Financial Sector Development and Economic Growth: Empirical Evidence from Nigeria

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The paper examines the relationship between financial sector development and economic growth in Nigeria. It tests the competing finance-growth nexus hypothesis using Granger causality tests in a VAR framework over the period 1960-2009. Four variables, namely; ratios of broad money stock to GDP, growth in net domestic credit to GDP, growth in private sector credit to GDP and growth in banks deposit liability to GDP were used to proxy financial sector development. The empirical results suggest bidirectional causality between some of the proxies of financial development and economic growth variable. Specifically, we find that the various measures of financial development granger-cause output even at 1per cent level of significance with the exception of ratio of broad money to GDP. Additionally, we find that net domestic credit is equally driven by growth in output, thus indicating bidirectional causality. The variance decomposition shows that the share of deposit liability in the total variations of net domestic credit is negligible, indicating that shock to deposit does not significantly affect net domestic credit. The findings from the paper indicate that the current reforms in the Nigerian banking sector should not be emphasized unilaterally. Rather, attention should be given to the complimentary and coordinated development of financial reforms and changes in the real sector of the economy.

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I. Introduction

One of the salient features of Nigeria's growth drive is a conscious development of the financial sector. For example, in the early seventies, as a result of the prevailing economic paradigm at that time, the sector was highly regulated with government holding controlling shares in most of the banks. In 1986, the liberalization of the banking industry was a major component of the Structural Adjustment Programme (SAP) put in place at that time to drive the economy from austerity to prosperity. In 2004, the consolidation exercise in the banking industry took a leading role in the National Economic Empowerment and Development Strategy (NEEDS), which was in place at that time to drive the economic agenda of the government. In 2009, as part of the broad economic measures to respond to the adverse effects of the global financial and economic crises, the Central Bank of Nigeria in conjunction with the fiscal authorities

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engineered measures to avert a collapse of the financial system with a view to maintaining economic growth.

The essence of emphasis on the development of the Nigerian financial sector is in the theory of financial repression which posits that efficient utilization of resources via a highly organized, developed and liberal financial system enhances economic growth (McKinnon, 1973; Shaw, 1973). This thesis, more or less, confirmed the conclusions of earlier works on the importance of the financial system which could be traced back to the works of Bagehot (1873), Schumpeter (1912) and Hicks (1969). Further enhancements to this hypothesis were explored in the works of Galbis (1997); Mathieson (1980); Fry (1988); Roubini and Sala-i-Martin (1992); Kwan, Wu and Zhang (1998) and King and Levine (1993b). This school of thought is classified as supply-led theory of finance-growth nexus.

While there is a near consensus that a well-functioning financial sector is a precondition for the efficient allocation of resources and the exploitation of an economy's growth potential, the economic literature is less consensual on how and to what extent finance affects economic growth. This, invariably, culminated in the emergence of demand-led theory of finance-growth nexus. Among others, Robinson (1952) argues that where enterprise leads, finance simply follows, suggesting that it is economic development which creates the demand for financial services and not vice versa. Giving further support to this line of argument, Gurley and Shaw (1955) contend that if income grows at a warranted pace, then the demand for financial assets also grows at a specifiable pace. Moreover, Lucas (1988) has argued that economists "badly overstress" the importance of the financial system on economic growth. It is simply a "sideshow" for economic activity. Recent developments in some economies around the world seem to provide further support for this school of thought. Specifically, the rapid growth of many Asian economies was accomplished despite a domestic financial sector that could not be regarded as developed (Shan, et al, 2001). This observation also holds for China (Lardy, 1998). With an average real GDP growth of 13.5 percent between 2005 and 2007, China's economic performance is extremely difficult to reconcile with the widespread view that its repressive financial system (in the McKinnon-Shaw sense) grossly distorts the optimal allocation of loanable funds and is, therefore, inefficient. In view of this puzzle, some empirical analysis is required at country level to examine whether it is the development of the financial sector that leads to economic growth or vice versa.

Time series studies have been conducted on U.S, U.K, Japan, Netherlands and Canada towards resolving this issue (See: Wachtel and Rousseau (1998); and Lee

and Wong (2005)). However, not much has been done on Africa, in general and Nigeria, in particular. The studies carried out on Nigeria have not clearly resolved the issue as most of them concluded that financial sector development did not promote economic growth while a few of them found evidence to support demand-leading hypothesis. A closer examination of these previous studies reveals that conscious effort was not made to explore various proxies of financial development as most of them used only the ratio of broad money to national income (M2/GDP). Hence, these studies actually modelled the impact of financial deepening on economic growth in Nigeria. In addition, there is the problem of endogeneity, which has not been carefully addressed in previous studies.

This study contributes to the literature by examining the relationship between financial sector development and Nigeria's economic growth, hence, addressing the country's specific dimension to finance-growth debate. The study is different from previous studies in scope (number of years is considerably longer). In addition, the effects of different measures of financial sector development on economic growth are examined, thereby providing a comprehensive empirical investigation of finance-growth nexus in Nigeria. The study also made conscious efforts to address the endogeneity issue and provide the framework for examining the possibility of the impact of economic growth on financial development.

The main objective of the paper, therefore, is to empirically investigate the nature of relationship between financial sector development and economic growth in Nigeria, in other words, whether it is demand-driven or supply-driven. Other specific objectives include the identification of the specific channels through which the financial sector affect economic growth while at the same time examine the effect of various financial measures on each others.
The remainder of this paper is structured as follows. Section two deals with the literature review while section three describes the methodology adopted, followed by a discussion of results in section four. Section five concludes.

