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## Article

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## GENERAL & APPLIED ECONOMICS | RESEARCH ARTICLE

# Economic growth, financial development and trade openness in Nigeria: An application of the ARDL bound testing approach

Adedoyin Isola Lawal<sup>1\*</sup>, Tony I. Nwanji<sup>1</sup>, Abiola Asaleye<sup>2</sup> and Victor Ahmed<sup>2</sup>

**Abstract:** For over a decade now, various efforts have been put in place by various governments of the developing economies to promote economic growth, financial development and expand trade with mixed results. The ability of financial development and/or trade openness to influence economic growth in the developing economies has been a subject of hot debate and remains inconclusive. While a number of scholars are of the view that compelling cointegration exists among each of these constructs, another set of substantial authors have documented that economic growth, trade openness and financial development do evolve independent of each other. Drawing from four financial developments–growth nexus theories, this study used the ARDL bound estimation techniques to examine the existence of cointegration among economic growth, financial development and trade openness in Nigeria. We intend to know what policy instruments need to be manipulated so as to achieve economic growth and financial stability. Our results show that a two-way cointegration exists between economic growth and financial development, on the one hand, as well as between economic growth and trade openness, on the other hand. We therefore recommend that in order to achieve economic growth, policy-makers should pursue strong financial development and increase trade openness.



Adedoyin Isola Lawal

### ABOUT THE AUTHOR

Adedoyin Isola Lawal lectures at the Department of Accounting and Finance, Landmark University, Omu Aran, Nigeria. He holds a bachelor's degree in Economics from the University of Ilorin, Ilorin, and a master's in Banking and Finance from Bayero University, Kano. He is at present on his PhD programme in Banking and Finance at Covenant University, Ota, where he is about to defend his oral thesis. He has published extensively in reputable journals. Lawal reviews for a number of Journals like *African Development Review* (Wiley); *The Quarterly Review of Economics and Finance* (Elsevier); *International Journal of Emerging Markets* (Emerald Insight); *Cogent Social Sciences* (Taylor and Francis); *Palgrave Communication* (Palgrave); *Asian Economic and Financial Review*; *International Journal of Business, Economics and Management*; and *Journal of Empirical Research*. He is on the Editorial Board of the *Binus Business Review* (Binus University, Indonesia) and *Human and Social Science Letters*.

### PUBLIC INTEREST STATEMENT

Nigeria dreams of achieving sustainable economic growth and to be enlisted among the first 20 largest economies in the world by the year 2020. However, to achieve sustainable economic growth, financial stability that accommodates trade openness is very crucial. Literature on the links among these constructs is at best mixed, with very scanty literature on the subject matter from Africa, most especially Nigeria. This study will be of public interest as it provides insight on the connections among these three constructs with focus on Africa's largest economy. Our model will be useful for other economies with similar characteristics as Nigeria.

**Subjects:** Social Sciences; Sustainable Development; Economics and Development; Economics, Finance, Business & Industry

**Keywords:** economic growth; financial development; trade openness; ARDL; Nigeria

**JEL classification:** C10; E01; F43; G00; O54

## 1. Introduction

The debate on the ability of financial development to influence economic growth had remained unresolved among economists. While authors like Goldsmith (1969), King and Levine (1993) and Rajan and Zingales (1998), among others, had documented the existence of a positive relationship between the two, Shan and Morris (2002) on the other hand had proved that no significant relationship exists between the two. In the same manner, the relationship between trade openness and economic growth has been extensively discussed with mixed results. For instance, Yanikkaya (2003) and Jung and Marshall (1985) are of the view that no significant relationship exists between trade openness and economic growth, Lee, Ricci, and Rigobon (2004) opined that a positive relationship exists between the two. As argued by Aghion, Bloom, Blundell, Grith, and Howitt (2005), financial constraints deter poor countries from maximizing the advantages of technology transfer, and in turn induce a diversion from the growth rate of the world frontiers. This position was further advanced by Fung (2009) and Menyah, Nazlioglu, and Wolde-Rufael (2014) who observed that economies with advanced financial development tend to grow faster and expand trade. Thus, financial development is both pro-growth and pro-trade. This notwithstanding, an opposing view exists among researchers stressing that economic growth, trade openness and financial development do evolve independent of others (Lucas, 1988).

In the recent years, in Nigeria, efforts have been made by both monetary and fiscal authorities to put in place measures that tend to promote economic growth. Some of the efforts include trade liberalization policy of 1990s, creation of export processing zones to boost exports, privatization of publicly owned enterprises so as to achieve efficiency in operation, aggressive campaign towards attracting foreign direct investment (FDI) as enshrined in various development plans, most especially the National Economic Empowerment Development Strategy (NEEDS), the Vision 20:20, the 7 points Agenda and the Transformation Agenda, among others. Financial development measures like financial liberalization, capital market restructuring, bank recapitalization and consolidation exercise of the year 2004/2005 were aimed at increasing access to fund by the private sector so as to boost economic growth and development. The questions are: Are these policies able to increase economic growth in Nigeria? What policy needs to be manipulated so as to achieve macroeconomic growth? What is the relationship between trade openness and economic growth? Does cointegration exist among economic growth, financial development and trade openness in Nigeria? Answering these questions is important to virtually all the various economic agents, most especially the policy-makers. Policy-makers will find these answers useful as they will help in knowing what policy needs to be adopted (or adjusted) so as to achieve both macroeconomic and financial stability objectives in the economy.

