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Financial Deepening and Economic Growth: Reassessing the Empirics for Nigeria

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Abstract
It has long been established within the theoretical and empirical literature that financial sector development plays a crucial role on the growth performance of an economy. However, the stage of growth of the financial sector and that of the economy of which this popularized positive effect is most felt still remains a subject of inquisition. The thrust of this paper is thus to investigate further the nature of the long run impact of financial deepening within the framework of the Johansen cointegration analysis and the vector error correction mechanism (VECM). On the overall, the result is line with the traditional argument of this the finance-growth nexus. However, we discover a long run non-linear negative relationship between the finance and growth. Thus, suggesting that the effect of financial deepening on growth may vary depending on the stage of growth of the financial sector.

I. Introduction

Understanding the nature, extent and direction of the linkage between financial deepening and economic growth performance has been a subject of heated debate within and outside the economic literature[1]. While the theoretical literature on the nexus offers robust and plausible explanation regarding the channels through which financial development stimulates growth, the empirical literature still remains contentious and seems not too compelling[2]. Similarly, while the causal relations between finance and growth has been firmly, established another source of gain striving concerns the direction of causality. Among the prominent and pioneering works connecting financial development and output growth include Schumpeter (1911), Patrick (1966), Goldsmith (1969), McKinnon (1973) and Shaw (1973). The traditional argument presented by these authors has often emphasized the positive impact of financial development on output growth particularly in the context of an emerging economy like Nigeria. Similarly, in the same spirit Fry (1988) and King and Levine (1993) also provided evidence supporting financial development as a prerequisite for sustained economic growth. Nevertheless, the widespread acknowledgments of the finance-led growth have been accompanied by some skepticism. Authors such as Dornsburch and Reynoso (1989) have also questioned the conclusion of previous influential studies and contend that the evidence supporting the finance-led growth paradigm is episodic and a vast exaggeration.

However, albeit the controversial and somewhat unclear linkage of financial development and output growth, evidence from earlier and recent studies lives a positive balance sheet in favour of the growth inducing role of financial development. Hence, in a Schumpeterian economic environment, a well-functioning, developed and structured financial sector can have a pronounced impact on technological innovation and economic growth.

Interestingly, in the finance led growth literature, one of the areas that remains largely unexplored is the nature of the relationship between financial development and growth. Stated differently, very few authors have tried to ask the question if there exist a linear or nonlinear relations which could appropriately explain the divergence in the empirical findings of previous studies. It has also been argued that the impact of financial development on economic growth of a country, depends on the stage of growth of the financial sector, and also is country and time specific.

Thus in light of these development in the literature, the aim of the present study is not to entirely thread the conventional path of previous studies but to offer some refreshingly insightful information about the nature, long term relationship, as well as the short run dynamics that govern the finance-growth nexus within the context of the Nigeria economy. In particular, the paper seeks out to estimate a futuristic non-linear model with the aim of investigating the nature of the nexus.

The sections in this paper collective present this idea. Immediately following this section is section 2 which reviews some of the literature. Section three presents the empirical strategy adopted for the study. While section four reports the empirical findings obtained from the analysis. Finally, section summarizes and concludes the paper with some recommendation.

[1] In the course of this paper we shall use financial development and financial deepening in an analogous manner.
[2] Channels identified in the literature through which financial development exerts influence on growth performance include; reduced transaction cost and facilitation of management risk; mobilization and pooling of risk; easing the exchange of goods and services; ensuring symmetry in information generation about prospective and prospective investment; and monitoring and evaluation of investment performance and exerting corporate governance.

II. Review of Previous Studies

We intend not to embark on an exhaustive review of the copious amount of literature in this topic. However, we shall restrict the review to some prominent past and recent studies.

One of the most prominent writers in the finance growth nexus is Hugh Patrick. In his seminal paper, Patrick asked a critical question, which sector, financial or real, leads in the dynamic process of economic development? Patrick identified two possible patterns in the causal relationship between financial development and economic growth. In the first, growth induces an expansion of the financial system.

According to this view, which in his words he termed as "demand-following," the lack of financial growth is a manifestation of the lack of demand for financial services by the real sector. Hence, he asserted that the creation of modern financial institutions, their financial assets and liabilities, and related financial services is in response to the demand for these services by investors and savers in the real economy. In this case, the evolutionary development of the financial system witnessed in developed countries is a continuing consequence of the pervasive, sweeping process of economic development. As the real side of the economy develops, its demands for various new financial services materialize, and these are met from the financial side. In the second pattern of the thesis, the expansion of the financial system precedes the demand for its services.

Channeling scarce resources from (small) savers to (large) investors according to relative rates of return, the financial sector precedes and induces real growth. The deliberate establishment and promotion of financial institutions in many less developed countries (LDCs) might reflect this belief in the "supply-leading" relationship between the two developments. A natural question then concerns the direction of causality between financial development and economic growth. Patrick asserted that the direction of causality changes over the course of development. In his view, financial development is able to induce real innovation-type investment before sustained modern economic growth gets under way, and, "as the process of real growth occurs, the supply-leading impetus gradually becomes less important, and the demand-following financial response becomes dominant. Unfortunately, there has been scanty quantitative evidence on this subject drawing on actual data of both developed and developing countries.

Within this two broad line of thinking, many researchers have offered evidence in support of the “supply leading” phenomenon suggesting that the financial sector prods growth in the real sector.