II. Literature Review

II.1 Finance-Growth Relationship: Theoretical Underpinning

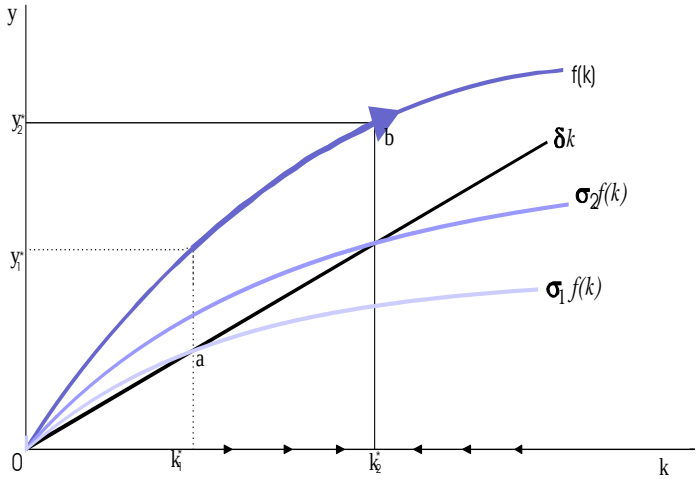
Major theoretical literature on financial development and economic growth process postulate four distinguishable, but not mutually exclusive, effects of financial activity and development on overall economic performance. The first is the provision of an inexpensive and reliable means of payment. The second is the volume and allocation effect, in which financial activity increases resources that

could be channeled into investment while improving the allocation of resources. The third is a risk management effect by which the financial system helps to diversify liquidity risks, thereby enabling the financing of riskier but more productive investments and innovations (Greenwood and Jovanovic, 1990: Bencivenga and Smith, 1991). The fourth is an informational effect; according to which an ex antes information about possible investment and capital is made available, ameliorating although not necessarily eliminating the effects of asymmetric information (Levine, 2004).

From an aggregate production function point of view, each of these financial effects may contribute to the transformation of a given amount of savings and investment inputs into a larger amount of output through either a capital accumulation channel (Hicks, 1969) or a technological change channel(Schumpeter, 1912).

Taking the capital accumulation channel as an example, the familiar Solow growth model shows that an increase in the savings rate, δ, will increase the steady-state levels of capital (k) and per capita output (y). Such a shift in δ is illustrated in figure 1. The shift from δ_1 to δ_2 causes steady state k to rise from k^*_1 to k^*_2 and per capita output to rise from y^*_1 to y^*_2

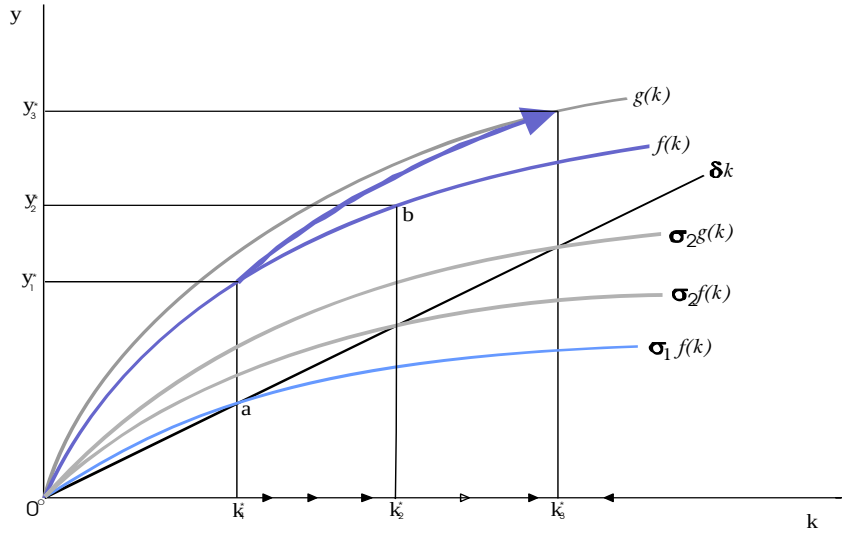
Figure 1: Effects of Savings on Capital Accumulation



The elimination of financial repression and a reduction in financial market failures are also likely to improve the quality of investment because only projects with returns greater than the interest rate are funded. This implies that the entire production function will shift up, from f(K) to g(K). This increase in the economy's

efficiency further increases savings because $\delta_2 g(K) > \delta_2 f(K)$, as shown in figure 2. It could be seen from figure 2 that the new steady-state levels of per-worker capital stock and per-worker output, k^*_3 and y^*_3, exceed not just the original levels, k^*_1 and y^*_1 but also the higher levels caused by just the increase in savings and investment, k^*_2 and y^*_2.

Figure 2: Effects of Savings on Output



Among other likely reasons, the financial sector's role as a monitor of how investment projects are managed contributes to the raising of the production function. The Solow model captures only the short-run and medium-run effects of improvements in financial development as it does not explain technological progress or long- run economic growth. The limitation of Solow growth model leads to Schumpeterian model of growth. Schumpeter posits that a well-developed financial sector is absolutely necessary if entrepreneurs are to successfully engage in a process of ingenuity. New projects require financing because innovation is not costless, and the upfront investment cannot always be covered by the entrepreneurs themselves. Without a financial sector to channel funds from savers to the most capable entrepreneurs, to monitor the projects, and to spread risk for savers, who are the sources of the investment funds, innovation would be nearly impossible and there would be little permanent economic growth.

II.2 Review of Empirical Literature

The role of financial sector in economic growth has intrigued macroeconomists and financial economists for decades. Numerous econometric studies such as the ones by Fernandez and Galetovic (1994) and Arestis and Demetriades (1996)

have led to conflicting results on causality, with some indicating reverse causality and others resulting in insignificant parameters. Arestis and Demetriades (1996), in particular, using twelve countries as case study, show that the direction of causality depends on the variable used and that each country exhibit different results. These results do not exhibit a pattern for developed or developing countries which confirms the hypothesis that institutional considerations and policies of countries do play a role in the relationship between finance and growth.

