Deposit Money Banks' Credit to Private-Public Sectors and Economic Development Nexus: Nigeria in Focus

Funso T. Kolapo, Michael O. Oke, Temitayo O. Olaniyan

Full Terms & Conditions of access and use can be found at
http://hrmars.com/index.php/pages/detail/publication-ethics

Deposit Money Banks' Credit to Private-Public Sectors and Economic Development Nexus: Nigeria in Focus

Funso T. Kolapo[a], Michael O. Oke[a] (Ph.D.), Temitayo O. Olaniyan[a,b]

[a] Department of Finance, Ekiti State University, Ado-Ekiti, Ekiti State, [b] Department of Finance, University of Ilorin, Ilorin, Nigeria

Abstract

We scrutinized deposit money banks' credit to private-public sectors and its nexus with economic development in Nigeria over the period 1970-2016. This study adopt per capital income as the proxy for economic development, while credits to private sectors, credits to government sectors, money supply, and lending interest rate were the financial deepening variables. We employed the Ng-Perron and Augmented Dickey Fuller Breakpoint Unit Root Tests in checking the presence of unit root, and in determining the order of integration of the variables– I(d) in the presence of structural break for each variables respectively, while the T-Y augmented Granger causality test is used to reveal how causal effects flow in this study. Hence, taking account of the effect of structural breaks, we found that bank credits to government sectors and lending interest rates were stationary series as $p < 0.01$. We also found from the T-Y Granger causality results in its overall sense that the feedback hypothesis by contrast to prior studies holds in the Nigerian context. The feedback hypothesis establish that banks' credit and economic development granger cause each other. In this paper, we recommended among other things that the monetary authorities should regulate the activities of deposit money banks to ensure that they gear up the growth of credits to private sectors by examining factors, such as lending interest rate which can possibly undermine lending to these sectors; considering their role as key engine of economic development in any developing economy.

Keywords: Bank Credits, Economic Development, Toda-Yamamoto Augmented Granger Causality, Deposit Money Banks, Feedback Hypothesis, Nigeria.

Introduction

The leading role played by bank financial institutions in developing economies cannot be undermined; these institutions perform the most crucial function in an economy as catalyst to developmental process. In the last decade, institutional credits to the private and public sectors for investment purposes has increased significantly; thereby helping to build up huge infrastructural facilities, capital project backing as well as meeting other recurrent expenditures

214

of the government respectively. However, the incidence of problem loans in banks has also increased simultaneously over the last decade; the increase is an indication that most of the credit advanced to customers may have entered into wrong hands. A situation which arises whenever individual and/or institutional borrowers' default in repaying the principal and/or accrued interest on a loan facility. Problem loans can be caused by several systematic and/or macroeconomic elements, which includes: unemployment, public debt, GDP and interest rates (Anastasiou, Louri & Tsionas, 2016; Ghosh, 2015; Louzis, Vouldis & Metaxas, 2012; Makri, Tsagkanos & Bellas, 2014). It may also be created by other macroeconomic factors, such as: political instability, incessant economic policy changes, energy crisis as well as the lack of commitment (customer's willful default), unrealistic investment projects, moral hazard, skimping and poor credit administration to mention but a few for customer- and bank-specific factors respectively. For many reasons, bank credits irrespective of who benefit of it should serve as an economy propellent; thus stirring up a desirable level of economic growth and/or development.

Deposit Money Banks (Hereafter, DMBs) as bank financial institutions generally act as lenders of short- and medium term loans to both private and public sector borrowers, hence they create the money they lend out to customers not as an individual bank but collectively as a system.[1] DMBs are also known as commercial banks in most developing countries, and with different names in other parts of the world. Wherever they are and by whatever name they are known for, they have a general and similar characteristics, and as well similar to but in many cases somewhat different from non-bank financial institutions. In developing countries, bank financial institutions must be awaken to the crucial role of financing economic projects and other related activities (Korkmaz, 2015; Levine & Zervos, 1998; Naceur & Ghazouani, 2007); therefore their contributions in ensuring sustainable economic growth and/or development should be unqualified. Generally, DMBs assume an intermediary role between the surplus units (those that are willing to lend to others by savings with the DMBs) and the deficit unit (whose who needs funds kept with the DMBs). Bank financial institutions play a key function by facilitating credit flow from the savers' side to the users' group in an economy, and in that process they create multiplicity of investments, which serve as one of the drivers of economic growth. However, some studies (see, for example, Demetriades & Luintel, 1996) have cast doubts on if a repressed banking sector can retard the growth of an economy, however, the studies of Roubini and Sala-i-Martin (1992); Singh and Bruce (1998) argue that a repressed banking sector reduce economic growth. Conversely, a liberalized banking sector can stimulate the growth in an economy (Ang & McKibbin, 2007; Bekaert, Harvey & Lundblad, 2005; Demetriades & Hussein, 1996), notwithstanding few exceptions also exist (see, for instance, Pagano, 1993).
In spite of the perceived roles played by these bank financial institutions in smoothing and keeping the Nigerian economy on the path of growth and development, several critical factors inhibit their functions. They also experience many challenges in ensuring that their funds have

