

## Measuring Co-Movements and Linkages between Nigeria and the UAE Stock Exchanges: Is there Opportunity for Portfolio Building?

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### Abstract

**Purpose:** The main objective of this study is to examine the relationship between Nigerian Stock Exchange and Dubai stock exchange with the aim of finding out the direction of movements between their respective indices.

**Approach/Methodology/Design:** The methodology adopted for the analysis is ARDL cointegration model and the Generalized Method of Moment (GMM). This is because of their known efficiency in detecting patterns between variables.

**Findings:** The result of the short-run analysis using GMM shows that there is existence of short-run causality between the Dubai financial market (DFM) and the Nigerian stock exchange (NSE). Thus, for investors looking for short-run arbitrage opportunity between the markets, they shall look elsewhere. But, the result of bound testing has shown lack of cointegration between the two markets. This is a sign of existence of opportunities for portfolio diversification between Nigeria stock exchange and Dubai financial market, since the two markets are not cointegrated in the long-run.

**Practical Implications:** The study helps bridge the empirical literature gap in stock market integration and portfolio diversification with reference to the Nigeria and UAE. It will, therefore, guide local and foreign investors with interest in Nigeria and UAE Stock Exchanges. It will also guide Nigerian and UAE policy makers to understand the market better, especially as it concerns financial contagion.

**Originality/value:** This study provides further evidence on stock market integration in emerging markets. New researches shall adopt different methodology such as use of volatility tracking models to measure volatility linkage between the markets.

## 1. Introduction

Recently, the field of stock market linkages has received increase attention from scholars around the world due to globalisation and information technology usage. The global financial crisis of 2008 and the future crises have made the topic of financial contagion a hot cake for researchers. Nations and institutions are watching keenly to see where the next crisis is coming from. According to a recent IMF briefing, major financial institutions around the world are not ready for future financial crisis. Emerging financial markets are continuously being affected by changes taking place in the developed economies (Cakan, Doytch, & Upadhyaya, 2015); where daily happenings in markets such as New York, London, Tokyo, and Paris stock exchanges are quickly felt in the emerging markets of the world. During the last global financial crisis between March 2008 and March 2009, the All Share Index of the Nigerian stock exchange lost a total share of 67% in its performance, while market capitalisation lost 62% of its value (Ajakaiye & Fakiyesi, 2009). Financial liberalisation, for example, has short-run negative effects which include wave of financial crisis (Trivedi, & Birau, 2013, Rejeb & Boughrara,

2015). A prominent example is the Asian financial crisis of 1996/7 which devastated the newly liberalised Asian emerging economies. What in financial literature is referred to as contagion is simply ‘increase in correlations between financial markets in times of financial crisis compared to the relative stability periods’ (Rejeb & Boughrara, 2015; Ghini & Saidi, 2015). There are many academic studies conducted in order to find out why stock markets around the world crashed at the same time. Most of these studies reached the conclusion that financial crises are contagious, like a global epidemic.

Stock market development is considered as a major contributor to economic growth by providing the enabling environment for growth and economic development, while ‘sound macroeconomic environment, well-developed banking sector, transparent and accountable institutions, and shareholder protection are necessary preconditions for the efficient functioning of stock markets in Africa and anywhere around the world (Yartey & Adjasi, 2007). There are empirical evidences that linked international portfolio diversification comes with risks reduction (Flavin & Panopoulou, 2006). The advances in information technology have made it possible for positive changes to be introduced in the way stock markets operate around the world (Angel, Harris, & Spatt, 2010). Multiple listings by large corporations in Africa has been rare, those so far executed have been met with mixed results. Ecobankplc has listed its shares on three major West African stock exchanges: Nigeria, Ghana and Ivory Coast. According to the bank’s management, the multiple listings ‘provide financial flexibility for Ecobank’s future capital needs’, making its shareholding very diverse, and the performance of the shares in the markets has been reasonably well (Ekpe, 2010). It has also increased liquidity of the bank shares and exposed it to wider investors’ base. But, empirical evidence from some selected cross listings cases in East Africa (Onyuma et al., 2012), associated multiple listings with improved performance and increase in investors’ confidence. Recognizing the potential benefits from cross border listings to market capitalization and liquidity on national exchanges in their region, East African Member States Securities Regulatory Authorities (EASRA) agreed an approval procedure in 2000 for cross border listings in the East African Community (EAC) (Irving, 2005).

The banking sector consolidation in Nigeria in 2004 has led to a growing interest and confidence in the Nigerian stock exchange immediately after the conclusion of the banking consolidation (Ningi, 2013). This confidence, therefore, led investors to pour huge amount of money into the Nigerian stock market resulting in over valuation and bubble in the All Share Index (ASI) and the total market capitalisation around the period 2008/9. As a result of the subsequent crash in the market, investors in the market incurred huge losses going into billions of Naira. This, therefore, encouraged investors to start looking for ways to reduce their risk exposure to the market by searching for alternative portfolio diversification channels. However, there are not very many empirical studies that explain the integration and portfolio diversification potentials of the Nigerian stock exchange. This study is therefore an attempt to fill that gap.

Over the last twenty years, there was resurgent interest in emerging markets stock exchanges around the world for reasons that included low returns obtainable from the developed stock markets around the world, need to diversify portfolio in order to reduce exposure to diversifiable type of risks, growing significant of these markets, and research into the nature of financial

contagion. Most of the past studies about stock markets integration agreed that there was an increased movement between major stock markets in the world more especially during the period of crisis. But, with the increase in the stock market co-movements, there comes a reduction of opportunity for portfolio diversification. In particular, the Nigerian stock exchange is perceived as less integrated with the world major stock exchanges as well as less efficient when compared with its counterparts in North America, Europe and Asia. Hence, this study attempts to find out the level of integration between Nigerian Stock Market and the United Arab Emirates' (UAE) Dubai base Dubai Financial Market (DFM) by studying the stock markets index performance from 2009 to 2019.