Empirical Evidence

The discussion presented above from Patrick had led to the proliferation of the literature on the finance-growth nexus. So much effort has been dissipated by several economists to understand the linkage.

King and Levine (1993a, b) in their study discovered a positive effect of financial development on economic growth from various indicators of financial development. By asserting that the ratio of bank credit in the private sector to GDP (termed as CREDIT) is a better indicator of financial development and by dividing countries into three groups according to their income levels, De Gregorio and Guidotti (1995) find that the positive effect of financial development on economic growth is much more significant in low- and middle-income countries than in high-income countries thus rendering credence to the supply-leading thesis as theorized by Patrick.

On the contrary but in line with the demand following hypothesis, Deidda and Fattouh (2002), utilize the ratio of currency plus demand and interest-bearing liabilities of banks and non-bank financial intermediation to GDP (termed as LLY) as the indicator of financial development. By dividing countries into two groups according to their income levels (i.e., high- and low-income countries), Deidda and Fattouh (2002) find that the relationship between financial development and economic growth is not significant in low-income countries but that only in high-income countries will financial development significantly promote economic growth. The results from these two studies support the demand-following and supply-leading theses respectively.

It is well recognized that high-income countries possess relatively high levels of financial development compared with low-income countries. As a result, the studies by Deidda and Fattouh (2002) and De Gregorio and Guidotti (1995) imply that the effect of financial development on economic growth may be linear or nonlinear depending on the stage of economic growth of the economy under study, although they reach different conclusions by using different indicators for financial development and classify countries into different income groups. While Deidda and Fattouh (2002) and De Gregorio and Guidotti (1995) renders some insights on the nature of the relationship between finance and growth which could take a nonlinear relationship between financial development and economic growth, it is improper to draw conclusion on the finance-growth relationship from both studies as they use different indicators of financial development and classify countries into different groups. Recently, Rioja and Valev (2004) employ both LLY and CREDIT as indicators of financial development and propose grouping countries into three categories according to their levels of financial development, instead of grouping countries by their income levels. They arrived at a consistent nonlinear relationship between financial development and economic growth from both LLY and CREDIT indicators. More

specifically, Rioja and Valev (2004) find that the effect of financial development on economic growth is uncertain for countries with low levels of financial development.

However, financial development significantly promotes economic growth for countries with intermediate levels of financial development. For countries with high levels of financial development, the finance-growth relationship is still positive. Nevertheless, the marginal impact of financial development on economic growth is higher for countries with intermediate levels of financial development than for those with high levels of financial development. If both CREDIT and LLY are proper indicators of financial development, then the study of Rioja and Valev (2004) seems more evincing and convincing than Deidda and Fattouh (2002) and De Gregorio and Guidotti (1995) because Rioja and Valev (2004) utilize both CREDIT and LLY as indicators of financial development and obtain a consistent relationship between finance and growth from both indicators.

More recently, Shen and Lee (2006) also confirm this nonlinearity, as they employ different indicators to measure banking as well as stock market development, and find that the relationship between banking development and economic growth exhibits an inverse U-shape. In other words, they find that banking development first promotes economic growth, until a level of banking development is reach after which further banking development decreases economic growth.

In their own effort, Levine and Zervos (1996) demonstrate that various measures of equity market activity are positively correlated with measures of real activity, across different countries, and that the association is particularly strong for developing countries. Using cross-country regressions and data for 41 countries covering the period 1976-93, they evaluate the extent to which these measures are robustly correlated with current and future rates of economic growth, capital accumulation and productivity improvement. They also examine whether these effects are additional to those of banking system development by including both stock market and bank-based financial indicators in the same regressions. They conclude that after controlling for initial conditions and various economic and political factors, the measures of banking and stock market development are robustly correlated with current and future rates of economic growth, capital accumulation and productivity improvements. They, therefore, conclude that stock markets provide different financial services from banks. Atje and Jovanovic (1993), using a similar approach, also find a significant correlation between economic growth and the value of stock market trading relative to GDP for 40 countries over the period 1980-8.

Ndebbio (2004) investigates financial deepening, economic growth and development for Sub-Saharan African countries. The study employed two financial deepening variables namely the degree of financial intermediation measured by M2 as ratio to GDP, and the growth rate of per capita real money balances. The study finds that a developed financial sector spurs overall growth of an economy.

Mohammed and Sidiropoulos (2006) investigate the effect of financial development on economic performance in Sudan from 1970 to 2004. The study estimated the short-run and long-run relationship between financial development and economic growth and other conditioning variables on economic growth using the autoregressive distributed lag (ARDL) model to co-integration analysis proposed by Pesaran and Shin (1999). Their results indicate a weak relationship between financial development and economic growth in Sudan due to the inefficient allocation of resources by banks, along with the absence of an appropriate investment climate required to foster significant private investment and promote growth in the long run, and to the poor quality of credit disbursal of the banking sector in Sudan.

Odiambho (2004) investigates the role of financial development on economic growth in South Africa. The study uses three proxies of financial development namely the ratio of M2 to GDP, the ratio of currency to narrow money and the ratio of bank claims on the private sector to GDP against economic growth proxied by real GDP per capita. He employed the Johansen and Juselius cointegration approach and vector error correction model to empirically reveal overwhelming demand-following response between financial development and economic growth. The study totally rejects the supply-leading hypothesis. However, Odiambho (2005) replicated this study for Tanzania and found the contrary result. He used the same model to empirically reveal a bi-directional causality between financial development and economic growth.

