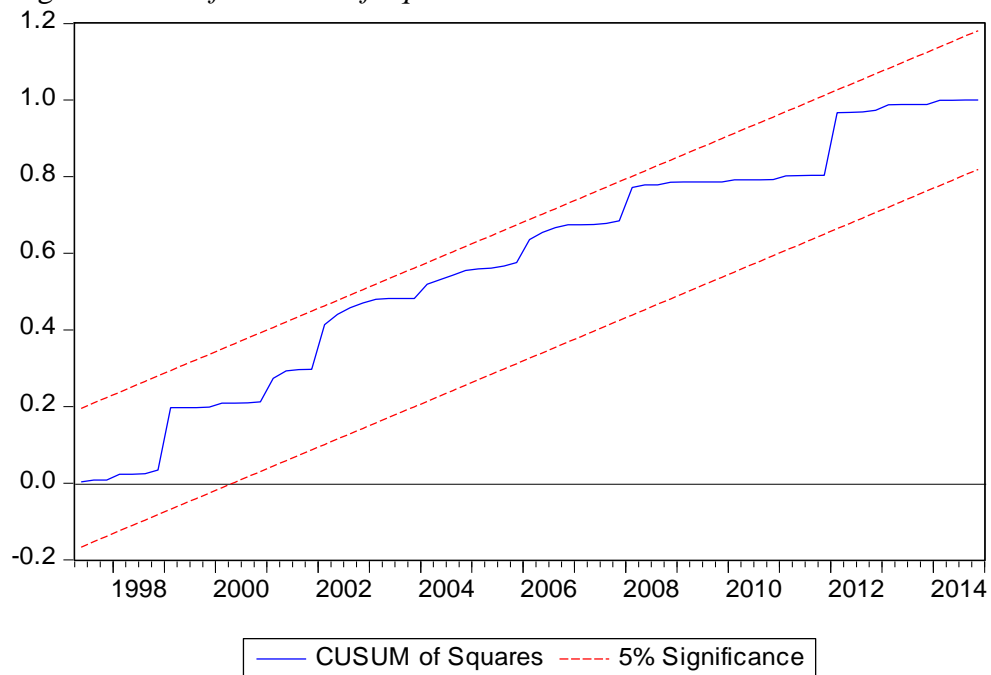Figure 2: *Plot of Cumulative Sum of Recursive Residuals*
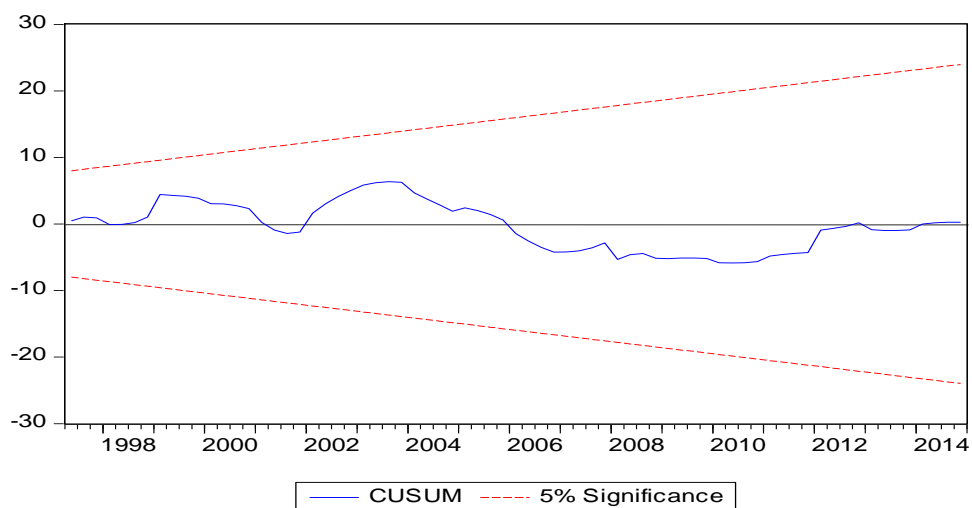
Authors' Construct, Azila (2017)

Note: The variable on the vertical axis is residuals while the variable on the horizontal axis is years. The straight lines represent critical bound at 5% level significance level.

Based on Figure 2, the plot suggests the absence of instability of the coefficient since the plots of all coefficients fall within the critical bounds at 5 percent significance level. Thus, all the coefficients of the estimated model are stable over the entire period of the study.

Figure 3: *Plot of CUSUM of Squares*

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Note: The variable on the vertical axis is residuals while the variable on the horizontal axis is years. The straight lines represent critical bound at 5% level significance level.

Again, considering the plot of the CUSUM of squares in Figure 3 above it can also be seen that the model is stable under the periods of consideration since the plots of all coefficients fall within the critical bounds at 5 percent significance level.

Serial Correlation Test

Table 12 shows the test of serial correlation in the model. This test was done using the Breusch-Godfrey Serial Correlation LM Test. The probability

value of .5704 of the observable R-squared indicated the existence of no serial correlation since the value was greater than .05 significant level.