The Nigerian Stock Exchange was established in 1960. It started as Lagos stock exchange before converting to current organisational form as Nigerian stock exchange in 1970s with trading floors opened across the country in Kaduna, Ibadan, Ilorin, Port Harcourt, Onitsha, Kano, Yola, Benin, Bauchi, Owerri, Uyo, Lagos and Abuja. In the 1980s the exchange management focused on consolidating corporate governance on the back of liberalisation of the economy and international exposure that come with it. From 2000, Modernization of the market, strong GDP growth, increased local and foreign participation further boost the market position; but weak regulatory practices rupture the market (Adeeko, 2013). It is at some levels watched and supervised by security and exchange commission (SEC), a federal government agency responsible for overseeing the Nigerian capital market. Its screen based trading system allows it to operate in a number of cities spread across the country, transactions are undertaken through a central securities clearing system (CSCS) while cash settlement occurs through a number of designated settlement banks (MFWA). The Exchange offers many services including, listing and trading services, licensing services, market data solutions, ancillary technology services, and more (Onyema, 2015). It also provides pricing mechanism between supply and demand for productive activities, acts as a platform for capital rising including privatization and exit opportunities, authorize and monitor market operators. In addition to Providing a robust capital market infrastructure and trading platform, ensuring an orderly, fair and equitable market place by protecting the integrity of the market and investors from market manipulation, providing a medium of exchange for retail and institutional investors to build and preserve wealth, while at the same time maintaining a robust Investor Protection Fund (Adeeko, 2013).

In 2009 the Nigerian stock market crashed which among other factors were attributed to Macroeconomic Instability, Low financial literacy, poor market discipline, Inadequate regulatory framework, Poor governance, Lack of liquidity, and Security and Exchange Commission (SEC) interference in the running of the exchange (Onyema, 2015). As at January 2015, industrial goods sector took the largest share of equity capitalisation on the Nigeria stock exchange with 31% of the total, followed by consumer goods and financial services at 30% each; the three sectors comprised 91% of the total equity capitalisation of the market, leaving the remaining 9% to construction/real estate 2%, oil and gas 2%, agriculture 1%, ICT 1%, and all other sectors 3% (NSE, 2015). The total market capitalisation in 2014 stood at \$90.68 Billion, in 2013 it was \$119.41 Billion, 2012 was \$94.74 Billion, for 2011 the capitalisation stood at \$41.81 Billion, and 2010 is \$75.334 Billion (NSE 2015). As at September 30, 2016 the total market

capitalisation stood at N16, 524, 101, 646,237 or \$54,133,011,126. The market continues to grow up to 28.127 trillion Naira in January 2020. The Nigerian stock exchange all shares index performance during the period of the study was mixed. The all share index of the Nigerian stock exchange reached its all time height just before the financial crisis of 2008. Subsequently, it collapsed rising moderately only from 2012 to 2014 then went into another gradual decline in activities from 2014 to 2016.

A number of studies have shown positive relationships between Nigerian stock exchange and growth in the Nigerian economy (Adefeso et al., 2013; Kolapo & Adaramola, 2012; Osinubi, 2002; Adenuga, 2010; Saibu & Bowale, 2009; Ogunmuyiwa, 2010; Nuruddeen, 2009; Mohtadi & Agarwal, 2001). Other studies have casted doubt on the positive contribution of the Nigerian stock exchange on economic growth (Henry & Olabanji, 2013; Adigwe et al., 2015). In addition, other studies show mixed results of both positive and negative relationship in the case of different measurement indicators of performance (Nwaolisa et al., 2013; Alajekwu & Achugbu, 2012; Enisan & Olufisayo, 2009). Nevertheless, the general conclusion is that the Nigerian stock exchange has contributed positively to the Nigerian economy in its 57 years' history of operation. It has open doors for foreign investors coming into Nigerian economy, and it reduces overreliance on the banking sector as source of finance for companies operating in Nigeria. It reduces the cost of raising capital, assists government privatisation programs as well as helps in the spread of wealth across the country. In 2013, Europe accounted for 72% of the foreign portfolio inflow into the Nigerian stock exchange, North America 20%, Africa 5%, Asia 2%, and Middle East 1%; in 2014 Europe accounted for 68%, North America 17%, Middle east 8%, Africa 4%, Asia 2%, Oceania 1% (Onyema, 2015). Akinlo (2004) studied the foreign direct investment and economic growth in Nigeria 1970-2001, and his findings show that both private capital and (lagged) foreign capital investments have small and statistically insignificant effect, on economic growth. Total capital inflows into the Nigerian economy rose threefold from US\$6billion in 2010 to over US\$20billion in 2014 (Kale, 2016). In the year preceding the financial crisis of 2008, total foreign portfolio investment coming into the Nigerian stock exchange increased by 21%. But, in 2009 one year after the peak of the crisis it decreased by 38.6% (Ajakaiye & Fakiyesi, 2009).