The evidence from Nigerian seems to be inconclusive, albeit specifically rigorous frameworks employed in analysis by previous studies: Again, to the best of our knowledge no study in this area has delve into ascertain if there exist a nonlinear relationship between finance and growth.

Agu and Chukwu (2008) employ the augmented granger causality test approach developed by Toda and Yamamoto (1995) to ascertain the direction of causality between “bank-based” financial deepening variables and economic growth in Nigeria between 1970 and 2005. Their co-integration results suggest that financial deepening and economic growth are positively co-integrated. In the Toda-Yamamoto sense, the study finds that the Nigerian evidence supports the demand-following hypothesis for “bank based” financial deepening variables like private sector credit and broad money; while it supports the supply-leading hypothesis for “bank-based” financial deepening variables like loan deposit ratio and bank deposit liabilities. Thus, the study concludes that the choice of bank-based financial deepening variable influences the causality outcome.

However, findings from earlier studies like Azege (2004) and Adam (1998) seem to point to the fact that only a well-functioning financial system facilitates economic growth. For instance, Azege (2004) employed data on aggregate deposit money bank credit over time and gross domestic product to establish that a moderate positive relationship exists between financial deepening and economic growth. Adams (1998) employed the 2SLS method and demonstrated that the financial intermediation process in Nigeria is sub-optimal and caused by a high lending rate, high inflation rate, low per capita income, and inadequate bank branches. A similar conclusion has also been arrived at in a recent study by Nzotta and Okereke (2009), who examine financial deepening and economic development in Nigeria between 1986 and 2007. They utilize time series data and two stages least squares 2SLS analytical framework and found that four of the nine variables; lending rates, financial savings ratio, cheques/GDP ratio and the deposit money banks/GDP ratio had a significant relationship with financial deepening, hence, they concluded that the financial system has not sustained an effective financial intermediation, especially credit allocation and a high level of monetization of the economy.

Interestingly, in a more recent study by Shittu (2012) examines the impact of financial intermediation on economic growth in Nigeria with time series data from 1970 to 2010. Employing cointegration test and error correction model, he finds that financial intermediation has a significant impact on economic growth in Nigeria.

This inconclusive nature of the subject especially for Nigeria, begs the need to further reexamine the nature of this nexus. The aim here is to ascertain if they could be a nonlinear relationship between finance and growth for the Nigeria economy thereby offering some explanation for the non-convergence of findings from previous studies.

III. Analytical Framework and Plan of Study

The current study derives its theoretical bearing from the framework of the neoclassical production function which has been extensive employed in applied economic research.

The production function approach is widely used to measure productivity growth as well as the impact of regulation and other policy variables (henceforth labeled as control variables) on growth rates. In this case we consider the standard production function approach in which the control variables appear as arguments of the production function just like the input variables -capital and labor. We then consider a factor-augmenting approach in which the arguments are capital and labor but we append augmenting functions to the input variables. We use the control variables as well as capital and labor as the arguments in the production equation. We assume for simplicity and amenability to analysis that the input arguments are exponential and the production function is Cobb-Douglas.

Thus, the theoretical model for this paper is stated in the usual form of the Cobb-Douglas production function below;

$$Y = f(L, K, t)A(v) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where Y is output, L is labour and K is capital stock, t is time trend introduced to measure the technical change, and v is all the un-measured factors.

Equation 1 is differentiable and can so be done to obtain the rate of change in output due to change in the inputs. Thus differentiating (1) totally[3], we obtain:

$$\dot{Y} = \delta_l \dot{L} + \delta_k \dot{K} + T_c + \varepsilon \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where, $\dot{Y} = (1/Y)(dY/dt)$, $\dot{L}_i = (1/L)\,(dL/dt)$, $\dot{K} = (1/K)(dK/dt)$, are rates of change in Y,L and K ; and $\delta_l = \partial \mathrm{Inf}(.)/\partial \mathrm{InL}$, $\delta_k = \partial \mathrm{Inf}(.)/\partial \mathrm{InK}$, $T_c = \partial \mathrm{Inf}(.)/\partial t$, and finally the residual component, $\varepsilon = (\partial \mathrm{InA(v)}/\partial \mathrm{Inv})\dot{v}$. In the preceding equation we decompose the growth rate of output into rates of change in inputs and change in technical efficiency. The ε term in equation 2 is the residual component of the equation that is used to capture the effect of unmeasured and unobserved variables on the rate of growth of output. We also expect the δ_l and δ_k terms to be positive for a well-behaved production function, implying that an input contributes positively (negatively) to output growth when its usage increase (decrease).

The Model

Building on the theoretical framework presented above, we proceed then to specifying the empirical model to be used in estimating the underlying relationship of our research interest. This is done by modifying equation 2 in order to include our variables of interest.

$$Y_t = \delta_l L_t + \delta_k K_t + \alpha_i X_t' + \beta_i Z_t' + T_c + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

Where the new term X_t' is a vector used to subsume the measures of financial deepening while Z_t' represents a set of control variables.