In general, empirical studies suggest three types of causal direction between finance and growth. First, the Harrod-Domar growth model would lead to a hypothesis of one-way causality from financial development to economic growth. Second, there is unidirectional causality from growth to finance. Such finding confirms Shan, et al (2001) conclusion that economic growth causes China's financial development. Nonetheless, a third alternative, the co-evolution (bidirectional causality) between economic growth and financial development hypothesized in both early and recent literature (Gurley and Shaw 1960, 1967; Bencivenga and Smith, 1991) cannot be ruled out.

In one of the early studies on this subject, Goldsmith (1969) analyzed data from thirty-five countries for the period 1860-1963 and found that financial and economic development are positively correlated over periods as long as several decades. Financial development was measured in his study by the ratio of financial intermediary assets divided by gross national product. The result from Goldsmith's study still leaves the puzzle unresolved because each variable has a feedback effect on the other. In an attempt to explain the puzzle, Goldsmith (1969) stresses that financial development largely occurs during the early stages of economic development when countries have low levels of income. This rationale seems to be debunked by the finding of Besci and Wang (1997) who point out that even though financial development occurs and may precede economic growth, it is unclear that it provides causality in an economic sense.

The finding of Goldsmith (1969) was later confirmed by De Gregor and Guidotti (1995) who note that over time, the correlations between financial development and economic growth are strong in the early stages of development and are diminished or even eliminated for OECD countries. They further show that the effect of financial development on growth becomes weaker as countries become more developed, perhaps because of problems with measuring financial development or because financial intermediaries actually have larger effects in less developed countries than in more developed ones. This finding was

further reinforced in the work of Wachtel and Rousseau (1998). It was found in a study of five industrialized economies at their early stages of development that the banking and securities markets mattered for industrialization and the expansion of commerce in four economies that are generally considered to have experienced "financial revolutions" over the past century. Similarly, Rousseau and Sylla (1999) examine the historical role of finance in the U.S from 1790-1850 and find a strong support for finance led growth. In addition, Rousseau (1999) investigates the Meiji era of Japan (1868-1884) and shows that the financial sector was instrumental in boosting Japan's explosive growth prior to the First World War.

Furthermore, some studies have examined the direction of causality through the use of instrumental variables that are correlated with financial development but not with growth beyond their link to financial development. La Porta, et al (1998) show that economies could be classified into four types, depending on whether their commercial/company laws were derived from English, French, German, or Scandinavian law. Using this measure of legal origin as instrumental variables, Levine (1998), Levine, et al (2000) find that it is correlated with the degree of financial development. Their results reveal a strong positive connection between instrumental variables and growth.

Some researchers have also explored causality with time series analysis such as Granger-type causality tests and vector autoregressive equations. Though some of these studies have mixed results over causality, nevertheless, majority of the works indicate that financial development leads to stronger growth. Xu (2000), using a VAR analysis, rejects the hypothesis that finance simply follows growth. Similarly, Chritopoulous and Tsionas (2004), using a panel data, show that causality runs from finance to growth. However, Jung (1986) and Demetriades and Hussein (1996), using time-series analysis, find causality running both ways, especially for developing economies.

Attempts have also been made on regional analysis within a country. Jayaratne and Strahan (1996) examine U.S liberalization over the restrictions on interstate branching in some states. They confirm that branch reform boosted bank-lending quality and accelerated real per capita growth rates. In addition, Guiso, et al (2002) examine individual regions of Italy and find that local financial development enhances the probability that an individual starts a business, increases industrial competition, and promotes the growth of firms.

Aside from the effect of financial sector development on growth at the macro level, some studies have examined the relationship between financial sector

development and growth at the microeconomic level. Rajau and Zingales (1998) show that industrial sectors that are relatively more in need of external finance develop more disproportionately faster in countries with more developed financial markets. Beck and Levine (2002) alluded to this finding through the use of different measures of financial development while Wurgler (2000) rationalizes the finding by showing that countries with a higher level of financial development increase investment more in growing industries and decrease investment more in declining industries than financially underdeveloped economies.

Another dimension in the study is the use of endogenous growth approach. Bencivenga and Smith (1991) employ an overlapping generation model and demonstrate that "an intermediation industry permits an economy to reduce the fraction of its savings held in the form of unproductive liquid assets and to prevent misallocation of invested capital due to liquidity needs". Thus, economic growth is induced via the capital stock. Greenwood and Jovanovic (1990) employ a general equilibrium approach and conclude that as savers gain confidence in the ability of the financial intermediaries, they place an increasing proportion of their savings with intermediaries. Greenwood and Smith (1997) use two models with endogenous growth formation and found that banks and stock markets allocate funds to the highest value user(s).

Apart from connecting the relationship between financial development and growth, one of the key issues is the indicator of financial development that should be used. The choice of indicators could produce differences in results about potential routes connecting the financial aspect of the economy and the real side of the economy. King and Levine (1993a) used measures such as liquid liabilities of banks and non-bank financial intermediaries (currency + demand and interest-bearing liabilities) over GDP; bank credit over the sum of bank credit and central bank domestic assets; credit to private enterprises over GDP. These measures were shown to have positive correlation with economic growth. However, Arestis and Demetriades (1996) show that King and Levine's causal interpretation is statistically fragile and that cross-sectional datasets cannot address the question of causality in a satisfactory way. Arestis and Demetriades (1997), using time series analysis, later conclude that the evidence favors a bidirectional causality relationship between financial development and economic growth. Moreover, Murinende and Eng (1994) find evidence of such bidirectionality in the case of Singapore, as do Demetriades and Hussein (1996) for 16 developing countries. Likewise, Luintel and Khan (1999), who investigate the finance-growth nexus in a multivariate VAR model, find bidirectional causality between financial development and economic growth in all their sample countries.