Table 8: *Breusch-Godfrey Serial Correlation LM Test*

F-statistic	0.499827	Prob. F(2,72)	0.6087
Obs*R-squared	1.122903	Prob. Chi-Square(2)	0.5704

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Heteroskedastcity Test

The test of heteroskedasticity of the model was also conducted and it was presented in Table 13. Again, we failed to reject the null hypothesis of no heteroskedasticity in the model. This so because the probability value of the observable R-squared which is .140 is greater than the significant value (.05).

Table 9: *Breusch Pagan-Godfrey heteroskedasticity test*

F-statistic	1.633358	Prob. F(7,74)	0.1394
Obs*R-squared	10.97400	Prob. Chi-Square(7)	0.1398
Scaled explained SS	23.76323	Prob. Chi-Square(7)	0.0013

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Summary

This chapter discussed the results and findings of the study. It began with discussion of the time property of the series and descriptive statistics of the relevant variables. The results for Augmented Dickey-Fuller (ADF) presented and followed by discussion of the test for co-integration using NARDL approach. All the results were discussed in relation to the hypotheses of the study.

The results of the NARDL co-integration test suggest that there was co-integration between West African Stock Markets in the short run but there was some difference with the relationship in the long run. In the long run, GSE was related to only ICE but that of NSE was not significant.

CHAPTER FIVE

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

Introduction

The chapter presents the summary, conclusions and recommendations of the study. The summary presents a brief overview of the research problem, objectives, methodology and findings of the study. The conclusions encapsulate the overall outcomes regarding the findings of the study in the light of the hypotheses of the study. The chapter further provides policy recommendations to be implemented by specific institutions. The chapter also presents the limitations of the study and offers some directions for future research.

Summary

The objective of this study was to examine stock market integration in West Africa. Specifically, the study investigated long- run and short-run relationship between Ghana, Nigeria and Ivory Coast Stock exchanges.

In order to achieve the objectives, the study employed quarterly data of market capitalization as a percentage of Gross Domestic Products (%GDP) from 1994 to 2015 obtained from the World Development Indicators (WDI). Prior to model estimation, time series properties of data were determined using the Augmented Dickey Fuller (ADF) and Phillips-Perron test statistics.

The unit roots results revealed that all the variables were stationary but it was made of mixture of variables integrated at order zero I(0) and order one I(1). NSE and GSE were stationary at levels (I(0)) whiles ICE was stationary at first difference (I(0)). A lag length of four was used in estimating the model. Followed by the bound test of 9.099 showed the presence of a long run co integration between the markets. The NARDL model was later estimated to

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show both the long run and the short run dynamics. The co integration analysis showed the presence of a long run relationship between the GSE and the ICE which exhibited a probability value of .041 and a negative coefficient value of -.244 but no relationship existed between GSE and NSE whiles the short run estimated showed co integration between all the markets. The findings of the study were contrary to the findings of previous works done and this could be largely attributed to the methodological approaches employed by those various works. Also, the introduction of various bodies to help foster the level of integration within the bloc could largely be a reason for the increase in the interdependence of the markets.

The plots of the cumulative sum of recursive residuals stability test and the CUSUM of squared for the model all showed that all the parameters estimated were stable over the study period since they were found to be within the five percent critical bounds level. Again, the stability of the model was assessed using the Breusch-Godfrey Serial Correlation LM and Breusch-Pagan-Godfrey heteroskedasticity test. The various test indicated no serial correlation as well as no heteroskedasticity making it appropriate to run the model.

Conclusions

The study investigated the both the long-run and short run relationship of the West African stock markets using nonlinear ARDL approach. The study identified a short run relationship among the three markets as well as a long run relationship among stock exchanges within West Africa specifically between GSE and ICE. The implication is that potential gains from portfolio diversification between the three markets are unlimited since systematic risk can be diversified away and arbitrage opportunities among them are not

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possible. The findings of the study were contrary to that of previous study. It however indicated that any wrong specification may lead to misleading conclusion regarding whether the stock markets are integrated or not. The study revealed that modelling macroeconomic variables will best be explaining using non-linear approaches.

Even though most of the markets within the bloc are integrated most especially within the long run, institutions of the individual markets should closely monitor the operations of the markets. With this level of integration, the introduction of the common currency which is the eco can now be feasible within the bloc.

Recommendations

Based on the findings of the study, the following are recommended. The study recommends that investors are encourage to embark on cross listing in Ghana, Nigeria and Ivory Coast Stock markets, however, the possibility of making arbitrage profit is minimal. Secondly, the Securities and Exchange Commission in West Africa must put in measurers that would foster integration among the Stock markets across the sub region (West Africa). Furthermore, Regional Integration arms such as ECOWAS, WACMIC together with governments should work towards developing the respective domestic market and build strong economic ties to facilitate integration capital markets in Ghana, Nigeria and Ivory Coast.

Directions for Future Research

This study has certainly raised several issues for further investigation. In order to get substantial and better result, there are several recommendations that should be considered in the future research.

It would be of interest to researcher to extend the study to generate further analysis on the topics using more comprehensive methodology. The use of GARCH technique in uncovering the short-run relationship between the stock markets will generate more meaningful analysis. Considering structural break in further study would be interesting to address the issue of how financial crisis altered stock markets linkages or interdependencies. Hence studies may analyze the stock market linkages before, during and after the recent global financial crisis that affected almost all markets.

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