To estimate the components of equation 3 and the relative magnitude of their impact on output, we rewrite equation 3 in a familiar regression equation as in below;

$$Y_t = \delta + \delta_l L_t + \delta_k K_t + \delta_i X_t' + \delta_i Z_t' + T_c + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots (4)$$

[3] We could also differentiate equation 1 partially to obtain the change in output caused by any particular input in the production function while holding constant other variables in the model.

One of the areas of controversy in the finance-growth literature is that the magnitude of financial development's impact on growth varies depending on the type of the financial indicator employed and the level of the country's development. This implies that the extent to which finance affects growth can be reasonably attributed to the measure of financial deepening employed. To address this concern, we examine the impact of three different measures of financial development.

The first one is the liquid liabilities of the financial system (LL), which is defined as currency, plus demand and interest-bearing liabilities of bank and non-bank financial intermediaries divided by GDP (M2/GDP). This is the broadest measure of financial depth used, since it includes all types of financial institutions (central bank, deposit money banks, and other financial institutions) Apergis et al. (2007).

The second indicator, bank credit (BC), is defined as credit by deposit money banks to the private sector divided by GDP

While the third one, private sector credit PC is the ratio of private credit by deposit money banks and other financial institutions to GDP and measures the activity of financial intermediaries i.e. this measure of financial sector development (FSD) isolates credit issued to the private sector as opposed to credit issued to governments and public enterprises; by doing so, it measures the mobilized savings that are channeled to private firms (see Beck et al. 2000) Thus, the term $X_i' = (LL, BC, PC)$

The information set of control variables Z_j' , includes variables that typically appear in the empirical literature. In the current paper, government spending as share of GDP is used and the volume of trade as share of GDP, to capture the degree of openness to external trade[4]. We also include Foreign Direct Investment as a share of GDP (FDI) to examine the contribution of foreign investment on growth.

From the literature, the three indicators of financial deepening are expected to assume positive values, though the magnitude of such positive coefficients still remains ambiguous.

According to Barro and Sala-i-Martin (1995), productive public spending such as spending on education, critical economic infrastructure or some other form of productive capital -promotes growth while non-productive spending in the area of debt servicing, recurrent consumption spending could impede growth. Additionally, there is also the notion of crowding out effect of government spending on private spending. A confluence of this two points – non-productive effect and the crowding out effect; weeds off any positive effect government spending may have on growth. However, Akyuz (1993) has argued that the much talk about crowding out effect is not as pronounce as currently being exaggerated at least for developing countries. In view of this, we live the expected effect of government spending as undetermined.

We include the volume of trade in order to measure the effect of openness to the rest of the world on the domestic economic growth performance. Trade, either in the form of exports or imports, is a proxy of growth-enhancing interactions (specialization, exchange of ideas through exports or acquiring foreign technology through quality imports) among countries acting as a conduit for knowledge dissemination, thus more open economies should exhibit higher growth rates. Therefore, the estimated coefficient on trade share in our specification is expected to be positive.

Finally, FDI is included as a share of GDP. According to the neoclassical growth model an economy with constrained domestic capital can still grow with the inflow of foreign capital in the form of transfer of technology, sophisticated managerial knowledge, better skills and expertise which complement domestic capital and thereby stimulate growth. Thus, in line with this thinking, it is expected that FDI should be positive.

Most of the data employed for the empirical analysis are obtained from the World bank data base WDI. Our dependent variable is the growth rate of real per-capita income, FDI and trade openness are measured as the ratio of real FDI to GDP and trade to GDP respectively, while capital is the ratio gross fixed domestic capital to GDP. However, data for labour employment is sourced from the University of Pennsylvania World Data profile. Finally, we obtain data for the three financial indicators form the CBN statistical bulletin 2012.

Econometric Methodology

The method of analysis adopted for this study is the Vector Error Correction approach. The steps to estimating a VECM model is to first obtain the order of integration of the variables, proceed to evaluating if the variables are cointegrated and finally, estimate the Vector Error Correction model (VECM). Thus, we begin as outlined above.

Unit Root Test

Prior to subjecting the time series data to the empirical estimation of the model in equation (4), there is need to first check whether the variables in the model possess any non-stationarity property. In other words, whether the individual series possess unit root properties. In doing so, we adopt the augmented approach suggested by

[4] The degree of openness to external trade is measured here by the sum of imports and exports divided by the GDP ($\frac{import+export}{GDP} \times 100$). The larger the fraction the more open is the economy to external trade.

Dickey and Fuller (1979) as well as that of Phillips-Perron (Phillips and Perron, 1988). The ADF test is carried out within the framework of the equation specified below.

$$\Delta Y_t = \vartheta + \theta_1 t + \delta Y_{t-1} + \theta_i \sum_{i=1}^{k} \Delta Y_{t-1} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (5a)$$

Where, ϑ is a constant, t time trend while ε_t is the error term. The term Y_{t-1} is the lagged value of the series Y. The above equation is a time and linear trend version of the specification underlying the ADF unit root test exercise. Interestingly, a point to note about the ADF and PP test is that they have the same distribution for large samples; hence they use the same hypothesis. However, unlike the ADF test where use is made of a parametric auto-regression to approximate the ARMA structure of the errors in the test regression, the PP tests ignore any serial correlation in the test regression. The test regression for the PP is carried out with the equation below

$$\Delta Y_t = \vartheta + \beta' t + \pi Y_{t-1} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (5b)$$

where ε_t is I(0) and may be heteroskedastic[5].