---

[1] Werner (2014) argued that individual banks cannot create "money" for the fact that they serve as mere intermediaries in the financial sector, however, with their systemic interactions they collectively create "money" as underpinned by banks "fractional reserve theory".

significant positive impacts on the productive sectors of a small open economy, like Nigeria. However, the debate on financial deepening indicators' link with economic development is age-longed, and prior studies have documented evidence roughly in support of the demand-following hypothesis, supply-leading hypothesis, feedback hypothesis, or the neutral hypothesis. The causal link between these variables will continue to create a controversial and contentious discussion, as prior research outputs have discussed diverse results across various countries, and for studies that used different data sets, study periods and/or methodologies. In Nigeria, the two main strands which have emerged are: the demand-following and supply-leading views. Therefore, this study provides an answer to the question on the causal link between deposit money banks' credit to public-private sectors and economic development in Nigeria. The motivation for this study emanates from the diverse results obtained by prior studies in Nigeria, and the need to also investigate an unpopular belief that banking sector reforms experienced in Nigeria for this 21st century may have been precipitated supporting the supply-leading hypothesis. Evidence to prove that, we differentiate from existing studies in Nigeria in two ways: First, we contribute new knowledge as we are able to document the relevance of the feedback hypothesis for the Nigeria; in resonance with the burgeoning empirical studies conducted for developed economies. This implies that the financial deepening-growth nexus follows a two-way causality, and other evidences may be taken with a large grain of salt. Second, we focus and concentrate on banks' credits to private sector and public sector alike; converse to taking one in isolation of the other. To the best of our knowledge, Agu and Chukwu (2008); Odeniran and Udeaja (2010) are the prior studies that found the mutual interdependence hypothesis applicable to Nigeria also by adopting the causality approach, even with that, their studies lack current relevance. The choice of variables also differs, hence this study is able to bridge these gaps by including credits to government sector as one of the features because of its alignment to the study's objective and also by updating the study's scope. However, it is imperative to state that financial deepening and growth nexus is much more highly complex than previously thought, in that, in many cases the empirical model and econometric method relied upon has shaped the relationship between these variables in previous studies.

The remainder of this paper proceeds as follows: In the next section, we discuss the literature review. Section 3 entails data issues and pre-estimation analyses. Estimation results and discussion is presented in section 4. Finally, we conclude in section 5.

Literature Review
Conceptual Literature
This section of the study covers the clarification as regards the role of deposit money banks in economic development.

Deposit Money Banks (DMBs) and Economic Development
Deposit money banks (DMBs) plays important role in accelerating the growth in a small open economy, like Nigeria. These institutions perform roles that are pivotal in ensuring that adequate funds flow between economic entities, especially in servicing the activities of the deficit sides of an economy (Ogege & Boloupremo, 2014). Deposit money banks perform series of specified functions to stimulate the development of an economy. They are also expected to

meet the finance needs of some preferred sectors, such as the: industrial, agricultural, communication, trade and commerce, and other productive sectors; they therefore should serve as an untiring force in providing funds that meet the financial needs of the private-public sectors. In this 21st century, the key functions performed by deposit money banks are fast becoming more customer-centered, therefore these banks are widening their primary and secondary functions. It now seems clearer that it is impossible to separate the development of banking institutions from the growth of modern economies, because not until the fall of the seventh-century, there was no record anywhere in the world which affirms the existence of any modern banking institution, since there was also no modernly developed economy at that time. The availability of natural resources endowment, technical know-how, supply of skilled manpower and labour and, of course, capital resources are factors that determine the level of development of an economy (Ogege & Shiro, 2013). Capital resources is, of course a critical factor required in economic development process, whether it is real or financial capital. Undoubtedly, they are both instrumental to any meaningful economic development, and this therefore underscore the importance of banking institutions, most especially the deposit money banks. DMBs serve as an intermediary between the savers' side and the spenders' side in any economy who intends to channel the funds they acquired to investment opportunities, and into what open the door for economic development.