In China, a study by Shan, et al (2006) not only finds bidirectional causality between financial development and economic growth but also concludes that the Granger causality from economic growth to financial development is stronger than that from finance to growth. Yet an earlier study by Aziz and Duenwald (2002) concludes that the positive link between finance and economic growth in China is more apparent than real because the non-state sector, which contributed most of China's remarkable growth, did not resort to the domestic financial system in any substantial way for financing. A more disturbing result was provided by Boyreau-Debray's (2003) study on Chinese financial development and growth, which finds that credit extended by the banking sector at the state level has a negative impact on provincial economic growth. Similarly, DeGregorio and Guidotti (1995) find evidence for a negative relationship between financial development and growth in twelve Latin American countries during the period from 1950 to 1985.

Empirical studies on Nigerian finance-growth dynamics are not only limited in number but restricted in scope in terms of the measure of financial development. Ndebbio (2004), using an ordinary least square regression framework, finds that financial sector development weakly affect per capita growth of output. He attributed the result to shallow finance and the absence of well functioning capital markets. The finding of Nnanna (2004) was more disturbing. He, also using ordinary least square regression technique, concluded that financial sector development did not significantly affect per capita growth of output. Similarly, Nzotta and Okereke (2009), based on two stages least analytical framework for a period starting from 1986 t0 2007, concluded that financial deepening did not support economic growth in Nigeria. However, Afangideh (2009), using three stage least square estimation technique on a data spanning 1970 to 2005, found that a developed financial system alleviates growth financing constraints by increasing bank credit and investment activities with resultant rise in output. The finding of Agu and Chukwu (2008) is quite different from other authors on Nigeria. They employed the augmented Granger causality test to ascertain the direction of causality between financial deepening and economic growth in Nigeria between 1970 and 2005. Their findings revealed evidence to support both demand- and supply-leading hypotheses, depending on the financial deepening variable that is used. In addition to the existing literature on finance and economic growth, this study sets to investigate the path of finance-growth nexus in Nigeria.

III Methodology;

III.1 Description of Variables and Data

The study employed quarterly data on selected variables from 1960-2008. As in the empirical literature, real GDP per capita is used to measure real growth rates with 1990 as the base year. However, a limitation of studies on the financial sector is that there is no single measure of financial sector development, therefore, instead of a single proxy; four measures are employed in this study in order to improve the robustness of the results.

The first measure is M2-to-GDP (MCY) ratio otherwise known as measure of financial deepening. The ratio measures the degree of monetization in the economy as well as the depth of the financial sector while it also shows an expansion of payment and saving functions. The second measure used in the study is the ratio of bank deposit liabilities to GDP (BDCY). This determines the capacity of the banking sector to perform its core role of allocating funds between savers and firms. The third ratio employed in this study is domestic credit to GDP (DCCY), which reflects the extent to which financial intermediaries allocate society's savings as well as firms' use of credit in addition to internal funds. The last measure is the ratio of private sector credit to GDP. The basis for this indicator is that commercial financial intermediaries are able to identify profitable investments, monitor managers, facilitate risk management, and mobilize savings.

III.2 Unit Root Test

The Augmented Dickey Fuller (ADF) and the Phillips-Perron tests are used to test for unit roots in the following equation

$$\Delta y_t = c_1 + \omega y_{t-1} + c_2 t + \sum_{t=1}^{p} d_i \Delta y_{t-l} + \mu_t \qquad (1)$$

y_t = relevant time series
Δ = an operator for first difference
t = a linear trend
μ_t= error term

The null hypothesis of the existence of a unit root is Ho: ω=0. Failure to reject the null hypothesis leads to conducting the test on further differences of the series. Further differencing is conducted until stationarity is reached and the null hypothesis is rejected. We use the Akaike Information Criteria (AIC) to determine the lag length.

III.3 Cointegration Test

Cointegration regressions measure the long-term relationship between the variables whose existence guarantees that the variables demonstrate no inherent tendency to drift apart. We employ the Johansen Cointegration tests (Johansen 1988; Johansen and Juselius, 1990), which set up the non-stationary time series as a vector autoregression (VAR) of order p:

$$\Delta y_t = \prod y_{t-1} + \sum_{i=1}^{p-1} \Gamma i \, \Delta y_t + \beta x_t + \in_t \quad (2)$$

$$\prod = \sum_{i=1}^{p-1} Ai\text{-}1, \qquad \Gamma = -\sum_{i=i+1}^{p} Aj \quad (3)$$

where yt is a k-vector of the I(1) variables, x_t is a vector of the deterministic variables, r is the number of the cointegrating relations, and ε_t is an identically and independently-distributed error term.

Two test statistics, the trace test and the maximum eigenvalue test, are used to test the hypothesized existence of r cointegrating vectors. The trace test statistic tests the null hypothesis that the number of distinct cointegrating vectors is less than or equal to r against a general alternative while the maximum eigenvalue test statistic tests the null hypothesis that the number of cointegrating vectors is r against the alternative of r+1 cointegrating vectors..

III.4 Vector Auto Regressions (VAR)

A VAR system is constructed to test the null hypothesis that financial sector development does not Granger-cause economic growth. The Vector AutoRegressive approach facilitates investigation of dynamic interactions among jointly endogenous variables in stationary multivariate systems without imposing a priori structural restrictions. One advantage of this approach is that it relieves the investigator of the task of deciding which variables are endogenous or exogenous. In addition, the problems associated with simultaneous equation models are avoided because VARs do not include current variables as regressors. A VAR regression of this form is estimated.

$$X_t = C + \prod X_{i,\,t-1} + \prod_1 X_{i,\,t-2} + \ldots\ldots\ldots + \prod_{t-p+1} X_{i,t-p+1} + \varepsilon_t \quad (4)$$

$$t = 1, 2\ldots p \qquad i = 1,2\ldots\ldots\ldots m$$

where c is a constant and x_t is a vector of m x 1 variables in the system.