The Dubai Financial Market (DFM) is the Dubai stock exchange located in Dubai, United Arab Emirates, founded on March 26, 2000. The companies listed on the exchange come from UAE and the wider MENA region. Between 2005 and early 2006, the market experienced problems when a bubble, that developed from previous rushes for the market listings, burst and share values dropped by around 60%. The DFM is one of three stock exchanges in the UAE; Abu Dhabi Securities Exchange (ADX) and the NASDAQ Dubai set up to trade international stocks. Just like its national counterpart, the ADX, Dubai stock exchange (DFM) is regulated by the Securities and Commodities Authority (SCA) of the UAE. DFM is a public joint-stock company that had its initial IPO in 2006. Like with most stock exchanges around the world during that period, DFM's net profit dropped sharply from 2007 till 2011. In 2007, DFM profits reached 1,439.6 million, but in 2011 it recorded a loss of AED 6.45 million. Things changed for the better in 2013 with a gain of +608.5% growths in net profits. Some of the major firms listed on

the market include banks such as Commercial Bank of Dubai (CBD), Dubai Islamic Bank (DIB) and Gulf Finance House (GFH); real estate firms such as Emaar Properties (EMAAR) and manufacturing firms such as National Cement Company (NCC).

Given all this background about Nigeria and the UAE Stock Exchanges, the study is an attempt to measure the co-movements between these stock exchanges. The study helps bridge the empirical literature gap in stock market integration and portfolio diversification with reference to Nigeria and the UAE. It will, therefore, guide local and foreign investors with interest in Nigeria and UAE Stock Exchanges. It will also guide Nigerian and UAE policy makers to understand the market better, especially as it concerns financial contagion. The level of trading relations between Nigeria and the UAE helped in explaining motivations for the study. Likewise, financial relationship between the countries, as it is an important factor in determining correlations between markets. Thus, the study will help open the way for both local and international investors interested in putting their money in NSE and DFM. This study unlike previous studies on stock exchange integration in Africa, examines diversification benefits in stock exchanges residing in two trading countries. Thus, the study helps in understanding how Nigerian economy is responding to globalization with reference to the UAE. It is of importance to researchers and policy makers in the area of portfolio theory.

## 2. Literature Review

Using pooled data from fifteen industrial and developing countries from 1980 to 1995, Garcia and Liu (1999) find out that stock market development proxy by market capitalisation increases by 0.007 percentage point when previous year's income level increases by one billion dollars. This shows positive influence of income level on stock market. When last year's saving rate increases by one percentage point, market capitalization increases by 0.879 percentage point, a pointer to positive influence of saving on stock market and the fact that most savings (in the countries of the study) are channel through the stock markets. When domestic credit to the private sector (divided by GDP) increases by one percentage, market capitalization increases by 0.527 %>It means that financial intermediation promotes stock market development. If value traded to GDP ratio increases by one percentage, market capitalization increases by 0.133 percentage, meaning that stock market liquidity has positive effect on market capitalization.

In a study on the impact of inflation on Nairobi stock exchange, Kimani and Mutuku (2013) using cointegration analysis find out that there is a negative relationship between inflation and stock market performance in Kenya in the period December 1998 to June 2010. Stock market liberalization as a specific type of capital account liberalization, which is a decision by a country's government to remove restrictions on capital inflows and outflows according to Henry (2000) leads to private investment boom. Irving (2005) argues that progress in developing national financial markets must precede any actual moves to integrate securities markets. The exchanges could benefit from closer cooperation, including encouraging cross border listings, information dissemination and technology sharing. According to some economists, stock markets can potentially raise savings and investment rates by introducing new instruments that might better meet savers' needs and by pooling the small savings of many individuals to fund

investment in large-scale projects that otherwise might not be undertaken without that new channel (Irving, 2005). That is where new innovations such as Islamic share index come in; as at now many stock exchanges around the world have embraced the novel scheme, including markets from developed and emerging economies of the world. The Nigerian stock exchange itself has since 2013 introduced its own Islamic share index called NSE-Lotus Islamic Index. The Dubai stock exchange also has its own Islamic stock index.

Financial liberalization of equity markets across the globe has been one of the most important national policy decisions of the past 25 years, as argued by Bekaert et al. (2003) in their paper on equity market liberalisation. According to them, equity market liberalizations give foreign investors the opportunity to invest in domestic equity securities of other nations and domestic investors the right to transact in foreign equity securities (Bekaert et al., 2003). The globalisation of finance has outpaced trade in goods and services in part due to advances in information and transportation technology (Bartram & Dufey, 2001). According to economic theory, activity of speculators in the capital markets is beneficial as it enhances the informational and allocational role of asset markets thereby making markets more efficient (Bekaert & Harvey, 2000). Due to increase correlations between global stock markets investors have started focusing on alternative method of diversification that focus on sectors and industries instead of countries (Bartram & Dufey, 2001). Benefits to international diversification come in the long-run not the short-run (Bhuyan et al., 2015). Previous works on international portfolio investments show that developed markets have an average correlation with other developed markets that is higher than the average correlation obtained with emerging markets, and for emerging markets the correlation with developed markets is generally higher than the correlation with emerging markets peers (Harvey, 1995).

One of the major risks of investment in the so-called emerging markets of the world is political risk. Political risk includes instability of a political system and government, threat of exchange controls, abolishment of non-resident convertibility and free remittance of funds to risk of nationalization of businesses and loss of property rights (Bartram & Dufey, 2001). Considering the cost associated with establishing stock markets some economists (Singh, 1999) suggested that small African countries shall use their scarce resources in improving their banking system. This argument is contrary to the view held by orthodox economists who argue that capital market become necessary as country developed and its economy become large. Stock market increases savings and investments, improves the productivity of investments, and raises the profitability of existing capital stock (Singh, 1999). From the perspective of emerging markets, much of portfolio capital inflows are literally “hot money”, which increases the vulnerability of the economy not just to international economic shocks but also to domestic shocks (Singh, 1999). Returns in emerging markets according to Harvey (1995) are more likely to be influenced by local news than what happens in a foreign country, since it is assumed that emerging markets are segmented from world capital markets. In the developing countries of the world, bank loan is the dominant formal source for financing. Stock exchange markets development has been slow to take off due to the small size of the businesses, lack of sufficient savings, and accumulation of capital difficulties due mainly to the lack of sufficient country-funds (Derrabi & Leseure, 2002).