The motivation for this work lies in knowing whether or not there is a long-run relationship among economic growth, financial development and trade openness, given the limited, conflicting and inconclusive results of the previous studies. This has severed policy implication for the Nigerian economy, given her commitment to achieving economic growth with the specific target of being among the first 20 world's largest economies by the year 2020. This paper contributes to literature in a number of ways: first, it presents the theoretical analysis that inquired into the relationship between economic growth, financial development and trade openness. Second, the autoregressive distributed lag (ARDL) model (most appropriate for small size data) is applied empirically to examine the relationship between these variables so as to aid policy decision-making. Thirdly, the study expands the front of knowledge using data sourced on the Nigerian economy (to the best of our knowledge, this study is one of the first studies that examined the relationship among the three constructs using Nigeria data). The choice of Nigeria is influenced by our earlier assertion that the country envisioned to be among the first 20 world's largest economies by the year 2020.

The rest of the paper is structured as follows: Section 2 centres on the theoretical and empirical review of literature, Section 3 presents the methodology and Section 4 deals with the result from analysing the data for the study while Section 5 presents the conclusion and recommendations.

## 2. Literature review

While there exist a number of literatures on the relationship between economic growth and financial development, on the one hand, and the relationship between economic growth and trade openness, on the other hand, the relationship among the two strands of literature has not been closely studied, especially using data sourced from emerging economies like Nigeria. This study attempts to use autoregressive distributed lag (ARDL) model to examine the relationship between these three constructs so as to aid policy formulation. The choice to test the validity of the assumption of the existence of a long-run association of economic growth with financial development and trade openness in a single study is influenced by the works of Bojanic (2012) and Menyah et al. (2014). As noted by Menyah et al. (2014), calibrating trade openness into the model of finance–growth nexus helps not only to underline the potential importance of trade openness but also to test the hypothesis that trade openness promotes financial development or vice versa.

### 2.1. Theoretical frameworks and empirical review

#### 2.1.1. Finance–growth nexus

The theoretical framework on the relationship between economic growth and financial development can best be classified into four categories: supply-leading theory; demand-following theory; finance–growth indifference theory; and the reciprocal theory.

The supply-leading theory explained that finance is a major determinant of growth, as finance provides avenue through which resources are mobilized and channelled from surplus spending unit (SSU) (traditionally low-growth sector like agriculture; land rents, among others) to deficit spending units (DSU) (modern high-growth sector where entrepreneurial activities are pursued). This school of thought believes that better financial system increases the chances of successful innovation which provokes increase in economic growth (Ahmed & Wahid, 2010; Bojanic, 2012; Ductor & Grechyna, 2015; Khoutem, Boujelbene, & Helali, 2014; King & Levine, 1993).

Recently, the endogenous growth theory was incorporated into the finance-leading framework based on the fact that financial intermediaries' roles of information collection and analysis, risk sharing, fund mobilization and liquidity provision essentially promotes economic growth within a given economy (Greenwood & Jovanovic, 1990; Pagano, 1993; Romer, 1986).

The demand-following theory of finance–economic growth nexus is of the view that finance plays a dependent role lagging behind growth. The theory states that the creation of modern financial institutions and products is principally a response to the demand for these institutions and products by savers and investors in the real sector, thus the financial sector follows the real sectors by adapting to the demands of the real sector rather than dictating the pace for the real sector to follow (Bolton, Santos, & Scheinkman, 2011; Gennaioli, Shleifer, & Vishny, 2012; Gurley & Shaw, 1967; Patrick, 1966; Stiglitz, 1994).

The finance–economic growth indifferent hypothesis centres on the view that no causal relationship exists between financial development and economic growth. The theory states that while modern economic growth is induced by the real sector growth, financial development is a product of historical antecedent of financial institutions, thus no causality from either finance to growth or from growth to finance exists between the two streams (Abu-Bader & Abu-Qarn, 2008; Boulila & Trabelsi, 2004; Khoutem et al., 2014; Shan & Morris, 2002).

The reciprocal theory of finance–economic growth nexus establishes the existence of cointegration between finance and economic growth. The theory explains that a cause and effect relationship

exists between financial development and economic growth. Under this hypothesis, economic growth facilitates the development of financial undertaking and its profitability, while a sound and efficient financial system accelerates economic growth. This school of thought believes that a bi-directional relationship exists between financial development and economic growth (Cecchetti & Kharroubi, 2012; Fung, 2009; Odhiambo, 2010; Owen & Temesvary, 2014; Wolde-Rufael, 2009).

### *2.1.2. Trade openness and economic growth nexus*

The theoretical background on trade openness–economic growth nexus has its roots in the neo-classical theory of growth. The theory established a strong causality from trade openness to economic growth based on the fact that trade openness influences the decision of various economies to integrate their home economies with the rest of the world, which will in turn boost both export and import thereby increasing specialization and productivity (Shahbaz, 2009, 2012; Shahbaz & Rahman, 2012). Anoruo and Yusuf (2000) documented a bi-directional causality between economic growth and trade openness while Jung and Marshall (1985) observed a unidirectional relationship between economic growth and trade.

The debate on the relationship between trade openness and economic growth centres around issues ranging from the disagreement on composition of trade openness index; use of cross-sectional analysis; and the direction of causality between the two constructs (Bojanic, 2012). For instance, Rodrik (1997) observed that most studies on the relationship between the two hardly appropriately capture trade regimes and trade policy choice, among other. Similarly, Yanikkaya (2003) and Dowrick and Golley (2004) focused on the direction of causality between trade and economic growth. In the study, the authors observed that no relationship exists between trade and economic growth while Frankel and Romer (1999), Lucas (2007) and Harrison (1996), among others, documented the existence of a functional relationship between trade and growth.