A variable X_{1t} is said to Granger cause another variable X_{2t} if any lagged value of X_{1t} is significant in the equation for X_{2t}. On the other hand, the null hypothesis will be accepted if all the lagged values of X_{1t} are jointly insignificant in the equation.

The model employed a modified version of Lee and Wong (2005) in which the equations in the VAR system contain the real per capita output and various measures of financial development. The Schwarz criterion is used to determine the number of lags to be included.
The VAR equations are specified as follow:

$$\Delta PGDP = \alpha_1 + \beta_{11}\Delta PGDP_{t-1} + \beta_{12}\Delta PGDP_{t-2} + \delta_{13}\Delta FI_{t-1} + \Delta_{14}\Delta FI_{t-2} \quad (5)$$

$$\Delta FI = \alpha_2 + \beta_{21}\ \Delta PGDP_{t-1} + \beta_{22}\ \Delta PGDP_{t-2} + \delta_{23}\Delta FIt\text{-}_1 + \Delta_{24}\Delta FI_{t-2} \quad (6)$$

If it is only the lagged values of the financial sector variables in equation 5 that are significant, we can infer that financial development Granger- causes economic growth. If the lagged independent variables in the two equations are significant, then, we can infer a bi-directional causality. However, if it is only the lagged value of the growth variable in equation (6) that is significant, we conclude that economic growth granger-causes financial development.

IV. Estimation Results

IV.1 Results from the Stationary Tests:

Unit root tests were performed on all the four variables using both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) statistics. The null hypothesis of a unit root cannot be rejected at the 1percent level for any the variables at the levels. Each of the variables becomes I(0) after differencing, showing that all the variables at their levels are non-stationary but their growth rates are stationary. The results of these tests are presented in table 1.

Table1: Results of Unit Root Tests (Constant, trend included)

Variable	Augmented Dickey-Fuller (ADF) Test		Phillips-Perron (PP) Test		Remarks
	Prob. Value (level)	Prob. Value (1st Difference)	Prob. Value (level)	Prob. Value (1st Difference)	
PGDP	0.3624	0.0000*	0.2144	0.0000*	I(1)
MCY	1.0000	0.0017*	0.9993	0.0000*	I(1)
NDCY	0.3624	0.0000*	0.9963	0.0000*	I(1)
DDY	1.0000	0.0054*	0.8935	0.0000*	I(1)

** Rejection of null hypothesis of unit root at 1%*

IV.2 Results from Cointegration Test

We test for the number of cointegrating vectors under the assumption that the series have a linear trend and the cointegrating equations have intercepts. Hannan-Quinn Information Criterion (HQ) and Schwarz Information Criterion (SIC) give a lag length of five as the appropriate lag structure.

Table 2: Johansen Multivariate Cointegration Test Result

Sample (adjusted): 1961Q3 2008Q4
Included observations: 190 after adjustments
Trend assumption: Quadratic deterministic trend
Series: GDDY GNDCY MCY PGDP
Lags interval (in first differences): 1 to 5

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.164749	80.49391	55.24578	0.0001
At most 1 *	0.112926	46.28957	35.01090	0.0021
At most 2 *	0.099943	23.52252	18.39771	0.0088
At most 3	0.018335	3.516027	3.841466	0.0608

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.164749	34.20434	30.81507	0.0185
At most 1	0.112926	22.76705	24.25202	0.0776
At most 2 *	0.099943	20.00649	17.14769	0.0187
At most 3	0.018335	3.516027	3.841466	0.0608

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The Trace statistics and the Maximum Eigenvalue statistics for the model are presented in Table 2. The null hypothesis of the absence of a cointegrating

relation among the variables is rejected at the 95 percent confidence level for both statistics. Furthermore, the Trace statistics indicates that there are three cointegrating equations while the Maximum Eigenvalue statistics indicates one cointegrating equation. The existence of Cointegration is indicative of a long run relationship between real output and the financial variables and is consistent with the finance-led theories.

V.3 Correlation Results

Table 3 summarizes the correlation among the variables used. As expected, there is a positive correlation between real GDP per capita and the various measures of financial sector development. Similarly, there is positive correlation among the various measures of financial development with the highest level of correlation between financial deepening variable and deposit liability of the Deposit Money Banks..

Table 3: Correlation Results

Covariance Analysis: Ordinary
Sample: 1960Q1 2009Q4
Included observations: 200

Correlation Probability	PGDP	MCY	NDCY	DDY
PGDP	1.000000			
MCY	0.414392	1.000000		
NDCY	0.464415	0.922951	1.000000	
DDY	0.397231	0.995741	0.902480	1.000000

V.4 VAR Estimation Results

The results of some selected variables from VAR estimates are presented in Table 4 while the full results are shown in Appendix 1. The test showed that credit to the private sector (CPSY), financial deepening (MCY), and deposit liability (DDY) were significant at 1 per cent while financial deepening was significant at 5 per cent level of significance. The results suggest that all the measures of financial development employed in the study granger-cause output. The result on financial deepening in particular is contrary to the finding of Nnanna (2004) as well as most of the studies on Nigeria. In addition, per capita output granger-

causes both net domestic credit and credit to the private sector at 1 per cent level of significance. This is a typical case of bidirectional causality.