Click and Plummer (2003) used correlation in finding short-run relation and cointegration method to find out long-run correlation between stock markets of Indonesia, Malaysia, the Philippines, Singapore, and Thailand. The data base they used for the study started from July 1998 to December 31 2002 which is a short span but the analysis extract is long-running, using both Daily and Weekly data. The authors used local currencies, U.S. dollars, and Japanese Yen for their calculations. Their findings show that the stock markets in the study were cointegrated. To assess the benefits of international portfolio diversification from different domiciles, Butler and Joaquin (2001) measured the correlation of U.S., U.K., Japanese, Australian and European stock market indices with the corresponding Morgan Stanley Capital International (MSCI) world-ex-domestic index. They examined the correlation profiles by comparing the differences between correlations in bear, calm and bull markets to the differences expected from a bi-variate normal model.

Utilizing the Autoregressive Distributed Lag (ARDL) approach to cointegration Marashdeh (2005), examined financial integration among four stock markets in the Middle East and North African (MENA) region, and the integration between these markets and three developed markets represented by the US, UK and Germany. The study employed monthly stock market indices expressed in local currencies. His findings show evidence of the existence of integration among the stock markets in MENA region, and absence of it between the MENA markets and the developed markets. The paper found only Egyptian market to be integrated with the international markets. Saiti, Bacha, and Masih (2014), investigated whether Islamic Stock Indices provide better diversification benefits compared to their conventional counterparts. The study particularly focused on investigating whether Islamic stock indices provide unique opportunities for the US-based investors. Using Dynamic Multivariate GARCH approach, the authors find that both the conventional and Islamic MSCI indices of Japan, GCC ex-Saudi, Indonesia, Malaysia and Taiwan provide better diversification benefits compared to Korea, Hong Kong, China and Turkey. It further suggested that Islamic markets provide better diversification opportunities compared to the Far East countries. Tabak and Lima (2002) studied causality and cointegration relationships among stock markets of Latin America and the United States using simple framework causality and cointegration. Causality and cointegration was tested for Argentina, Brazil, Chile, Colombia, Mexico, Peru, Venezuela and the US. The findings showed no evidence of cointegration among these stock markets but short-run causality could not be rejected according to their analysis.

In a study to find Relationship between Stock Markets of major developed countries and Asian emerging markets, Wong, Penm, Terrell and Lim (2004) find co-movement between some of the developed and emerging markets in their study, but that some emerging markets differed from the developed markets with which they shared a long-run equilibrium relationship. The countries covered in the study were United States, United Kingdom, Japan, Malaysia, Thailand, Korea, Taiwan, Singapore and Hong Kong. Heilmann (2010) investigated the linkages between eight Asian stock price indices and the American S&P 500 index in local currencies by applying cointegration framework on Weekly data. Performing pair-wise Cointegration Regression Augmented Dickey Fuller tests did not show much evidence for the long-run relationships

among the indices. But, applying the Johansen cointegration test on the whole system instead indicates at least one cointegrating vector. Further analysis suggested that the Asian financial crisis of 1997/1998 changed the cointegration relationship between some of the countries, especially between the the U.S. and Japan, the study found out.

Early empirical works on financial contagion employed correlation analysis to measure co-movement between markets (Ghini & Saidi, 2015). Christoffersen, Errunza, Jacobs, and Jin (2010) investigated patterns and trends in correlations over time using weekly returns for large systems of Developed Markets (DMs) and Emerging Markets (EMs) during the period 1973-2009, their findings suggested that the correlations have been trending upward for both the DMs and EMs. Thus, while correlation analysis implies that diversification potential of EMs had disappeared, their study contradicted it. Though, diversification benefits might have had lessened in the case of DMs, the case for EMs remained intact, the authors concluded. In a paper studying co-movement between Pakistan and Indian stock markets, Rehman and Shah (2016) found evidence of significant long run relationship between bilateral equity co-movement and GDP growth differential of Pakistan and India. The authors employed Auto Regressive Distributed Lag (ARDL) technique to check long term relationship among the included variables, while for the likely short term relationship; error correction term was used to measure speed of convergence toward long run equilibrium. Another study on the link between the stock exchanges of Brazil and Turkey during the period 2002 to 2009 found that there was a significant market interrelation between Turkey and Brazil (Yalama, 2009). The author employed the Johansen and Juselius (1990) cointegration framework and Vector error-correction modelling, as well as the Granger Causality Test from bivariate VECM estimations. The study finding indicated that different in time zone between the two markets did not affect the link between the markets. The action of stock markets during financial crisis is of interest to scholars of financial contagion. A paper by Assidenou (2011) examined the cointegration of major stock market Indices during the 2008 global financial Distress, basing his analysis on daily closing prices of international stock markets indices, the analysis showed that three set of indices of economies (OECD group, Pacific group and Asia group) had at least one cointegrating vector during the period of the study.

### **3. Methodology and Procedures**

The methodology adopted for this study is cointegration analysis by means of ARDL. Generalised Method of Moment (GMM) is also tested. Data is collected from Yahoo Finance on monthly basis for the period 2009-2019.