Literature on specific country analysis shows mixed results. For instance, Uddin, Sjö, and Shahbaz (2013) used Cobb–Douglas production, simulation-based ARDL bound testing and Gregory and Hansen's structural break cointegration approaches to analysis data sourced from 1970 to 2011 on Kenya's economy and observed that in the long run, a positive relationship existed between financial development and economic growth. Their finding contradicts earlier work by Odhiambo (2009) who used Granger causality test and observed that money supply (M2) as a percentage of GDP exhibits a negative effect on economic growth for the same economy. For South Africa, Odhiambo (2010) established a bi-directional causality between financial development proxy by the ratio of money supply to GDP and economic growth. In a related development on South Africa, Umar (2010) observed that financial development proxy by stock market turnover as a percentage of the GDP does promote economic growth in the short run, though the link becomes very weak in the long run with causality running from economic growth to financial development.

Bojanic (2012) examined the relationship between economic growth, financial development and trade openness for the Bolivian economy using bivariate cointegrated systems, standard Granger regression and Error Correction Models to analyse data sourced from 1940 to 2010. He observed that a long-run equilibrium relationship existed between the trio. Furthermore, it was observed that unidirectional Granger causality runs from financial development and trade openness indicators to economic growth indicators.

For Tunisia, Khoutem et al. (2014) used ARDL model to examine the financial development–economic growth nexus based on annual data sourced from 1973 to 2008, and observed that financial development is the prime mover of economic growth and development. Furthermore, the study established the existence of a bi-directional relationship between economic growth and financial development, especially when focus is on the bank-based financial system.



Inessa and Ariss (2014) examined the nexus between macroeconomic and financial sectors on the Egyptian economy for the period 1993–2010 and documented the existence of a positive shock to capital inflows and that growth in GDP improves financial market development.

For UAE, Al-Malkawi, Marashdeh, and Abdullah (2012) examined the relationship between financial development and economic growth from the period 1974–2008 and observed that a negative and statistically significant relationship existed between financial development measured by M2/GDP and economic growth. The authors also noted that a bi-directional relationship existed between the two. They submitted that neither the demand-following hypothesis nor supply-leading hypothesis holds for the UAE economy.

However, the result from the Middle East and North African (MENA) countries differs, for instance: Abu-Bader and Abu-Qarn (2008) and Boulila and Trabelsi (2004), among others, show that there is no clear evidence to support the view that financial development impacts economic growth or vice versa.

Agbloyor, Abor, Adjasi, and Yawson (2014) investigated the relationship between financial development and economic growth in some selected African economies using panel instrumental variables and generalized method of moments (GMM) estimation techniques to analyse data from 1990 to 2007 and observed that foreign direct investment (FDI), foreign equity portfolio investment (FEPI) and private debt flows (PDI) impact economic growth negatively while private capital flow (PCF) significantly affects economic growth positively. They submitted that in the long run, financial development significantly impacted growth.

Samargandi, Fidrmuc, and Ghosh (2015) used pooled mean group estimation techniques in a dynamic heterogeneous panel setting to re-examine the connections between economic growth and financial development for a panel of 52 middle-income economies for a period covering 1980–2008, and observed that the relationship between the two is U-shaped in the long run and insignificant in the short run. The implication is that excessive financial development beyond the optimum economic growth will have an adverse effect on growth. The authors recommend that once optimum point is reached, the growth rate of the financial sector should be kept at constant.

When trade openness is calibrated into the model of financial development–economic growth nexus, Demetriades and Law (2006) used a cross-country and dynamic panel data estimation technique to establish a positive relationship between financial development, trade openness and economic growth. Their view was supported by earlier work like Rajan and Zingales (2003), Beck (2002) and Svaleryd and Vlachos (2002) who observed that economies characterized with well-developed financial system have a better export share and favourable Balance of Trade which induce economic growth and development. However, the existence of any meaningful relationship between the two has been challenged by Wolde-Rufael (2009) for Kenya, and Gries, Kraft, and Meierrieks (2009) for 16 Sub-Saharan African economies who noted that no prominent relationship exists among them. Furthermore, Menyah et al. (2014) examined the relationship between the two using annual data (sourced from 1965 to 2008) for 21 African economies when panel bootstrapped estimation techniques to Granger causality are applied, and observed that limited evidence existed to support the finance-led growth and trade-led growth hypotheses (see also Dowrick & Golley, 2004; Yanikkaya, 2003).

From the above, it is evident that debate on the relationship between financial development and trade openness and economic growth is inconclusive as results vary from countries to countries and methodologies and theoretical framework used, among other things. This notwithstanding, the relationship among these constructs is of utmost importance for policy formulation and implementation as empirical evidence based on this relationship can help the government (policy-makers) in determining the direction for her reform agenda, that is whether or not in the financial sector, trade sector or both when achieving economic growth is in view.

Empirical literature on the relationship between economic growth and financial development in Nigeria is very scanty and restricted (in term of measures of variables and methodology). For instance, Ndebbio (2004), Nnanna (2004) and Nzotta and Okereke (2009) used OLS regression to examine the nature of the relationship between financial development and economic growth, and observed that no significant relationship existed between financial development and economic growth. These studies suffer from serious methodological problem, as it is evidence that OLS estimation techniques do produce biased and incorrect estimates of the parameter coefficients and cannot capture the long-run dynamic relationship between financial development and economic growth. Furthermore, results of the empirical studies on this relationship from Nigeria like in other economies are mixed and inconclusive. For instance, contrary to the above-mentioned authors, Agu and Chukwu (2008) documented the existence of a bi-directional relationship between financial development and economic growth. The drawback from Ndebbio (2004), Nnanna (2004) and Nzotta and Okereke (2009), and the inconclusive nature of the relationship between economic growth and financial development have motivated the current study to overcome the limitations in the existing studies by employing a more appropriate estimation technique—the ARDL approach—to cointegration techniques. The study also calibrated trade openness into our model, given the fact that the trade sector plays a significant role in the nation's economy.