The result on domestic credit is in tandem with findings in some developing economies. In China, for instance, Jean-Claude (2006) shows evidence of causality from domestic credit to economic growth which was predicated on the fact that the large share of the state budget and direct credit in China constitute some of the official development tools used by the Chinese authorities. The entire result revealed that the various measures of financial sector development have impact on economic growth contrary to most of the earlier studies on Nigeria. In view of this finding, the development of the financial sector is still very critical to overall economic growth. Nevertheless, the bi-directional causality on net domestic credit and credit to the private sector implies that both demand-led and supply-led hypotheses hold in Nigeria, lending support to the finding of Agu and Chukwu (2008).

Both net domestic credit (NDCY) and credit to the private sector (CPSY) were not significant at 5 per cent level, indicating that these variables do not granger-cause economic growth. On the other hand, financial deepening (MCY) and deposit liabilities (DDY) were significant at 5 and 1 per cent, respectively, suggesting that both variables granger-cause economic growth. Furthermore, output does not granger-cause financial deepening and deposit liabilities at 5 per cent level of significance while it granger-causes net domestic credit and private sector credit at 1 and 5 per cent, respectively.

Finally, the results from this study tend to corroborate the evidence (Arestis and Demetriades, 1996) that the causal link between finance and growth is crucially determined by the nature and operation of financial institutions and policies pursued in each country.

Table 4: Granger Causality Results

Pairwise Granger Causality Tests

Sample: 1960Q1 2009Q4
Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
NDCY does not Granger Cause PGDP	196	2.67331	0.0334
PGDP does not Granger Cause NDCY		3.54008	0.0082
MCY does not Granger Cause PGDP	196	6.30290	9.E-05
PGDP does not Granger Cause MCY		1.81815	0.1270
DDY does not Granger Cause PGDP	196	5.06742	0.0007
PGDP does not Granger Cause DDY		2.04039	0.0905
CPSY does not Granger Cause PGDP	196	5.86096	0.0002
PGDP does not Granger Cause CPSY		4.49354	0.0017

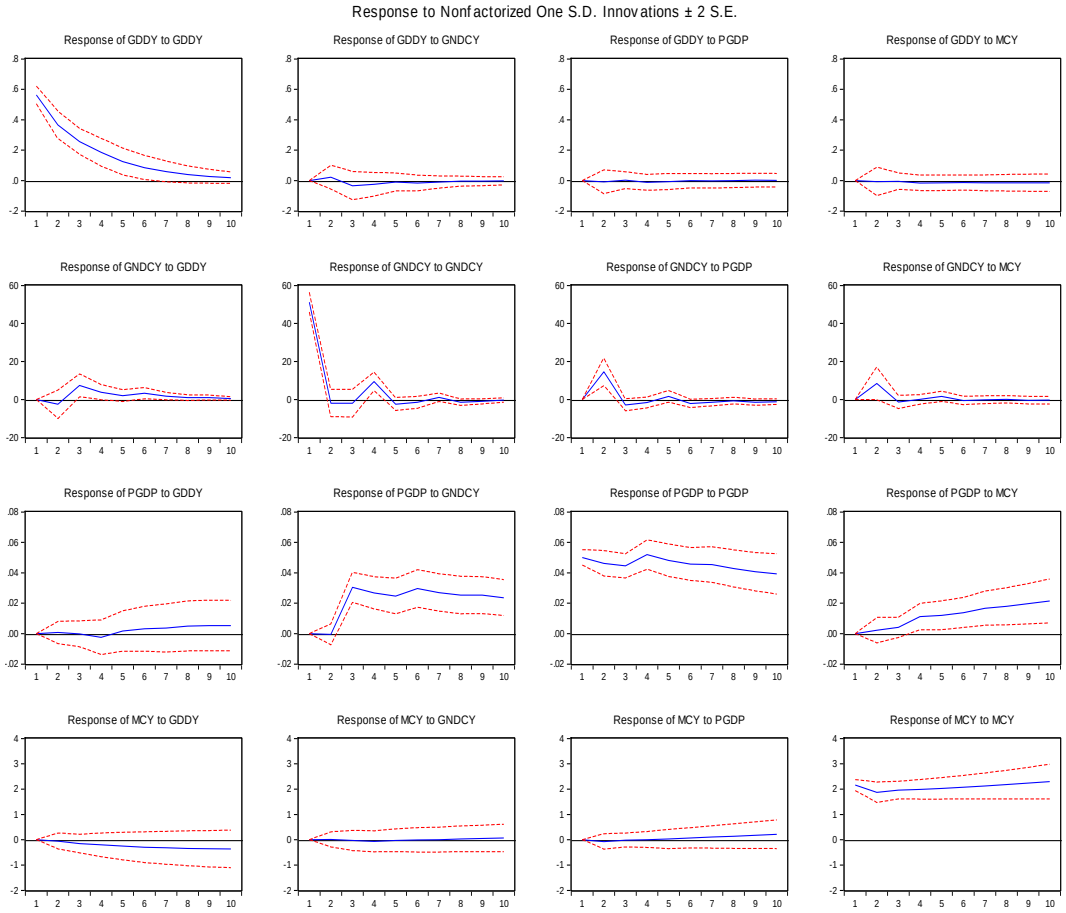
IV.5 Results from Impulse Response Function

Figure 3 presents impulse response functions which trace the long-run responses of the system variables to one standard deviation shocks to the system innovations spanning over the ten (10) quarters. The result shows that each variable responds significantly to its own one-standard deviation shock. Furthermore, the results reveal per capita output responds to shocks in net domestic credit (GNDC) and financial deepening (MCY). For example, a one standard deviation shock to the innovations in net domestic credit would lead to a significant positive response in output from the third quarter and the increases would be sustained up to the tenth quarter horizon (column 2, row 3). Similarly, a one standard deviation shock to financial deepening would commence a moderate shock in per capita output from the second quarter and it would rise consistently up to the tenth quarter. Consistent with the Granger analysis,

innovations to deposit liabilities of the domestic money banks did not yield significant output response.