#### **Scope of the Study**

The study covers the period starting from September 2009 to August 2019. Data used for the study is Monthly Share Index. It captures the degree of integration between the two stock markets. Using Autoregressive Distributed Lag (ARDL) model and Generalized Method of Moment (GMM), the study seeks to find dynamic linkages between Nigerian stock exchange and Dubai Financial Market. Data for the study is time series data obtained from Yahoo Finance. Secondly, some previous studies in this area have used Daily Price Index (Khan, 2011;



Abdullahi, 2019). Several other related studies in this area have used combination of Daily and Weekly data (Raj & Dhal, 2008); while others used only Weekly data (Wong et al., 2004). Many past studies have measured linkages in local currencies (Dimitriou & Kenourgios, 2012). Still, some previous studies in this area (Raj & Dhal, 2008; Alagidede, 2008; Tabak & Lima, 2002; Assidenou, 2011) made use of stock indexes in US Dollar to allow for international comparisons. But, other studies like Click and Plummer (2003) used local currencies, at the same time others (Heilmann, 2010; Abdullahi, 2017) used both the Dollar and local currencies. The present study uses local currencies and where data is not available in local currency its dollar equivalent was used. Indices expressed in local currency helped evade problems associated with transformation due to fluctuations in cross-country exchange rates and assumptions related to Purchasing Power Parity (Dimitriou & Kenourgios, 2012).

The period of the study (2009-2019) was chosen because it is most recent and falls after the period after the global financial crisis of 2008 that generated a great shock to the global economy including in Nigeria. The period also falls before the current crisis caused by COVID-19 pandemic. Financial crisis period is seen as structural break on economic data. In order to avoid the major structural break that occurred with the occurrence of global financial crisis of 2008/2009, the period from September 2009 was selected as the beginning date of the study with the end period to be September 2019. The data used is time series data from 2009 to 2019. The reason for choosing the UAE includes the fact that it represents one of countries that trade most with Nigeria. The type of integration being measured here is horizontal integration.

### **Generalised Method of Moment (GMM)**

GMM is good for the estimation of short run and long run relationship between variables. As with other instrumental variable estimators, for the GMM estimator to be identified, there must be at least as many instruments as there are parameters in the model. In models where there are the same numbers of instruments as parameters, the value of the optimized objective function is zero. If there are more instruments than parameters, the value of the optimized objective function will be greater than zero (Pindyck & Rubinfeld, 1998; Stock, Wright, and Yogo, 2002). Lags of explanatory variables were used as instrumental variables in this paper. Hansen (1992) has shown that an asymptotically efficient or optimal GMM estimator can be obtained by choosing weighting matrix so that it converges to the inverse of the long-run covariance matrix.

### **ARDL Model**

ARDL approach to cointegration was introduced by Pesaran et al. (1996). According to (Fabozzi et al., 2006), ARDL methodology regresses one variable on its own past and on the present and past values of a number of other variables. In addition, ARDL co-integration model is able to capture the short-run and long-run components of the model simultaneously. Our model is:

$$NSE_t = \beta_0 + \beta_1 DSE_t + e_t \quad (1)$$

$$DSE_t = \beta_0 + \beta_1 NSE_t + e_t \quad (2)$$

The Error Correction Model (ECM) is derived as:

$$\Delta \ln NSE_t = a_0 + \sum_{j=1}^{k_1} b_j \Delta \ln DSE_{t-j} + k_1 \ln NSE_{t-1} + k_2 \ln DSE_{t-1} + \varepsilon_t \quad (3)$$

$$\Delta \ln DSE_t = a_0 + \sum_{j=1}^{k_1} b_j \Delta \ln NSE_{t-j} + k_1 \ln DSE_{t-1} + k_2 \ln NSE_{t-1} + \varepsilon_t \quad (4)$$

Where,

$\Delta =$  first difference operator

$\ln =$  natural logarithm of the stock index

$a_0, b_j, k_1, k_2 =$  parameters

$\varepsilon_t =$  Error term

F-test is used to test the cointegration through testing for significance of the lagged levels of the variables. Our null hypothesis of no cointegration is  $H_0: k_1 = k_2 = 0$ . It is tested against the alternative of at least one non-zero result, i.e.  $H_1: k_1 \neq 0$  or  $k_2 \neq 0$ . The calculated F-statistics is compared with the critical values. Where the F-statistic exceeds the upperbound level, the null hypothesis is rejected, which indicates the existence of co-integration. On the alternative, if the F-statistic falls below the lower bound level, the null hypothesis cannot be rejected, supporting the non-existence of co-integration. However, if it falls within the upper and lower bounds, the result is inconclusive (Pesaran et al., 1996).

#### 4. Results and Discussion

##### GMM Results

The GMM result show that DFM is caused by NSE and NSE is also caused by the DFM in the short-run. See table 1 and 2 for the results of the analysis. This confirms the existence of short-run relationship between the two markets. Thus, we reject the second null hypothesis ( $H_2$ ) that says there is no short run relationship between the markets.