### 3. Data and methodology

This study used annual time series data from 1981 to 2013 sourced from Central Bank of Nigeria Statistical Bulletin (2014). The real gross domestic product (RGDP) was used as proxy for economic growth, while net credit to the private sector (NDC) as a percentage of the GDP, money supply (M2) as a percentage of GDP and stock market turnover ratio (STR) as a percentage of GDP were used as proxies of financial development. Total trade, i.e. sum of export and import (TRD) as a percentage of GDP, was used as the proxy for trade openness. Data on all the variables were transformed into natural logarithms to achieve stationarity in variance. Equation (1) represents the economic growth–financial development–trade openness nexus.

$$\ln \text{RGDP} = \beta_0 + \beta_1 \ln \text{NDC} + \beta_2 \ln \text{M2} + \beta_3 \ln \text{STR} + \beta_4 \ln \text{TRD} + \varepsilon_{t1} \quad (1)$$

where RGDP is the real gross domestic product (a proxy for economic growth),  $\beta_0$  is the constant term,  $\beta_1, \dots, \beta_4$  are the coefficients of the model and  $\varepsilon_{t1}$  represents the error term. The choice of the variables used was influenced by the works of Umar (2010) (for STR as proxy of financial development); Al-Malkawi et al. (2012) (for M2/GDP and NDC as proxies of financial development); Odhiambo (2010), Anoruo and Yusuf (2000), Demetriades and Law (2006) (for RGDP as a proxy for economic growth) and Bojanic (2012) (for TRD as a proxy of trade openness). We presume that a positive relationship exists between M2 and RGDP (Odhiambo, 2010). We also expect that a positive relationship exists between RGDP and each of TRD, STR and NDC (see Anoruo & Yusuf, 2000; Demetriades & Law, 2006).

#### 3.1. The ARDL estimation technique

In choosing an appropriate time series model, it is important to examine the results of stationarity and cointegration tests. This study employed the recently developed autoregressive distributed lag (ARDL) bounds testing approach to cointegration developed by Pesaran and Shin (1995). The technique has several advantages over other estimation techniques like Engle and Granger (1987) and Johansen (1991). First, it can be applied regardless of the order of the integration of the regressors (either I(1) and/or I(0)); it is a more statistically significant approach for examining correlation when faced with small data size as other techniques require large data size for validity to hold. It also allows for the variables to have different optimal lags, which is not applicable to other techniques. Lastly, the technique employs a single reduced form equation for determining both long- and short-run relationship among variables (Babajide & Lawal, 2016; Babajide et al., 2015; Bahmani-Oskooee & Ng, 2002; Kyophilavong et al., 2013; Odhiambo, 2010; Pesaran & Shin, 1999).

Having stated the advantages of the ARDL model, this study employs a bound test to test for cointegration among the variables under study. In order to examine the cointegration among the variables stated in Equation (1), we formulate the ARDL framework as follows:

$$\begin{aligned} \Delta \ln \text{RGDP}_t = & \beta_{01} + \sum_{i=1}^{n1} \beta_{11} \Delta \ln \text{RGDP}_{t-i} + \sum_{i=0}^{n2} \beta_{12} \Delta \ln \text{NDC}_{t-i} + \sum_{i=0}^{n3} \beta_{13} \Delta \ln \text{M2}_{t-i} + \sum_{i=0}^{n4} \beta_{14} \Delta \ln \text{STR}_{t-i} \\ & + \sum_{i=0}^{n5} \beta_{15} \Delta \ln \text{TRD}_{t-i} + \phi_{11} \ln \text{RGDP}_{t-1} + \phi_{12} \ln \text{NDC}_{t-1} \\ & + \phi_{13} \ln \text{M2}_{t-1} + \phi_{14} \ln \text{STR}_{t-1} + \phi_{15} \ln \text{TRD}_{t-1} + \varepsilon_{t1} \end{aligned} \quad (2)$$

where  $\ln$  is the log of the variables, RGDP, TRD, STR, NDC and M2 are as earlier defined.  $\Delta$  represents the first difference operator;  $\beta_{01}$  is the constant term; and  $\beta_{11}, \dots, \beta_{15}$  represent the short-run coefficients,  $\phi_{11}, \dots, \phi_{15}$  are the long-run coefficients,  $n_1, \dots, n_5$  are the lag length and  $\varepsilon_{t-1}$  represents the white noise error term. In order to find out whether there exists a cointegrating relationship among RGDP, TRD, STR, NDC and M2 in the long run, we test the null that  $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$  and the alternate hypothesis  $H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$ , by calculating  $F$ -test developed by Pesaran, Shin, and Smith (2001) and modified by Narayan (2005). The calculated  $F$ -statistics value is compared with upper and lower critical values which are given by Pesaran et al. (2001). If the calculated  $F$ -value is higher than the upper critical value, then the null hypothesis of no cointegration will be rejected whether or not the variables are  $I(0)$  or  $I(1)$ . As recommended by Pesaran et al. (2001), once we are able to establish the existence of cointegration among the variables, we proceeded to estimate the Error Correction Model.