Therefore, these banks pool together the funds of the scattered savers, and make it available for the users of funds, that are investment ready. Consequently, it is possible for qualified investors to access a substantial stock of funds which exist in temporary residence with DMBs, and invest such in large physical projects (Ogege & Shiro, 2013). They added that the intermediary activities of these banks in aggregating savings and investment are economically very rewarding. Unsurprisingly, the quantum of purchasing power available for the investment and consumption expenditures can be influenced by these banks. They do this through their credit contraction power, and by their established policies, they also can affect the direction of funds to alternative uses, through the prices of the various financial claims. In addition, they also make choice of whether their credits are available for financing investment in some preferred sectors of an economy or consumption purpose, however, their choice in this regard tells about what become of a nation's pattern of development. DMBs differs from other financial intermediaries, in that they have a "high degree of liquidity" against their demand deposits. They also as a system of banks have the ability to "create" and "destroy" money. A greater proportion of the supply of money in a modern economy is created by these institutions from the customers' deposit with them. They also as a group serve as the principal supplier of the medium of exchange in an economy. However, deposits money banks face a myriad of problems that may impede their contributions to economic development in a nation, and these problems can be classified into those that create internal or external threats to their survival. To mention a few are: bad management, board room crisis, risk asset portfolio, weak capital bases, unstable economic and political environment, legal problems, international financial crisis, and financial distress among others.

Theoretical Review

There are several theories in economics and finance literature that offers theoretical explanation on the link between deposit money banks' credit and economic development. These theories are discussed as:

Theory of Savings Mobilization

Financial institutions perform savings mobilization as one of the major functions. As banks in an economy mobilize savings from the savers' side in their millions, it is also important that they channel same to the deficit spending units. This will in a way, enhance economic growth and development. One major determinant of the development process (in terms of the relations between output growth rate and capital stock) is capital accumulation (Saint-Paul, 1992). He added that capital plays the dual role of increasing production capacity and effective demand.
Solow (1956) and Swan (1956) assumed separately that capital stock (investment) equals saving. A continuous increase in income level largely determines the increase in investments, and what savings will be (Harrod, 1939). However, the savings of some economic agents is what serve as banks' credit.

Theory of Financial Repression

The path-breaking works of Cameron, Crisp, Patrick and Tilly (1973); McKinnon (1973) and Shaw (1973) discussed that financial development will contribute more laudably to economic growth in a nation where the authorities have no interference in the operations of the financial institutions. Interference, which can come in the form of interest rate regulation, ceilings on deposit and loan rates, guidelines on lending operations or any other official guidelines is responsible for the poor performance of some banks and other financial institutions. A low and often negative real rate of return on financial assets, and also on the deficient savings being mobilized and channeled into investment projects is frequently the result of several interference (Agu, 1988). The proponents of financial repression theory, therefore advocated a positive real interest and financial liberalization. The reckoning forces of a free market can ensure the presence of an optimal financial structure, the elimination of market fragmentation and some attendant distortions to the proper operation of the mechanisms which exist in the market. Based on the financial repression hypothesis, government legislations and policies distort the operation of the market mechanisms in the determination of the "prices" of financial resources. Financial repression majorly results in limited savings, and savings are limited due to interest ceilings. The hypothesis can be ultimately reduced to official interest rate policies. Portfolio regulation and oligopolistic financial markets, are also recognized as what might result in other forms of financial repression (Galbis, 1982). The attention of the financial repression hypothesis is also drawn to the interest accrued on the savings instruments available to the public and how inflation also affects it. However, a positive real rate of interest is a pointer to financial deepening, and not financial repression.

Supply-Leading Hypothesis

Schumpeter (1911) propounded the "supply-leading hypothesis", and the hypothesis was espoused by Calderon and Liu (2003); Gurley and Shaw (1967); King and Levine (1993); and McKinnon (1973). The hypothesis strongly believe that financial development positively affects

economic growth and/or development. The hypothesis holds that as capital accumulation, savings and investments rate increases, financial development also deepens, and this is closely followed by an increased economic growth. However, because entrepreneurs can easily access supply-leading funds, they have their expectations increasing. They can blow up existing standards in order to open up new horizons (possible alternatives), thereby challenging them to "think broadly"; hence this represent the basic tenet of the hypothesis.