Table 1: GMM analysis with DFM as dependent variable

Dependent Variable: DFM				
Method: Generalized Method of Moments				
Date: 10/01/20 Time: 16:00				
Sample (adjusted): 2009M10 2019M09				
Included observations: 120 after adjustments				
Linear estimation with 1 weight update				
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 5.0000)				
Standard errors & covariance computed using estimation weighting matrix				
Instrument specification: NSE(-1)				
Constant added to instrument list				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

NSE	4.98E-05	2.48E-05	2.006550	0.0471
C	-0.016269	0.668857	-0.024323	0.9806
R-squared	0.205691	Mean dependent var		1.485467
Adjusted R-squared	0.198960	S.D. dependent var		0.684794
S.E. of regression	0.612896	Sum squared resid		44.32570
Durbin-Watson stat	0.180215	J-statistic		2.80E-43
Instrument rank	2			

*Source: author's analysis using Eview*

**Table 2: GMM analysis with NSE as dependent variable**

Dependent Variable: NSE				
Method: Generalized Method of Moments				
Date: 10/01/20 Time: 16:03				
Sample (adjusted): 2009M10 2019M09				
Included observations: 120 after adjustments				
Linear estimation with 1 weight update				
Estimation weighting matrix: HAC (Bartlett kernel, Newey-West fixed bandwidth = 5.0000)				
Standard errors & covariance computed using estimation weighting matrix				
Instrument specification: DFM(-1)				
Constant added to instrument list				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DFM	4236.376	1297.915	3.263986	0.0014
C	23851.91	2529.562	9.429263	0.0000
R-squared	0.205901	Mean dependent var		30144.90
Adjusted R-squared	0.199172	S.D. dependent var		6442.389
S.E. of regression	5765.230	Sum squared resid		3.92E+09
Durbin-Watson stat	0.110908	J-statistic		5.61E-45
Instrument rank	2			

*Source: author's calculation using Eview*

## ARDL Results

The results of the ARDL analysis show that there is no cointegration between the two markets, since the F-statistics are lower than the lower bound critical values. Thus, for the long-run relationship between the two markets, no long term relationship exists. See table 3 and 4 for the results of the tests. Thus, we cannot reject the first null hypothesis ( $H_1$ ) that says there is no cointegration between NSE and DFM.

**Table 3: ARDL bound testing with NSE as dependent variable**

ARDL Bounds Test	
Date: 10/01/20 Time: 15:47	
Sample: 2009M11 2019M09	
Included observations: 119	

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Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	1.823201	1

Critical Value Bounds

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Significance	I0 Bound	I1 Bound
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	5.58

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*Source: author calculations using Eview*

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Long Run Coefficients

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
	2591.7891	3888.42201		
DFM	86	6	0.666540	0.5064
	27510.769	6448.87856		
C	355	9	4.265977	0.0000

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*Source: author's analysis using Eview*

Table 4: ARDL bound testing with DFM as dependent variable

ARDL Bounds Test

Date: 10/01/20 Time: 15:53

Sample: 2009M12 2019M09

Included observations: 118

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	1.707691	1

Critical Value Bounds

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Significance	I0 Bound	I1 Bound
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	5.58

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Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
NSE	0.000085	0.000050	1.719405	0.0883
C	-1.291268	1.566779	-0.824155	0.4116

*Source: author's analysis using Eview*

## 5. Conclusion and Suggestion

The result of the short-run analysis using GMM shows that there is existence of short-run causality between the DFM and the NSE. Thus, for investors looking for short-run arbitrage opportunity between the markets, they shall look elsewhere. But, since the result of the bound testing has shown lack of cointegration between the two markets, this is a sign of existence of opportunities for portfolio diversification between Nigeria stock exchange and Dubai financial market as the two markets are not cointegrated in the long run.

### Gaps in the Literature and Areas for Further Research

The existing academic literature is yet to examine the relationship between Nigerian stock exchange and Dubai stock exchange. The UAE has important trading relations with Nigeria. It is in the forefront in the move toward globalisation of trade. This study is more important when we take into consideration the random nature of stock index that makes it far difficult to forecast its future movements using previous data. The fact that Nigerian economy is the largest in Africa and its stock market second only to that of South Africa, this makes the Nigerian stock exchange very strategic in Africa and call for more studies to unravel its mode of operation. For example, Kapingura, Mishi, and Khumalo (2014) noted that 'stock markets in Africa have received little attention due to under development and illiquidity of the markets' this further led credence to the argument that there were few studies carried out in this area of research. Alagidede (2008) observed that African markets share weak stochastic trends with both the rest of the world and with each other, and tend to respond more to local information than global events except for South Africa. This study provides further evidence on stock market integration in emerging markets. New researches shall adopt different methodology such as the use of volatility tracking models to measure volatility linkage between the markets.