Cointegration Analysis

The cointegration analysis as developed by Engle and Granger (1987) and popularized by Johansen (1988) investigates the long-run relationship among economic variables. The test is carried out using the Vector Autoregressive (VAR) analysis to evaluate their long-run properties. However, the cointegration procedure requires time series system to at least be integrated of the same order. Thus to carry out a meaningful test, all the variables in the model must be integrated of the same order say d, then the cointegration test can be embarked upon.

Using the detailed VAR (p) we can examine the long run relationship embedded in the model in equation 4. This is described in equation 6 below;

$$V_t = \gamma_0 + \Gamma_1 V_{t-1} + \Gamma_2 V_{t-2} + \cdots + \Gamma_p V_{t-p} + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots (6)$$

In equation (6), V_t is a (8*1) column vector of regressors specified in equation 4; γ_0 is a constant term; $\Gamma_i i$ represents a (8*8) parameter matrix while μ_t represents a (8*1) matrix of Gaussian stochastic errors.

Vector Error Correction Model

There may exist an error correction representation (VECM) of the VAR (p) model specified in equation 6 above. In fact Johansen and Juselius (1990) and Johansen (1995) suggest that if V_t consists of k terms integrated of order one, then equation 6 can be rearranged as a vector error correction model (VECM). Hence, assuming that the variables are integrated of the same order, say (d) as stipulated, the general specification of the VECM for this VAR (p) model is as follows:

$$\Delta V_t = \Omega_1 \Delta V_{t-1} + \Omega_2 \Delta V_{t-2} + \cdots + \Omega_{p-1} \Delta V_{t-p+1} + \Pi V_{t-p} + \mu_t \dots\dots\dots\dots (7)$$

where ΔV_t is the first difference notation of V_t (i.e. $\Delta V_t = V_t - V_{t-1}$), $\Omega_t = -\left(1 - \Omega_1 - \Omega_2 - \cdots - \Omega_p\right)$. Π is an identity matrix. Assume Π includes r linearly independent columns where r < k and k is the number of variables in V_t, equation (7) converges to a long run equilibrium described by $\Pi = \alpha\beta$, where α and β are both (8*r) matrices.

Matrix β composes of the coefficients defining the long-run equilibrium, while matrix α represents the coefficients that describe the speed of adjustment towards the long run equilibrium relationship.

In a similar manner, we can also represent the relationship between financial deepening and growth in a dynamic vector error correction model (VECM) frame- work thus:

$$\Delta Y_t = \delta + \delta_1 \Delta L_{t-1} + \delta_2 \Delta K_{t-1} + \delta_i \Delta X'_{i(t-1)} + \delta_j \Delta Z'_{j(t-1)} + \delta\psi + \varepsilon_t \dots\dots (8)$$

We assume as is conventional in the econometric literature that ε_t are IID errors with $N(0, \sigma^2)$[6] and ψ are the

[5] The PP tests correct for any serial correlation and heteroskedasticity in the errors ut of the test regression by directly modifying the test statistics $t_{\pi=0}$. One advantage of the PP tests over the ADF tests is that the PP tests are robust to general forms of heteroskedasticity in the error term. Another advantage is that the user does not have to specify a lag length for the test regression. Interestingly, both the ADF and PP test are carried out under the hypothesis that $\delta = 0$ and $\pi = 0$.

For a detail discussion of the mechanism for carrying out the ADF and PP, consult Marno Verbeck (2004) "A Guide to Modern Econometrics".

[6] This assumption of the behaviour of the error term allows us to thread the part of estimating the above model without issues on endogeneity. Intuitively, we assume that there is no correlation between the errors and the regressors. Thus, for any given

error correction terms which capture the speed of convergence back to steady state. VECM specifications restrict the long-run behaviour of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics (Unalmis, 2002).
Equation 8 above forms the basis for the empirical test of any linear or nonlinear relationship between finance and output growth in Nigeria. Specifically, we shall estimate equation 8 using both linear and nonlinear specification of the set of financial deepening regressors included in the model[7].
We present the summary statistics for the variable in table 1 in the appendix.
Similarly, the result for the correlation matrix is presented in table 2. The evidence from the correlation matrix suggests a tentative nature of correlation (i.e either negative or positive) among the variables in the model. However, our attention is focused on the correlation between the finance deepening variables and the GDP per capita. As can be readily seen from the table, two of the measures of financial deepening variables are positively correlated with the GDP per capita.

IV. Empirical Result

In this section we present the empirical evidence based from our findings from the estimation of the models. All estimation exercise has been performed using the E-VIEWS 7.0 software package. The empirical results are based on the specified equation and the empirical models stated in the research methodology.