Demand-Following Hypothesis
The demand-following hypothesis was pioneered by Robinson (1952). This Keynesian theory holds that changes in the real sectors affect financial development. This theory asserts that with an expansionary fiscal policy, financial deepening occurs. The belief is that full employment can be reached by injecting money into the economy through increase in government spending. When the level of income and aggregate demand in an economy are instigated, the demand for money also increases and all is the result of an increased government spending (Mckinnon, 1973). An indispensable need for increased economic growth is what makes demand to increase in the financial sector (Robinson, 1952). In this same view, higher demand for using money is driven by improvements in the economy, it consequently stimulate developments in the financial sector. In a different way, an increase in the demand for the services of operators in the financial markets by a growing real sector will result in the development and progress of the markets. Therefore, an increase in the demand for financial services is triggered by rising economic growth, and this is the corollary result of an expanded financial sector (Goldsmith, 1969; Jung, 1986; Kar & Pentecost, 2000; Lucas, 1988; Ndlovu, 2013; Omotor, 2007; Robinson, 1952).

The feedback, mutual dependence or interdependence hypothesis which was championed by Patrick (1966) is one of the two other hypothesis which exist between the supply-leading and demand-following hypothesis. It states the existence of a mutual effect between financial development and economic growth, hence it establishes reciprocity. The neutral hypothesis expressed most prominently by Lucas (1988) is the second hypothesis, and it asserts the absence of any relationship at all between financial development and economic growth.

Empirical Review
Nyasha and Odhiambo (2018) employed a revisionist approach to a previously authored paper, to re-investigate the nexus between financial development and economic growth in Kenya. They find that nexus we talk about here varies over time, and also per country. Their study concluded that whatever is used as proxy in capturing financial development; coupled with the estimation method applied are significant determinants of the nexus between the variables in question. Utilizing an alternate approach and a dataset from 24 developed economies, Swamy and Dharani (2018) also explored the causal relations between financial development and economic growth over the period 1983-2013. It found using panel Granger causality tests that the feedback hypothesis exist.

By adopting the Toda-Yamamoto augmented Granger causality test, Karimo and Ogbonna (2017) investigated the causality between financial deepening and economic growth in Nigeria over the period from 1970-2013. Their results revealed that financial deepening-growth nexus in Nigeria follows the supply-leading hypothesis. Over the period from 1981-2014, Okafor,

Ezeaku and Ugwuegbe (2016) evaluated the nexus between deposit money banks' credit and the economic growth in Nigeria. The results of the vector autoregressive (VAR) Granger causality test used in the study showed that financial development is sine-qua-non for economic growth in Nigeria, hence the study supports the supply-leading hypothesis.

In Saba (2016), the causal effect of bank activities on economic growth was investigated in Pakistan from 1961-2013. The study which employed co-integration and Granger causality test in its analysis revealed that bank activities has no significant impact on economic growth, and that saving and lending activities result in no significant benefits. Ihemeje and Ikwuagwu (2016) studied the effect of sectorial credits from deposit money banks on the economic growth in Nigeria within the period from 1985-2014. The regression results revealed that credits to the agricultural and manufacturing sectors have positive effect, while those advanced to commerce and trade showed an inverse relationship with economic growth.

Iwedi, Igbanibo and Onuegbu (2015) empirically investigated the impact of banks' domestic credits on Nigeria's economic growth. Gathering time series data for the period from 1980-2013, the co-integration result should a weak long run relationship between banks' domestic credit indicators and gross domestic product of Nigeria. The study recommended that the monetary authorities should devise appropriate policies that will enhance ta mutual dependence response between the banking sector development and the real sector growth. In Akakabota (2015), the effect of financial sector reforms on economic growth in Nigeria over the period from 1986-2012 was examined. The regression technique employed showed that credit claims of deposit money banks affects economic growth in a positive way while interest rate charge by banks for lending has negative relationship with economic growth.