### Conflict of interests

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## References

- Abdullahi, S.I. (2019), ‘Measuring volatility linkage, clustering and sensitivity to external shocks in Nigeria stock index’, *Int. J. Financial Services Management*, Vol. 9, No. 4, pp.345–368.
- Abdullahi, S.I. (2017) ‘Stock market linkage, financial contagion and assets price movements: evidence from Nigerian stock exchange’, *Journal of Advanced Studies in Finance*, Vol. 9, No. 2, pp.146–159. DOI: 10.14505/asf.v8.2(16).04.
- Adeeko, B. (2013), “*NSE: financial sector reforms and global economic stability, challenges and prospects*”, presentation at National Defence College, Abuja, November, 2013
- Adefeso, H. A., Egbetunde, T. and Alley, I. (2013), “Stock market development and growth in Nigeria: A causal analysis”, *Arabian Journal of Business and Management Review (OMAN Chapter)* Vol. 2(6), p. 78-94
- Adenuga, A. O. (2010), “Stock Market Development Indicators and Economic Growth in Nigeria (1990-2009): Empirical Investigations”, *Central Bank of Nigeria Economic and Financial Review* Vol. 48(1), p. 33-70
- Adigwe, P.K., Nwanna, I. O., and Amala, A., (2015), “Stock market development and economic growth in Nigeria: An empirical examination (1985- 2014)”, *Journal of Policy and Development Studies* Vol. 9(5), p. 134-154
- Ajakaiye, O. and Fakiyesi, T. (2009), “*Global Financial Crisis Discussion Series: Nigeria*”, Overseas Development Institute London and University of Lagos
- Akinlo, A. E. (2004), “Foreign direct investment and growth in Nigeria An empirical investigation”, *Journal of Policy Modeling*, Vol. 26, p. 627–639
- Alagidede, P. (2008), “African Stock Market Integration: Implications for Portfolio Diversification and International Risk Sharing”, *Proceedings of the African Economic Conference 2008*
- Alajekwu, U. B. and Achugbu, A. A. (2012), “The Role of Stock Market Development on Economic Growth in Nigeria: A Time Series Analysis”, *African Research Review*, Vol. 6 (1), p. 51-70
- Assidenou, K. E. (2011), “Cointegration of Major Stock Market Indices during the 2008 Global Financial Distress”, *International Journal of Economics and Finance* Vol. 3(2), p. 212-222
- Angel, J.J., Harris L. E. and Spatt, C. S. (2010), “*Equity Trading in the 21st Century*”, George Town University, USA
- Bartram, S. M., and Dufey, G. (2001), “International Portfolio Investment: Theory, Evidence, and Institutional Framework”, *Social Science Research Network*, Paper No. SSRN-id270196
- Bekaert, G., Harvey, C. R., and Lundblad, C. T. (2003), “Equity Market Liberalization in Emerging Markets”, *Journal of Financial Research* Vol. 26(3), p. 275–299
- Bhuyan, N. H., Reza, R., and Slaydon, J. (2015), “The Best Market Mixtures for Portfolio Diversification across Markets”, *International Journal of Education and Social Science*, Vol. 2(12), p 11-18

- Butler, K. C., and Joaquin, D. C. (2001), “Are the Gains from International Portfolio Diversification Exaggerated? The Influence of Downside Risk in Bear Markets”, *Social Science Research Network*, Paper No. SSRN-id221992
- Cakan, E., Doytch, N. and Upadhyaya, K. P. (2015), “Does U.S. macroeconomic news make emerging financial markets riskier?”, *Borsa \_Istanbul Review Vol. 15(1)*, p. 37-43
- Click, R. and Plummer, M. G. (2003), “Stock Market Integration in ASEAN after the Financial Crisis”, *The International Centre for the Study of East Asian Development, Kitakyushu*, Working Paper Series 2003-06
- Derrabi, M. and Leseure, M. (2002), “*Global Asset Allocation: Risk and Return on Emerging Stock Markets*”, School of Business Administration, Al Akhawayn University in Ifrane, Morocco
- Dimitriou, D. and Kenourgios, D. (2012), “Opportunities for international portfolio diversification in the balkans' markets”, *MPRA Paper No. 37479*, <https://mpra.ub.uni-muenchen.de/37479/> accessed on 8/3/17
- Ekpe, A. (2010), “Motives for a Multiple Listing on African Stock Exchanges: The Ecobank Experience”, *Private sector & Development, Issue 5*
- Enisan, A. A. and Olufisayo, A. O. (2009), “Stock market development and economic growth: Evidence from seven sub-Sahara African countries”, *Journal of Economics and Business Vol. 61*, Issue 2, P. 162–171
- Fabozzi, F.J., Focardi, S.M., Focardi, S. and Kolm, P.N. (2006), *Financial Modeling of the Equity Market: From CAPM to Co-integration*, Wiley, Hoboken, NJ.
- Flavin, T. and Panopoulou, E. (2006), “International Portfolio Diversification and Market Linkages in the presence of regime-switching volatility”, *IIS Discussion Paper, No.167/June 2006*
- Garcia, V. F. and Liu, L. (1999), “Macroeconomic determinants of stock market development”, *Journal of applied Economics, Vol. 2(1)*, p. 29- 59
- Ghini, A. and Saidi, Y. (2015), “Financial market contagion during the global financial crisis: evidence from the Moroccan stock market”, *International Journal of Financial Markets and Derivatives, Vol. 4,(1)*, p. 345-3
- Harvey, C. R. (1995), “Predictable risks and returns in emerging markets”, *NBER working paper series*, No. 4621
- Heilmann, K. (2010), “*Stock Market Linkages - A Cointegration Approach*”, Maters Dissertation Submitted to the School of Economics, University of Nottingham
- Henry, P. B. (2000), “Do Stock Market Liberalizations Cause Investment Booms?”, *Journal of Financial Economics* (Volume not indicated), accessed on 23/2/17
- Henry, O. and Olabanji, E. O. (2013), “Stock Market Performance and Sustainable Economic Growth in Nigeria: A Bounds Testing Co-Integration Approach”, *Journal of Sustainable Development; Vol. 6(8)*, p. 84-92
- Irving, J. (2005), “Regional Integration of Stock Exchanges in Eastern and Southern Africa: Progress and Prospects”, *IMF working paper*, WP/05/122
- Johansen, S., and Juselius, K., (1990), “Maximum likelihood estimation and inference on