Finally, it could be observed from the impulse response function is that it takes per capita output at least two quarters to respond to shocks in both financial deepening and net domestic credit. This has implication for policy makers to be forward-looking in tinkering with the various policy variables.

Figure 3: Impulse Response Function



IV.6 Variance Decomposition

The results of variance decomposition of the model over a 10-quarter horizon are presented in Appendix 2. The variance decomposition apportions the total fluctuations in a particular variable to the constituent innovations in the system. The results show that the variables are largely driven by themselves. For example, about 99 per cent of the variations in per capita output are due to its own innovations during the first two quarters of the forecast horizon. The contribution of net domestic credit to the variations in per capita output becomes significant from the third quarter when it reaches 11.83 per cent. The net domestic credit contributes about 23 per cent to the innovations in per capita output by the tenth quarter. The contributions of other variables become noticeable in the tenth quarter as deposit liability contribute about 2 per cent, financial deepening

contribute about 6 per cent and net domestic credit contribute about 23 per cent. Thus, the principal drivers of PGDP are itself and net domestic credit.

The variances of net domestic credit are driven primarily by itself in the first quarter, contributing about 99.9 per cent of the total variations. By the second quarter, all the other variables collectively contribute about 5 per cent of the total variations in net domestic credit. The per capita output emerges as the second major driver of GNDCY, contributing about 4.0 per cent of the total variations in GNDCY by the end of the tenth quarter. The shares of deposit liability and financial deepening in the total variations of net domestic credit stand at 2.85 and 1.75 per cent, respectively. This result is suggestive that a reasonable portion of total deposit mobilized by the DMBs does not translate to credit to the domestic economy.

With regard to variations in financial deepening (MCY), its own contribution stands at 68.64 per cent while that of per capita output is 31.01 per cent during the first quarter of the forecast horizon. By the end of the fifth quarter, the share of per capita output in total variation of financial deepening increases to 31.41 per cent. The total contribution of the two remaining variables is less than one per cent of the total variations in financial deepening at the end of the tenth quarter. Thus, the key model variables driving financial deepening are itself and per capita output.

The variations in deposit liability of the DMBs are basically driven by itself. For instance, variations in deposit liability contribute the whole of the total variations in the first quarter of the forecast horizon while at the end of the tenth quarter; it still contributes about 99.0 per cent.

In sum, the variance decomposition shows that the significant variation for each variable is due to its own variations but the case of the deposit liability of the DMBs is on the extreme side. Variation from itself accounts for almost 100 per cent of total variations in the deposit liability of the DMBs. Lastly, the results of variance decomposition analysis confirm the significant influence of the net domestic credit and output on each other, suggesting that both financial sector developments and output growth complement each other.

VI. Summary and Policy Considerations

The paper aims to provide an empirical framework for understanding the finance – growth nexus in Nigeria. Most of the earlier studies used financial deepening to proxy financial sector development and concluded that there was no relationship between financial sector development and economic growth in Nigeria. This study, however, employed four measures, financial deepening, growth in net domestic credit, and growth in deposit liability of DMBs to proxy financial sector development. To this end, the analysis empirically tested competing finance-growth nexus hypothesis using the Granger non causality tests for Nigeria over the period 1960-2009. Unlike most of the earlier studies, the major empirical results show that financial deepening does not have any influence on Nigeria's economic growth. The VAR results indicate that changes in net domestic credit impact on economic growth while per capita output also influences net domestic credit, that is, there is bi-directional causality between net domestic credit and economic growth. Changes in deposit liabilities appear to have no major impact on economic growth.

The long-run responses of the system variables to one standard deviation shocks show that a one standard deviation shock to net domestic credit would lead to a significant positive response in output from the third quarter and the increases would be sustained up to the tenth quarter horizon. The variance decomposition shows, among others, that the contribution of net domestic credit to the variations in per capita output reaches 11.83 per cent by the seventh quarter and increases above 20 per cent by the tenth quarter. Furthermore, the shares of deposit liability in the total variations of net domestic credit are negligible, suggesting, among others, that a reasonable portion of total deposit mobilized by the DMBs does not translate to credit to the domestic economy.

The fact that the growth in the net domestic credit positively influences output has major implications. To fully realize the growth potentials of the Nigerian economy, it is necessary to remove all obstacles that could undermine the growth of credit to the domestic economy. Among other measures, the establishment of the proposed Asset Management Corporation should be hastened to free the DMBs from non-performing loans, and thereby, enhance their ability to extend credit to the economy.

Lastly, the evidence of bidirectional causality between net domestic credit and economic growth implies simultaneity between financial development and economic growth. The finding suggests that the development of financial institutions should not be emphasized unilaterally; rather, attention should also be

given to the complimentary and coordinated development of reforms in other areas. Development of the financial sector should not proceed at a faster pace than structural changes in the real sector or changes taking place in institutional setting.

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Appendix1: The full Estimated VAR Results.