Unit Root Test Results
As earlier stated a precondition for any meaningful cointegration analysis is that the series in the model are non-stationary and integrated of the same order. Having this mind, we performed the Augmented Dickey-Fuller (ADF) test with a constant and a time trend specification. The result from the test indicates that the null hypothesis of a unit root in the series cannot be rejected for all the variables at the 5 percent level. Similarly, the result of the Phillip-Perron (PP) test for non-stationarity, specified with a constant and deterministic trend, corroborates that of its ADF counterpart, which obviously reveals the existence of unit root at the levels of the series.
Given the non-stationary properties of the series at their levels, we induce stationarity in the variables by applying both the ADF and PP tests on their first difference. This time the variables become stationary. This vividly suggests that all the series follow a stationary process at their first difference. This also implies that the original series at their levels must be differenced once in order to obtain stationary series. Thus, it can be concluded that all the variables in the model are integrated of the same order thus fulfilling the condition for carrying out the cointegration analysis.
The result of the unit root test exercise is presented in table 1 below.

value of the regressor, the correlation is zero. $E(\varepsilon W_p) = 0$.
[7] The nonlinear specification to be employed is the quadratic function. The aim here is to examine if there could be some sort of U-shaped relationship in the finance-growth empirics. Interestingly, similar approach has been employed by Hung (2009). However, we proceed in a rather simplistic framework, by squaring the three indicators of financial development to obtain some futuristic values after which we then re-estimate the model.

Unit Root Test

	ADF Test			PP Test		
Variable	**Levels**	**Ist Diff.**	**Lags**	**Levels**	**Ist Diff**	**Lags**
GDPPC	-2.223584	-5.4044**	0	-2.246902	-5.6599**	6
EMP	-2.118223	-3.82711*	0	-1.806681	-3.84837*	3
CAP	-2.278879	-5.8171**	1	-2.073422	-5.7184**	6
M2	-2.229688	-4.6793**	4	-1.551114	-4.9113**	13
CPS	-1.616429	-5.1269**	0	-1.763833	-9.4735**	30
BC2	0.018826	-7.1306**	0	0.187048	-7.2167**	3
GVX	-2.030516	-6.2482**	0	-2.285454	-6.2878**	2
TOP	-3.105666	-7.3655**	0	-3.034963	-7.3066**	1
FDI	-3.277714	-10.288**	0	-3.277714	-26.731**	30

Note: ** and * denote significance at the 1% and 5% respectively and hence rejection of the null hypothesis that there is unit root in the variables. The lags are selected based on the optimal lag length selection of the SIC and NW criteria for the ADF and PP test respectively.

Cointegration Analysis

Having confirmed that all the series are integrated of the same order, this gives the impetus to set the cointegration regression and then proceed to test for cointegrating relationship in the model. This is done within the framework of the Johansen cointegration test which had earlier been discussed.

Table 4: Cointegration Test Result

	Trace Test		Max. Eigenvalue Test	
H_0	$\phi_{stats.}$	$\widehat{\phi_{CV}}$	$\rho_{stats.}$	$\widehat{\rho_{CV}}$
$\tau = 0$	387.524**	197.3709	123.58**	58.43354
$\tau \leq 1$	263.944**	159.5297	77.439**	52.36261
$\tau \leq 2$	186.504**	125.6154	53.938**	46.23142
$\tau \leq 3$	132.566**	95.75366	44.5194*	40.07757
$\tau \leq 4$	88.0464**	69.81889	37.0001*	33.87687
$\tau \leq 5$	51.04634*	47.85613	27.57569	27.58434
$\tau \leq 6$	23.47067	29.79707	16.38572	21.14162
$\tau \leq 7$	7.084950	15.49471	5.264763	14.26460
$\tau \leq 8$	1.820187	3.841466	1.820187	3.841466

Note: τ denotes the hypothesized number of cointegrating equation. $\phi_{stats.}$ and $\rho_{stats.}$ are the trace and maximum eigenvalue statistics respectively, while $\widehat{\phi_{CV}}$ and $\widehat{\rho_{CV}}$ are the critical values for both test. Finally, ** and * indicate asymptotic significance at the 1% and 5% level respectively.

The result from the exercise indicates that there is a significant cointegrating relationship among the variables in the model. Both the trace and maximum Eigen- value test statistics reject the null hypothesis of no cointegrating vectors in the model at the 5% level $H_0: \tau = 0$. This implies that there is at least one cointegrating vector in the model. Proceeding with the sequential testing, the trace statistics for $H_0: \tau \leq 5$, equally suggests that there is more than five cointegrating equations in the model, on the contrary, the maximum eigenvalue test statistics only holds up for $H_0: \tau \leq 4$, thereby suggesting that there are at least five cointegrating equation. However, the hypothesis for higher cointegration rank cannot be rejected at a statistically significant level.
Thus, based on the result of the two test statistics, it can be concluded that there are a maximum of 5 cointegrating relationship in the system.

Vector Error Correction Estimation
Evidence from the cointegration analysis, robustly establish the existence of long run relations in the model as indicated by the five cointegrating vectors from the trace and maximum eigenvalue test statistics. This outcome

suggests that we examine the long run relations in the model as well as the short run dynamics which could be inherent in the long run relations. Thus within the framework of the vector error correction model we obtain the following result below.

Long Run Vector of Cointegrating Equations

Cointe Eq:	CointEq1	EMP(-1)	CAP(-1)	M2(-1)	CPS(-1)	BC2(-1)	GVX(-1)	TOP(-1)	FDI(-1)
GDPPC(1)	1.0000	2.4262	0.7212	0.1738	0.5429	-0.0491	0.0614	0.4954	-0.0278
		(0.040)	(0.022)	(0.028)	(0.026)	(0.008)	(0.011)	(0.022)	(0.008)
C	0.1777	[-59.38]	[-32.66]	[-6.001]	[20.68]	[5.615]	[-5.299]	[21.85]	[3.466]

Short Run Vector of Cointegrating Equations

Error Correction:	D(GDPC)	D(EMP)	D(CAP)	D(M2)	D(CPS)	D(BC2)	D(GVX)	D(TOP)	D(FDI)
CointEq1	-0.1487	0.0139	2.1434	-0.0203	-0.2108	-0.7737	-0.4094	1.7922	-0.8712
	(0.181)	(0.008)	(0.408)	(0.494)	(0.6706)	(1.437)	(0.697)	(0.513)	(1.439)
	[-0.817]	[1.704]	[5.245]	[-0.041]	[-0.314]	[-0.886]	[-2.021]	[3.490]	[-0.605]

Note: t-statistics are in [ ] while the standard errors of the estimated coefficients are in ( ).