Fapetu and Obalade (2015) also investigated the impact of sectoral allocation of banks' credit on economic growth in Nigeria for the periods of intensive regulation, deregulation and guided deregulation. The ordinary least square technique employed for the three regimes revealed that credits allocated to private and public institutions have significant positive contributions on economic growth during period of intensive regulation, but otherwise in the deregulation era. Neelam (2014) studied the impact of bank credit on economic growth in Nepal for the periods from 1975 to 2013. The analysis done via Johansen approach to Co-integration approach and error correction model showed that bank credit to the private sector has positive effects on the economic growth in Nepal in the long run.

In a study for the effect of deposit money banks intermediation role on economic growth in Nigeria for the 1973-2011 period, Ogege and Boloupremo (2014) found that credit allocation to the production sectors has significant impact on economic activity. Balago (2014) examined the causal link between bank credit and economic growth in Nigeria for the periods from 1983 to 2012 by establishing VEC models. The result of the study showed that causality runs from bank credit to the real GDP.

Employing regression technique, Ogege and Shiro (2013) examined the role of banks deposit money in the growth of Nigerian economy for 1974-2010 period. The study found a co-integrating relationship between economic growth and role of banks in the Nigerian economy. Taking 10 banks as sample, Aurangzeb (2012) also investigated the contributions of banking sector to economic growth of Pakistan for the periods from 1981 to 2010. The regression results indicated that banks deposits, investments, advances, profitability and interest earnings have significant positive impact on economic growth of Pakistan. The study also confirmed a

bidirectional causal relationship of deposits, advances and profitability with economic growth, and a unidirectional causal relationship running from investments and interest earnings to economic growth.

The association between credit in banking sector and economic growth in Nigeria was examined by Akpansung and Babalola (2012) for the period from 1970 to 2008 utilizing the two-stage least squares approach and Granger causality test. The study establishes evidence that credit in private sector positively affected on economic growth while lending rate slows down economic growth., while evidence of unidirectional causal relationship from GDP to private sector credit (PSC) and from industrial production index (IND) to real GDP. Okwo, Mbajiaku and Ugwunta, (2012) investigated the effect of bank credit to the private sector on economic growth in Nigeria for the periods from 1981 to 2010. The co-integration result of the study showed that bank credit to private sectors has a strong positive and significant relationship with economic growth.

Theoretical Basis, Data Issues and Preliminary Analyses

This study adopts an econometric methodology in the analysis of the link between deposit money banks' credit and the development of an economy, looking at Nigeria in focus. In this study, we adopt a technique that provide evidence for the direction of causality between the two variables of interest. This study complied data on per capital income, bank credits to private sector, bank credits to government sector, money supply, and lending interest rate for the time period which spans from 1970 to 2016, and these data which were transformed to their natural logarithms was derived from the Central Bank of Nigeria *statistical bulletin*, National Bureau of Statistics Fact Book and the World Bank Development Indicator Database. The model built for this study specifies economic performance (measured with per capital income) as a function of credit from DMBs to private sectors, credit from DMBs to government sectors, money supply and lending interest rate.

Descriptive Statistics

Table 3.1 of descriptive statistics, reports the descriptive properties of the values of PCI, CPS, CGS, MS and LIR. From Table 3.1, the mean value of PCI is greater than that of any other series. It can also be observed that there is a wide margin between the maximum and minimum values of each of the series, this indicates that there is large variance present in all the series. All the series except LIR are positively skewed, and this means that there is every tendency of obtaining negative extreme values than positive extreme values for LIR. This further implies that all other series have a symmetric distribution. For all the series, the Kurtosis statistic indicates a platykurtic (low-peaked and thin-tailed) probability distribution. The Jarque-Bera statistic supports rejection of the null hypothesis of normal distribution for all the series.

Table 3.1: **Results of Descriptive Statistics**

Statistics	PCI	CPS	CGS	MS	LIR
Mean	6.275582	4.828997	3.479701	5.154563	2.626115
Median	6.080702	4.845132	3.022374	5.108004	2.820783
Maximum	8.032788	9.956209	8.289720	9.980804	3.454738
Minimum	5.030932	-0.798508	-1.560648	-0.105361	1.791759
Std. Dev.	0.850446	3.179770	3.192125	3.120170	0.468416
Skewness	0.727626	0.147225	0.166766	0.024394	-0.437465
Kurtosis	2.477024	1.763082	1.582737	1.757474	1.828933
Jarque-Bera	4.682895	3.165971	4.151425	3.028075	4.184764
JB P-Value	0.096188	0.205361	0.125467	0.220020	0.123393
Observations	47	47	47	47	47