Vector Autoregression Estimates
Sample (adjusted): 1960Q3 2008Q4
Included observations: 194 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	GDDY	GNDCY	PGDP	MCY
GDDY(-1)	0.649466	-4.408328	0.001263	-0.092441
	(0.07334)	(6.67450)	(0.00653)	(0.28123)
	[8.85604]	[-0.66047]	[0.19356]	[-0.32871]
GDDY(-2)	0.035638	15.85554	-0.002234	-0.126767
	(0.07355)	(6.69411)	(0.00654)	(0.28205)
	[0.48453]	[2.36858]	[-0.34136]	[-0.44944]
GNDCY(-1)	0.000437	-0.037261	-1.04E-05	0.000230
	(0.00076)	(0.06921)	(6.8E-05)	(0.00292)
	[0.57479]	[-0.53839]	[-0.15352]	[0.07898]
GNDCY(-2)	-0.000918	-0.035784	0.000602	-0.000714
	(0.00076)	(0.06910)	(6.8E-05)	(0.00291)
	[-1.20932]	[-0.51784]	[8.90595]	[-0.24536]
PGDP(-1)	-0.166642	290.5638	0.922199	-1.426310
	(0.78307)	(71.2689)	(0.06967)	(3.00287)
	[-0.21281]	[4.07700]	[13.2359]	[-0.47498]
PGDP(-2)	0.185118	-308.1234	0.043878	2.189901
	(0.77499)	(70.5338)	(0.06896)	(2.97190)
	[0.23887]	[-4.36845]	[0.63632]	[0.73687]
MCY(-1)	-0.002904	3.918219	0.001060	0.868167
	(0.02170)	(1.97500)	(0.00193)	(0.08322)
	[-0.13380]	[1.98391]	[0.54911]	[10.4328]
MCY(-2)	0.000852	-4.167140	6.31E-05	0.155175
	(0.02310)	(2.10262)	(0.00206)	(0.08859)
	[0.03687]	[-1.98188]	[0.03072]	[1.75156]

C	0.000509	14.72419	0.014757	-0.275807
	(0.09964)	(9.06830)	(0.00887)	(0.38209)
	[0.00511]	[1.62370]	[1.66459]	[-0.72184]
R-squared	0.458625	0.129597	0.965287	0.955074
Adj. R-squared	0.435214	0.091958	0.963786	0.953131
Sum sq. resids	58.66083	485905.1	0.464401	862.6285
S.E. equation	0.563104	51.24953	0.050103	2.159365
F-statistic	19.59032	3.443142	643.0528	491.6093
Log likelihood	-159.2537	-1034.387	310.1078	-420.0103
Akaike AIC	1.734575	10.75657	-3.104204	4.422787
Schwarz SC	1.886176	10.90817	-2.952602	4.574388
Mean dependent	-0.008679	5.072178	0.577807	5.488529
S.D. dependent	0.749284	53.78198	0.263283	9.974335
Determinant resid covariance (dof adj.)		6.650709		
Determinant resid covariance		5.499813		
Log likelihood		-1266.454		
Akaike information criterion		13.42736		
Schwarz criterion		14.03376		

Appendix 2: Variance Decomposition (percent of total variance)

Appendix 2a: Variance Decomposition of GDDY:

Period	S.E.	GDDY	GNDCY	PGDP	MCY
1	0.563104	100.0000	0.000000	0.000000	0.000000
2	0.671461	99.87667	0.112170	0.005179	0.005985
3	0.719502	99.66805	0.314596	0.009619	0.007732
4	0.743173	99.54232	0.408732	0.010879	0.038064
5	0.753649	99.51044	0.416346	0.011134	0.062078
6	0.758662	99.43911	0.459727	0.018684	0.082480
7	0.761144	99.38979	0.474635	0.025775	0.109805
8	0.762332	99.34993	0.476745	0.038667	0.134659
9	0.762989	99.30566	0.479413	0.056545	0.158381
10	0.763400	99.26198	0.479584	0.074945	0.183491

Appendix 2b: Variance Decomposition of GNDCY:

Period	S.E.	GDDY	GNDCY	PGDP	MCY
1	51.24953	0.006358	99.99364	0.000000	0.000000
2	52.70107	0.045369	94.72595	3.459363	1.769313
3	53.26732	1.838160	92.85201	3.538587	1.771246
4	54.27160	2.260441	92.53526	3.497970	1.706332
5	54.39425	2.417159	92.31950	3.501832	1.761513
6	54.52999	2.721523	91.92947	3.588767	1.760238
7	54.58345	2.804271	91.79558	3.642632	1.757516
8	54.61477	2.829700	91.75846	3.655980	1.755856
9	54.64371	2.851719	91.69076	3.699915	1.757609
10	54.65535	2.855224	91.65508	3.730692	1.759001

Appendix 2c : Variance Decomposition of PGDP:

Period	S.E.	GDDY	GNDCY	PGDP	MCY
1	0.050103	0.497425	0.110561	99.39201	0.000000
2	0.067384	0.641757	0.149192	99.12981	0.079240
3	0.084751	0.568958	11.83992	87.37727	0.213850
4	0.099943	0.452718	14.96074	83.56632	1.020220
5	0.111268	0.643795	16.51738	81.21856	1.620269
6	0.121738	0.902372	19.31610	77.53998	2.241548
7	0.130567	1.156459	20.75923	75.02089	3.063420
8	0.137901	1.476944	21.75597	72.85015	3.916940
9	0.144405	1.772637	22.72735	70.65163	4.848389
10	0.150080	2.027049	23.38651	68.68217	5.904268

Appendix 2d: Variance Decomposition of MCY:

Period	S.E.	GDDY	GNDCY	PGDP	MCY
1	2.159365	0.252682	0.090693	31.01081	68.64581
2	2.885386	0.158175	0.110725	32.30672	67.42438
3	3.492293	0.132389	0.083687	32.09381	67.69012
4	4.017130	0.168517	0.063488	31.79598	67.97202
5	4.493617	0.244472	0.057525	31.41669	68.28131
6	4.936996	0.345052	0.057931	30.85684	68.74018
7	5.356370	0.442445	0.063519	30.26587	69.22817
8	5.758662	0.531182	0.081189	29.65853	69.72909
9	6.148428	0.608823	0.105317	29.03220	70.25366
10	6.528991	0.672314	0.135144	28.41225	70.78029