The error correction model (ECM) representation of the ARDL approach is as follows:

$$\begin{aligned} \Delta \ln \text{RGDP}_t = & \beta_{01} + \sum_{i=1}^{n1} \beta_{11} \Delta \ln \text{RGDP}_{t-i} + \sum_{i=0}^{n2} \beta_{12} \Delta \ln \text{NDC}_{t-i} + \sum_{i=0}^{n3} \beta_{13} \Delta \ln \text{M2}_{t-i} + \sum_{i=0}^{n4} \beta_{14} \Delta \ln \text{STR}_{t-i} \\ & + \sum_{i=0}^{n5} \beta_{15} \Delta \ln \text{TRD}_{t-i} + \alpha \text{ECM}_{t-1} \end{aligned} \quad (3)$$

The essence of the error correction model is to show the speed of adjustment back to long-run equilibrium after a short-run shock. In order to ensure the goodness of fit of the model, we conduct a number of diagnostic tests. Specifically, these tests examined the serial correlation, functional form, normality and heteroscedasticity associated with the selected model. As noted by Pesaran et al. (2001) stability tests (CUSUMQ and CUSUM) are useful in checking the stability of the coefficients of the regression. The tests are updated recursively and plotted against the break points. If the plot lies within the critical bounds of 5% level of significance, then the null hypothesis of all coefficients in the given regression is stable and cannot be rejected.

#### 4. Results and discussion

Statistical characteristics of all variables are shown in Table 1. The Jarque-Bera (JB) test statistic was employed to ascertain whether economic growth, financial development and trade openness follow the normal probability distribution. The JB test of normality is an asymptotic or sizeable sample test, which calculates the skewness and kurtosis measures and uses the following test statistics:

$$JB = N(S^2/6 + (K - 3)/24)$$

where  $N$  = sample size,  $S$  = skewness coefficient and  $K$  = Kurtosis coefficient. For a distributed variable with normality,  $S = 0$  and  $K = 3$ . Hence, the JB test of normality is a test used for the joint hypothesis that  $S$  and  $K$  are 0 and 3, respectively.



**Table 1. Descriptive statistics and test for variables normality**

	RGDP	NDC	STR	TRD	M2
Mean	139.8787	1.238583	10.95455	11.88182	3.323117
Median	133.6508	6.671433	12.000000	11.700	3.580605
Maximum	158.2074	21.76893	16.500000	28.802	37.66733
Minimum	117.7256	-96.39948	6.000000	4.105	-99.89880
STD.DEV	13.80807	20.62040	3.173873	4.564793	17.93176
Skewness	0.007096	-2.597353	-0.084587	0.846133	-4.258121
Kurtosis	1.492403	12.48918	1.904266	3.649962	26.52031
Jarque-bera	4.167259	214.5540	2.253628	6.024590	1147.147
Probability	0.00078	0.000000	0.00064	0.00017	0.0050
Observations	384	384	384	384	384

Source: Author's computation (2016) using e-Views 7.

Ultimately, we can see that all the variables are not normally distributed apart from trade openness whose skewness coefficient is close to zero (0.846133) and kurtosis coefficient is 3.649962.

#### 4.1. Unit root test

Table 2 shows the result of the ADF test of stationary for all the variables both in the levels and first difference. From the result, it can be deduced that we cannot reject the null hypothesis of unit root for all the variables in the level form except for STR that is stationary at level I(0). However, when the test is applied to the variables at the first differences, the null hypothesis is rejected. This implies that the variables are stationary for the order one I(1). Given that all the variables are stationary at least at I(1), we proceed to test whether the variables are cointegrated or not.

In addition to the ADF unit root test, this study performed the Lee and Strazicich (2003) (L&S hereafter) unit root tests that provide for endogenously determined structural breaks under both the null and alternative hypotheses. Literature has shown that failure to consider the presence of structural breaks in data generating process could lead to both misleading hypothesis testing results and substantial reduction in the statistical power of traditional unit root tests. For the L&S test, a rejection of the null hypothesis implies existence of a strong evidence of stationarity in the data generating process.

Table 3 presents the results of the L&S tests; from the results, it can be deduced that structural breaks occurred in the monthly time series data on RGDP, STR, NDC and TRD. The results also show that the series are stationary at first difference with time breaks occurring as follows: RGDP 2002:02 and 2005:08; TRD 2005:01 and 2010:07; STR 2002:04 and 2005:12; and NDC 2000:11 and 2005:09. Each of these dates is significant for Nigeria, for instance: the Nigerian capital market fully adopted the central security clearing system (CSCS) accounting framework in the year 2002, the banking sector recapitalization exercise which attracts large volumes of money into the capital market was

**Table 2. ADF test results**

Variables	ADF level	ADF – First differ	Order of integration
lnRGDP	-1.0878	-7.5324	I(1)
NDC	-2.6632	-4.3112	I(1)
M2	-2.6307	-4.2738	I(1)
TRD	-2.0394	-4.3090	I(1)
STR	-3.3705	-5.4924	I(0)

Notes: Statistical sign at 1% level; Statistical sign at 5% level.

Source: Author's computation (2015) using e-View Package, version 7.2.

**Table 3. Lee and Strazich's minimum LM unit root tests with a single break**

Series	Constant	$S_{t-1}$	K	$D_t$	$D_{\tau}$	Break date
RGDP	-0.096 (20.850)*	-0.121 (-3.151)	4	-0.23 (-2.430)	-0.020 (-2.450)	2002:02
lnRGDP	0.026 (3.741)**	-0.634 (-3.814)***	4	0.016 (1.318)	-0.027 (-3.866)**	2005:08
TRD	0.053 (6.801)*	0.185 (-2.891)	4	0.030 (1.175)	0.008 (0.422)	2005:01
lnTRD	0.030 (4.021)*	-1.001 (-4.644)*	2	0.042 (2.624)**	-0.042 (-4.335)*	2010:07
STR	0.083 (4.122)*	-0.113 (-2.163)	2	-0.012 (-0.561)	-0.038 (-1.741)**	2002:04
lnSTR	-0.025 (-2.788)**	-0.835 (-4.506)*	1	-0.109 (-2.526)**	0.122 (4.554)*	2005:12
NDC	0.005 (3.364)**	-3.204 (-3.146)	4	0.033 (3.452)**	-0.012 (-3.106)**	2000:11
lnNDC	0.001 (0.4118)	-1.242 (-5.422)*	1	0.012 (1.441)	-0.012 (-2.027)*	2005:09
M2	-0.087 (19.866)*	-0.133 (3.052)	4	-0.11 (-2.21)	-0.012 (-2.211)	2001:05
lnM2	0.014 (3.551)**	-0.452 (-2.811)***	4	0.008 (1.211)	-0.029 (-3.744)**	2008:10