The result in table 5 above presents the long run and short run cointegrating coefficients respectively from the VECM estimation.

The long term variables that explain growth are the regressors included in the model, and the coefficient which measure the degree of variation in growth in the long term derived from changes in these regressors are shown in table 5 coefficient of cointegrating vector with the speed of adjustment coefficient.

The estimated coefficients from the result indicate that two of the financial indicators (m2, cps) are a positively and statistically significant while bc2 is negative and not significant. In addition, the coefficients of the input variables labour employment and capital stock carry the expected sign and are statistically significant.
However, albeit the negative coefficient of one of the financial indicates, on the overall, the results provide strong evidence that financial depth has a robust long term positive effect on output.
The result for the three control variables included in the model offers some interesting outcome. First, and surprisingly, government expenditure exhibits a statistically significant positive coefficient, thereby pointing to the growth stimulating role of government spending in developing countries like Nigeria. The result contradicts the theorizing of the crowding out effect thesis. It does, however, further lends credence to the argument by Akyuz (1993).
Secondly, the coefficient of trade openness behaves as theorized and conforms to its expected positive and statistically significant value. This result implies that increase openness to trade contributes to enhancing the growth performance of country. This validates the classical trade theory, and is in line with that of Obadan and Okojie (2007).
Finally, and unexpectedly, the result for foreign direct investment fails to conform to the expected prediction from both theoretical and empirical postulates. The coefficient assumes a negative and statistically insignificant value. However, an explanation for this result is succinctly offered by the dependency school which posits that there is a deleterious long-term impact of FDI on growth. According to the hypothesis in the short-run, any increase in FDI enables higher investment and consumption and thus relates directly and immediately with economic growth. However, as FDI accumulates and foreign projects take hold, there will be adverse effects on the rest of the economy that reduce economic growth. This is due to the intervening mechanisms of dependency, in particular “decapitalization and disarticulation” (Olofsdotter, 1998). Again, it can also be argued intuitively that inflow of FDI is a necessary condition for economic growth, but a sufficient condition is reached if such foreign investments are channeled to the most productive and growth stimulating sectors of the economy. This has been the case that typifies Nigeria, where foreign investment has traditionally concentrated in the oil extraction sector which contributes relatively small to long term economic growth and development of the

country.
The result for the short term behaviour and the adjustment of the variables to their steady state level reveals that the three financial indicators statistically account for adjustment of the model to the long term equilibrium. Similarly, the short term coefficients of government expenditure and FDI also explain the speed of convergence of the model to its long term equilibrium value.
Turning our attention to the second objective of the current paper which is to examine if there exist any non-linear relationship between finance and growth. This exercise is carried by estimating the quadratic form of equation 8 using the key research regressors. In this estimation the focus of our analysis is focused solely on the coefficient of the financial indicators.
The result from this estimation reveals that all the financial measures take up negative long term parameter values. This result offers some insightful information which can be used to arrive at interesting conclusion. First, it can be concluded from the evidence that increase financial deepening and sophistication of financial asset port-folio will result in the allocation of financial resources away from productive and growth enhancing activities. Put differently, the development of the financial sector will reach a point in which it will begin to engage in activities that can endanger economic growth. Hung (2009) provides sufficient evidence to justify this outcome.
In his analysis Hung finds that financial development reduces the extent and cost of credit rationing and thereby facilitates capital investment and economic growth. However, due to the incentive constraint that results in credit rationing, this positive effect of financial development on economic growth declines along with financial development. This is further explained by Rioja and Valev's (2004) who summits that the positive effect of finance on growth is more significant in countries with intermediate levels of financial development than in those countries with high levels of financial development. Thus one can appropriately assert that there is an unambiguously positive relationship between finance and output at the intermediate stage of financial development. However, the direct positive effect is blurred by the increasing sophistication in the financial sector.
The second explanation is derived by, Jappelli and Pagano (1994) who obviates from traditional focus of previous studies on loans for capital investment to examine the effect of credit rationing on economic growth from loans for non-productive consumption. More specifically, in a model where the credit rationing of consumption loans is exogenously given, Jappelli and Pagano (1994) explains that an increase in the extent of credit rationing reduces banking resources allocated to consumers and thereby forces the economy to save more resources for capital investment. In a model where capital investment gives rise to an externality, the increase in the extent of credit rationing in consumption loans promotes growth. On the other hand they noted that if consumption loan is endogenously obtain, then credit rationing in regard to consumption loans in this context leads to an opposite effect on capital investment and economic growth. This is due to the fact that it reduces the extent of credit rationing for loans to consumption, which, as is demonstrated by Jappelli and Pagano (1994), is detrimental to capital investment and economic growth.
Hence, in this model, the net effect of financial development on economic growth depends on the relative magnitudes of these two opposite effect. We present the result of the nonlinear estimation in table 1 in the appendix.