- cointegration with applications to the demand for money”, *Oxford Bulletin of Economics and Statistics* Vol. 52, p.169-210
- Kale, Y. (2016), “Understanding Market Data for savvy investing and wealth creation”, Nigerian stock exchange market data conference, 18<sup>th</sup> October 2016
- Kapingura, F. M., Mishi, S., and Khumalo, S., (2014), “Integration of the African Stock Markets to the Global Markets: Case Study of South Africa”, *Mediterranean Journal of Social Sciences MCSE*, Vol 5 (2), pp.619-628
- Khan, T. A. (2011), “Cointegration of International Stock Markets: An Investigation of Diversification Opportunities”, *Undergraduate Economic Review*: Vol. 8: Iss. 1, Article 7
- Kimani, D., and Mutuku, C. (2013), “Inflation dynamics on the overall stock market performance: The case of Nairobi Securities Exchange in Kenya”, *Economics and Finance Review*, 2(11), p. 1-11.
- Kolapo, F. T. and Adaramola, A. O. (2012), “The Impact of the Nigerian Capital Market on Economic Growth (1990-2010)”, *International Journal of Developing Societies*, Vol. 1(1), p. 11–19
- Marashdeh, H. (2005), “Stock Market Integration in the MENA Region: An Application of the ARDL Bounds Testing Approach”, *University of Wollongong Economics Working Paper Series*, WP 05-27, accessed on 12/11/16
- Mohtadi, H. Agarwal, S. (2001), “Stock Market Development and Economic Growth: Evidence from Developing Countries”, available at [https://www.researchgate.net/publication/228607085\\_Stock\\_Market\\_Development\\_and\\_Economic\\_Growth\\_Evidence\\_from\\_Developing\\_Countries](https://www.researchgate.net/publication/228607085_Stock_Market_Development_and_Economic_Growth_Evidence_from_Developing_Countries), accessed on 19/5/17
- Ningi, S. I. (2013). Analysis of the effects of the banking sector consolidation on the real sector of the Nigerian economy. *IOSR Journal of Business and Management (IOSR-JBM)*, 13(6), 08-13.
- Nuruddeen, A. (2009), “Does stock market development raises economic growth? Evidence from Nigeria”, *The Review of Finance and Banking Vol.1*, Issue 1, p. 15-26
- Nwaolisa, E. F., Kasie, E. G. and Egbunike, C. F. (2013), “The impact of capital market on the growth of the Nigerian economy under democratic rule”, *Arabian Journal of Business and Management Review (OMAN Chapter)* Vol. 3(2), p. 51-61.
- Ogunmuyiwa, M. S. (2010), “Investor’s Sentiment, Stock Market Liquidity and Economic Growth in Nigeria”, *J SocSci*, Vol 23(1), p. 63-67.
- Onyema, O. N. (2015), “The Nigerian Capital Market: An Investment case”, Presentation at *Nigerians in Diaspora Investor Forum* Zurich, Switzerland
- Onyuma, S. O., Mugo, R. K., and Karuiya, J. K., (2012), “Does Cross-border listing (still) improve firm financial performance in Eastern Africa?”, *Journal of Business, Economics & Finance*, Vol.1(1), p. 123- 178
- Osinubi, T. S. (2002), “Does Stock Market Promote Economic Growth in Nigeria?”, *The ICFAI Journal of Applied Finance, IJAF Vol. 10*(3), p 17-35,
- Pesaran, M.H., Shin, Y. and Smith, R.J. (1996), “Testing for the existence of a long-run



- relationship”, Working Paper No. 9622, Department of Applied Economics, University of Cambridge, Cambridge.
- Raj, J. and Dhal, S. (2008), “Integration of India’s stock market with global and major regional markets”, *Bank for International Settlements Paper No. 42*
- Rehman, M. and S. M., Shah (2016), “Factors Influencing Co-movement of Diversified Portfolio between Pakistan and India”, *International Journal of Economics, Management and Accounting 24(2)* p. 189-207.
- Rejeb, A. B. and Boughrara, A. (2015), “Financial integration in emerging market economies: Effects on volatility transmission and contagion”, *Borsa Istanbul Review* Vol.15(3), p.161-179
- Saibu, M. O. and Bowale, K. E. I. (2009), “*Financial Development and Economic Growth: Further Empirical Evidence from Nigeria*”, available at [unilag.edu.ng/opendoc.php?...Financial%20Development%20and%20Economic%20..](http://unilag.edu.ng/opendoc.php?...Financial%20Development%20and%20Economic%20..), accessed on 27/12/16
- Saiti, B., Bacha, O. I. and Masih, M. (2014), “The diversification benefits from Islamic investment during the financial turmoil: The case for the US-based equity investors”, *Borsa Istanbul Review* Vol 14(4) p. 196-211
- Singh, A. (1999), “Should Africa Promote Stock Market Capitalism?”, *MPRA Paper No. 54291*,
- Tabak, B. M. and Lima, E. J. (2002), “Causality and Cointegration in Stock Markets:the Case of Latin America”, *Working Paper Series No 56*, Central Bank of Brazil.
- Trivedi, J. and Birau, R. (2013), “Analysis of international contagion in emerging stock markets in terms of global financial crisis”, *Advances in Accounting, Auditing and Risk Management*, Vol (12).p.12-6
- Wong, W. K., Penm, J., Terrell, R. D., and Lim, K. Y. (2004), “The Relationship Between Stock Markets of Major Developed Countries and Asian Emerging Markets”, *Journal of Applied Mathematics and Decision Sciences*, Vol. 8 (4) p. 201-218.
- Yalama, A. (2009), “Stock market linkages in emerging markets: evidence from Turkey and Brazil”, *Banks and Bank Systems*, Vol. 4, Issue 3, p. 34
- Yartey, C. A., & Adjasi, C. K. (2007). Stock market development in Sub-Saharan Africa: Critical issues and challenges. *IMF Working Papers*, 1-33.