Notes:  $K$  represents the lag length,  $S_{t-1}$  is the coefficient of the unit root parameter and  $t$ -values are parentheses. Critical values are gotten from Lee and Strazich (2003). The critical values applied to the dummy variables follow the standard normal distribution.

Source: Author's computation (2016).

\*Significance level at 1%.

\*\*Significance level at 5%.

\*\*\*Significance level at 10%.

introduced in the year 2004 and ran till late 2005. The RGDP witnessed tremendous growth from annual average of 3% in the 1980s and 1990s to about 6% in the year 2001. This new position was sustained till late 2007. The trade sector also witnessed tremendous growth in the year 2005 with about US\$26 billion surplus, amounting to about 20% of the GDP. This upward movement was also sustained till the late 2013 (Central Bank of Nigeria, 2014). The intentional effort of the Federal government to revamp the Nigerian Investment Promotion Commission in the early 2000 was to drive the privatization objective of the government; the introduction and adoption of the National Economic Empowerment Development Strategy (NEEDS) in the 2005, as well as the various trade and regulatory reforms are some of the efforts that boost NDC in Nigeria.

Our results, as shown in the unit root parameter,  $S_{t-1}$ , reveal that we cannot reject the null hypothesis of the presence of a unit root with a structural break present in both level and trend even at 10% level of significance. The implication is that L&S unit root test confirms that the variables in our model are non-stationary in levels. The study rejects the null hypothesis for first-differenced series of TRD, STR and NDC at 1% and rejects the null hypothesis of RGDP and M2 at 10%.

#### 4.2. Result of the long-run relationship

Table 4 shows the results of the estimate of long-term relationship among the variables. Given the established linkage among the constructs as shown in the literature review sections, there is the probability of endogeneity among economic growth, financial development and trade openness; we therefore followed Ang's (2010) recommendations that Equation (2) should be re-estimated by keeping each of the variables in the model as dependent variable to address the problem of endogeneity. From Table 4, it can be deduced that a compelling long-run relationship exists among the variables when regression is normalized in the lnRGDP, NDC, TRD and STR models. This implies that the variables are cointegrated in these models. However, when the variables are normalized in the M2 model, the result shows that no-cointegration exists among the variables.

Having established the existence of cointegration, we proceed by estimating the long-run and short-run ARDL models for the study based on Schwartz Bayesian Criteria (SBC). The results of both the long-run and short-run relationships are presented in Table 5.

**Table 4. F-statistics for testing the existence of a long-run relationship among the variables**

Model	F-statistic	Decision
$F_{InRGDP} (InRGDP/NDC, M2, TRD, STR)$	5.3215*	Cointegration exist
$F_{M2} (M2/InRGDP, NDC, TRD, STR)$	2.1101	No-cointegration exist
$F_{NDC} (NDC/InRGDP, M2, TRD, STR)$	6.4221*	Cointegration exist
$F_{TRD} (TRD/InRGDP, NDC, M2, STR)$	7.4003*	Cointegration exist
$F_{STR} (STR/InRGDP, NDC, M2, TRD)$	5.1214**	Cointegration exist

Notes: The relevant critical value bounds presented in this table are obtained from Pesaran and Shin (1999) Pesaran et al. (2001). The critical values for all the regressions with intercept and trends are 2.762–3.428 at 10% significance level and 3.084–4.219 at 5% significance level.

Source: Author's computation (2016).

\*Significance level at 5%.

\*\*Significance level at 10%.

The ARDL results of both the long-run and short-run relationships between the variables based on Schwarz Bayesian criterion (SBC) are presented in Table 5. From the results, it can be deduced that when RGDP is the dependent variable, no significant relationship exists between money supply (M2) as a percentage of the GDP and RGDP both in the long and short run. This implies that M2 has no impact on economy growth. This is in line with the findings of Abu-Bader and Abu-Qarn (2008) who documented that no clear evidence exists to support the existence of any linkage between financial development proxy by M2 and economic growth for MENA economies. However, the findings contradict the results of Uddin et al. (2013) who noted that a significant relationship existed between money supply as a percentage of RGDP and economic growth for Kenya. In terms of existence of a significant relationship, the results from our analysis contradict the findings of Odhiambo (2009) for South Africa and Al-Malkawi et al. (2012) for UAE who documented that a negative relationship exists between M2 as a percentage of RGDP and the RGDP. The results also show that a positive and significant relationship exists both in the long run and short run between RGDP and Net Credit to the private sector (NDC). The relationship between RGDP and TRD is negative and significant in the long run but positive and