Model Diagnostic Test Result
In this section we present some relevant statistic used to evaluate the sufficiency and robustness of the model employed for the empirical analysis as well as the consistency of the estimates obtained. First is the R^2 and Adjusted R^2 which indicate that more than 50% and 40% variation in the regressand is jointly explained by the set of regressors that enter the regression equation. The result is fairly reasonable. Secondly, we reject the non-significance hypothesis about the joint parameters based on the F-statistic value. The Durbin- Watson test statistic shows that the residuals in the model are serially uncorrelated and this result is reinforced by the LM test for serial correlation. Lastly, the residual normality test based on the Jacque-Berra statistic reveals that the residuals from the estimation are normally distributed as expected. The result is presented in table two in the appendix.

V. Summary and Concluding Remarks

The crux of the present study has been to reexamine the finance-growth nexus with the aim of disentangling the long run and short term impact of financial development on economic growth. However, unlike most previous studies this paper moves further to investigate if there is a nonlinear relations in the nexus that can be used to explain the non-convergence of findings of previous empirical literature on the topic. Again, the study obviates from the difficulty of appropriate measure financial sector development, by selecting three different indicators of financial sector development in order to adequately capture such effects.
The result from the estimation exercise utilizing the VECM approach supports the popular notion that financial

development propels growth as two of the three indicators take on positive long term coefficient thereby, suggesting a positive long term linkage between financial development and growth. Similarly, the input variables in the model - labour and capital behaves as expected in the growth equation. While two of the set of auxiliary control variables that enter the growth equation behaves properly– government spending and trade openness both conforms to their expected values and contributes positively to growth. However, FDI fails to validate the theorizing of the modernization theory that embodies it.

For the nonlinear estimation of the long term coefficient for the key regressors in the equation all assume negative values. Although this result may be puzzling upon first glance, it does rather conform well to the stage of financial sector development thesis in the literature. By implication the result of course, suggest that the impact of financial development on growth varies with the stage of development of the financial sector itself.

It is obvious from our findings that further research is needed before more definitive conclusions can be drawn on this issue, especially on the nature of the much talked about finance-led-growth paradigm. In this sense, this paper also provides a basis for further research into the finance-growth nexus for Nigeria using a more robust and rigorous nonlinear relations framework. In addition, utilizing cointegrating VECM approach and extending the time spans of the data sets in these future studies so as to adequately capture the long-run effects of financial development on growth can offer great opportunities for new discoveries in the topic.

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APPENDIX

Table 1: Summary Statistics for the Variables

	GDPPC	EMP	CAP	M2	CPS	BC2	GVX	TOP	FDI
Mean	7.2698	3.5481	2.4174	3.2110	2.7998	1.8991	2.2500	3.9719	0.9775
Median	7.1592	3.5534	2.4122	3.2565	2.7663	2.2484	2.3204	4.0904	1.0301
Maximum	7.7559	3.9245	3.5610	3.7080	3.6027	3.4660	2.8872	4.4827	2.3825
Minimum	6.9821	3.1797	1.6975	2.5825	2.1747	-0.8374	1.5755	3.1616	-0.4098
Std. Dev.	0.2336	0.2210	0.4611	0.2837	0.3607	1.3093	0.3875	0.3549	0.6634
Skewness	0.7709	0.0016	1.0156	-0.3359	0.4118	-0.4132	-0.2239	-0.9953	-0.2097
Kurtosis	2.1377	1.8198	3.5963	2.2551	2.3390	1.7886	1.6976	3.1575	2.8372
Jarque-Bera	4.2913	1.9149	6.1625	1.3835	1.5333	2.9568	2.6078	5.4830	0.2783
Probability	0.1169	0.3838	0.0459	0.5008	0.4645	0.2279	0.2714	0.0644	0.8700
Sum	239.90	117.01	79.787	105.96	92.394	62.675	74.251	131.07	32.258
Sum Sq. Dev.	1.7465	1.5636	6.8056	2.5772	4.1649	54.860	4.8067	4.0305	14.085
Observations	33	33	33	33	33	33	33	33	33

Table 2: Correlation Matrix

	GDPPC	EMP	CAP	M2	CPS	BC2	GVX	TOP	FDI
GDPPC	1								
EMP	0.559420	1							
CAP	0.029409	-0.725755	1						
M2	0.486599	-0.025125	0.478807	1					
CPS	0.561514	0.190195	0.287257	0.896998	1				
BC2	-0.101491	0.608842	-0.767892	-0.533871	-0.414140	1			
GVX	0.290662	-0.131448	0.348405	0.443902	0.422980	-0.284118	1		
TOP	0.263447	0.710311	-0.470687	-0.282941	-0.173029	0.561377	-0.302891	1	
FDI	-0.031981	0.540490	-0.586043	-0.322822	-0.175766	0.604464	-0.261915	0.592764	1

Table 3: Model Diagnostic Test Statistics

Test Statistic	Value
R^2	0.5217
Adjusted R^2	0.4175
$\text{Durbin} - \text{Watson}$	1.8804
$F - \text{stats.}$	4.9485
$\text{VEC Normality } J - B \text{ Test}$	3.9664
VEC LM Test	72.852