**Table 5. Estimated long-run and short-run coefficients using the ARDL based on Schwarz Bayesian criterion**

Regressors	Dependent variables (Coefficients and T-ratio)									
	RGDP		M2		NDC		TRD		STR	
	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR
RGDP			0.8808 (3.0085)	0.4747 (0.7919)	0.1923 (3.0198)**	0.0767 (0.5284)**	0.5779 (2.4338)*	0.0779 (2.8165)*	0.1188 (0.6521)**	0.6687 (2.3191)**
M2	0.3156 (1.2023)	0.0070 (0.2075)			0.4244 (3.1298)**	0.0589 (2.2204)*	−0.6469 (−1.3073)	−0.3735 (−4.0315)	0.6469 (1.3098)*	0.4747 (4.3015)*
NDC	0.44659 (3.1576)**	0.15570 (0.9579)**	−1.0361 (−0.824)	0.1440 (0.8390)*			0.8698 (2.1345)**	0.9985 (6.2354)**	−0.7309 (−1.465)**	−0.4125 (−4.4551)*
TRD	−0.22074 (−1.68)***	0.6206 (6.5815)**	−0.7832 (−1.15)*	−1.0875 (−0.717)*	0.1016 (1.214)*	0.7309 (1.248)*			0.9854 (3.1196)*	0.2987 (2.9856)*
STR	0.3957 (2.2885)*	0.0825 (0.0409)	1.4782 (1.8959)*	0.4315 (1.720)*	0.3735 (4.0315)***	0.0160 (0.1611)**	0.1188 (0.1111)**	0.0160 (0.1611)**		
Trend	0.0049 (0.8739)	0.0105 (2.142)	0.0798 (1.1516)	−0.0102 (−1.877)	0.0232 (2.9174)	0.0032 (4.4219)	0.0049 (0.8739)	0.0006 (0.8862)	0.09856 (4.1566)	0.0343 (3.6541)
ECM (−1)		−0.5367 (−3.09)***		0.1348 (2.9623)		−0.1389 (−3.271)**		−0.2563 (−4.532)**		−0.3047 (−4.192)**

Note: t-Statistics are presented in angle brackets.

Source: Author's computation (2016) using Microfit 4.0.

\*Significance level at 10%.

\*\*Significance level at 5%.

\*\*\*Significance level at 1%.

significant in the short run. This is a departure from the reviewed literature as it contradicts the findings of Rajan and Zingales (2003) who argued that a positive relationship exists between economic growth and trade openness. The existence of a significant negative relationship in the long run between RGDP and TRD, though a significant positive relationship exists between the two in the short run, calls for caution in handling trade policy. It is important to state that given this scenario, policy-makers should pay keen attention to the trade sector so as to manipulate its behaviour such that the consequences of long-run negative effect should be carefully treated. In the long run, the relationship between RGDP and STR is positive and significant, though the relationship is not significant in the short run.

Similarly, when NDC is the dependent variable, it can be deduced that both in the long and short run, a significant and positive relationship exists between the dependent variable and each of the RGDP, M2, TRD and STR. When TRD is the dependent variable, our result shows that a positive and significant relationship exists between TRD and each of the RGDP, NDC and STR both in the long run and in the short run. Again, the result when TRD is the dependent variable points to the need to monitor the behaviour of trade sector in the nation's economic life. With significant positive impact both in the long and short run, one will see that a careful manipulation of trade policy by maintaining discriminative trade policy that focuses on promoting sound and favourable balance of trade, importation of plants and machineries to boost local production so as to enhance exportation of finished or semi-finished products rather than mere primary produce/goods will promote economic growth. Our result also shows that a significant and positive relationship exists between M2 and STR. The implication is that an increase in money supply can lead to an upward trend in investment in the stock market. Finally, when STR is the dependent variable, our result shows that the relationship between STR and each of the RGDP, M2 and TRD is positive and significant while the relationship between STR and NDC is negative, though significant both in the long and short run. This implies that the Nigerian Capital Market has the capacity to attract necessary fund required to fund the economy.

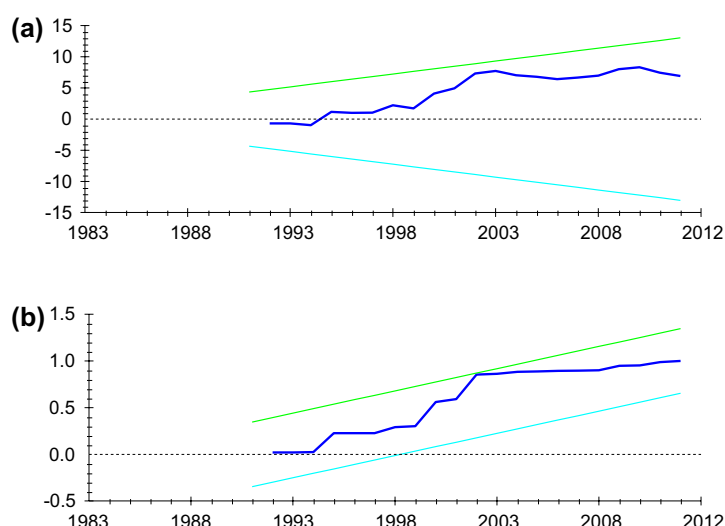
On the degree of elasticity among the variables, it can be deduced that the long-run impact of NDC on the RGDP is around 0.45 and is statistically significant at 5% level; this implies that a 1% increase in NDC will lead to about 45% increase in the RGDP in the long run while the impact in the short run is about 16%. The result also shows that STR will impact RGDP such that 1% increase in STR will lead to about 40% increase in the RGDP in the long run. Similarly, the elasticity result on the relationship between TRD and RGDP shows that in the short run, a 1% increase in TRD will result in about a 62% increase in RGDP.

When each of NDC, TRD and STR is the dependent variable, our result shows that a 1% increase in RGDP will lead to about 19, 58 and 11% increase in each of NDC, TRD and STR, respectively, in the long run while the corresponding short run estimates are 7, 8 and 67%, respectively.

The error correction terms ( $ECT_{t-1}$ ) show the speed of adjustment back to equilibrium in the estimated model. A significant relationship with a negative sign for the (ECT) implies the existence of a long-term equilibrium relationship among the variables of the model (Narayan & Smyth, 2005). The speed of adjustment in correcting disequilibrium to equilibrium from the previous year to the current year is shown by the magnitude of the coefficients of ECT (Pesaran et al., 2001). From our result, it can be deduced that when the RGDP is the dependent variable, the coefficient is negative and significant at 5% level of significance. It also connotes a high speed of adjustment back to equilibrium of 56.73%. Our result further shows that the ECM for the NDC, TRD and STR is statistically significant at 90% confidence level with negative signs. This establishes the existence of a stable long-run relationship and indicates the existence of a long-run cointegration among the variables. The coefficients of the ECM estimates for each of the variables are  $-0.1389$ ,  $-0.2563$  and  $-0.3047$  for the NDC, TRD and STR, respectively. This implies that the speed of adjustment following a short-run shock is about 13.89, 25.63 and 30.47%, respectively.

**Figure 1. (a) Plot of cumulative sum of recursive residuals and (b) Plot of cumulative sum of squares of recursive residuals.**

Note: The straight lines represent critical bounds at 5% significance level.



In the case of M2, though some of the coefficients are significant, the coefficients of the error correction term are positive and the calculated  $F$ -statistics also showed an inconclusive result. Combining the results (M2 result) indicates that there is no cointegration when M2 is the dependent variable.

In order to check the estimated ARDL model's stability of the coefficients of the long run with that of the short run between economic growths and its causes, the study employed the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares (CUSUMQ). If the plots lie within the 5% range of significance level, the null hypothesis states that the coefficients in the error correction models (ECM) are stable and cannot be rejected; if otherwise, we reject the null hypothesis of the constancy of the coefficients (Bahmani-Oskooee & Ng, 2002). From Figure 1(a) and (b), it can be deduced that both the plots of CUSUM and CUSUMQ statistics stay within the critical boundaries; thus, we conclude that we cannot reject the null hypothesis.

## 5. Conclusion and recommendation

This study examined the relationship between economic growth, financial development and trade openness in Nigeria. We employed ARDL model to examine the existence or otherwise of cointegration among the variables. In our analysis, the real gross domestic product (RGDP) was used as the proxy for economic growth, net credit to the private sector (NDC) as a percentage of GDP, stock market turnover ratio (STR) as a percentage of GDP and money supply (M2) as percentage of GDP to represent the variables for the measurement of financial development while trade openness is proxy by total foreign trade (TRD) as a percentage of the GDP.

Our result shows the existence of strong evidence against the null hypothesis of unit roots in most of the series under investigation. The ARDL results indicate the existence of a long-term equilibrium relationship between economic growth and financial development, and between economic growth and trade openness. Furthermore, the result of the  $Ect_{t-1}$  coefficient ( $-0.53657$ ) has the expected sign and is highly significant at 1% significant level. This implies that the speed of adjustment back from the short-term disequilibrium to the long-term equilibrium is about 53.66%. Furthermore, the CUSUM and CUSUMQ stability tests' result shows that the coefficients of the Error Correction Model are stable as the plots of both curves lie within the 5% bounds.

The results of the estimate coefficients of both the long-run and the short-run relationships show that net domestic credit as a percentage of RGDP, stock market turnover ratio and trade openness are significant in achieving economic growth, though no significant relationship exists between money supply (M2) and economic growth proxy by RGDP both in the long and short run. Furthermore,

our results also show that causality flows to and from economic growth (proxy by RGDP) to both financial development and trade openness indicators in both the long and short run except when money supply was used as the proxy for financial development. Based on these results, we conclude that a reciprocal or bi-directional relationship holds for Nigeria among the three constructs; this implies that existing policies aimed at boosting the financial sector as well as the trade sector have indeed aided economic growth. Our results are consistent with the earlier findings by Agbloyor et al. (2014), Inessa and Ariss (2014) and Agu and Chukwu (2008). Overall, the empirical evidence from this study shows that the reciprocal theory of finance–economic growth nexus and the neo-classical hypothesis on trade–economic growth nexus hold for Nigeria as evidence abound that bi-directional relationship does exist between economic growth and financial development (except when M2/GDP was the proxy of financial development) on the one hand and between economic growth and trade openness on the other hand.

To achieve economic growth, therefore, policy-makers are expected to pursue strong financial development with focus on ensuring that banks and other financial institutions are empowered and positioned to provide the necessary funds to the productive sector of the economy. Policy-makers should also pursue policy that lowers the ratio of money supply (M2) to GDP as evidence abound from our study that it has little or no significant contribution to economic growth; thus, policy-makers should ensure that the money supply in circulation is significantly channelled to the private sector of the economy for productive purposes. The capital market should also be strengthening to facilitate the mobilization and efficient allocation of funds to the productive sector of the economy. The capital market should be strengthened so as to be able to support the privatization exercise of government.

Since trade openness was found to be a contributor to economic growth, policy-makers are advised to pursue policies that will promote trade openness such as establishment of bilateral and multi-lateral trade agreements on favourable terms, establishment of export processing zones, granting of tax holidays and other incentives to the would-be exporters, creating an able environment that will support international trade and relevant technology transfer, among other things.

Similarly, policy-makers can use changes in the real sector or economic growth to determine the direction of growth and development of both the financial sector and the trade sector of the economy as evidence abound that a significant relationship exists between economic growth and each of the financial development and the trade sector of the economy.

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