Source: *Authors' Computation, 2018*

Unit Root Test

The presence of a unit root may occurs due to the non-stationary properties inherent in most times-series data. Ng-Perron (NP) modified and Augmented Dickey Fuller (ADF) breakpoint unit root tests were employed to check for the presence of unit root and determine the order of integration of series – I(d) in the presence of structural break in each series respectively. However, the T-Y Granger non-causality test does not consider the presence of unit root properties in time-series data. The Ng-Perron test consists of four individual test statistics namely MZa, MZt, MSB and MPT, but this study make use of the MZa and MZt test statistics. The rejection of the null hypothesis that a series contain a unit root was done by comparing in absolute terms, the test statistics and critical values, hence, test statistics must be greater than the critical values. An automatic maximum lag length selection based on the Schwarz Information Criterion, set the optimal lag length at 9. The ADF breakpoint unit root test was performed in an Innovative Outlier (IO) model so as to determine the order of integration of each series in the presence of structural changes. We summarize and report the unit root tests result in *Tables 3.2A and 3.2B* as.

Table 3.2: **Unit Root Test Results**

	3.2A: Ng-Perron Unit Root Test				
	Level		First difference		
Series	MZa Statistics	MZt Statistics	MZa Statistics	MZt Statistics	I(d)
lnPCI	-3.04186^b	-1.19247^b	-18.4906*^{a}	-3.03881*^{a}	I(1)
lnCPS	-13.9786^b	-2.62663^b	-11.4437**^{a}	-2.32755**^{a}	I(1)
lnCGS	-11.7210^b	-2.38670^b	-82.4144*^{a}	-6.41606*^{a}	I(1)
lnMS	-14.5494^b	-2.62465^b	-16.9427*^{a}	-2.90817*^{a}	I(1)
lnLIR	-3.36987^b	-1.19536^b	-22.4834*^{a}	-3.35270*^{a}	I(1)
	3.2B: Augmented Dickey Fuller Breakpoint Test				
	Level		First difference		
Series	Break Date	Coefficient	Break Date	Coefficient	I(d)
lnPCI	1982	-3.341824^b	1993	-7.416466‡^{b}	I(1)
lnCPS	1982	-3.875698^b	1993	-5.832344‡^{a}	I(1)
LnCGS	1998	-6.072790‡^{b}	----------	----------	I(0)
LnMS	1990	-3.003639^a	2008	-5.031801‡^{a}	I(1)
LnLIR	1986	-5.028239‡^{a}	----------	----------	I(0)

Source: Authors' Computation, 2018

Notes: * and ** imply series has no unit root at 1% and 5% asymptotic critical values respectively and ^{a} and ^{b} indicate intercept only and trend and intercept respectively. Also, ‡, † and • denotes *p*-value less than 1%, 5%, and 10% respectively. We deduced from the Table 3.2 that the maximum order of integration (d_{max}) among our variables is 1 whether structural break is ignored or not in the unit root test. All the series were non-stationary series without considering the presence of structural break, but in the presence of structural break, only lnCGS and lnLIR are stationary series at p < 0.01.

Model Specification
The model built for this study specifies per capital income as a function of bank credits to private sector, bank credits to government sector, money supply, and lending interest rate. It can be depicted in its econometric form as:
$lnPCI_t = \alpha_0 + \alpha_1 lnCPS_t + \alpha_2 lnCGS_t + \alpha_3 lnMS_t + \alpha_4 lnLIR_t, + \mu_t$).. *(1)*
Equation 1, is an empirical model where PCI is a measure for economic development, which is, obtained by dividing real GDP by the total population; CPS is credit from DMBs to private sectors; credit from DMBs to government sectors; MS is money supply; LIR is lending interest rate; and μ is the disturbance error term.

Estimation and Results
This study employed an Augmented Granger non-causality test, which was developed by Toda and Yamamoto (1995) in its analysis. Toda and Yamamoto (T-Y) approach is superior to the Pairwise Granger causality test, in that it overcomes the condition that all series must be integrated in order of one- I(1). Also, establishing co-integration and stationarity of series are not

recognized as pre-conditions for the test. However, T-Y approach requires a maximum order of integration (d_{max}) to determine the number of extra lag to be added to each of the variables; hence this justifies the reason for performing unit root test on the series. From the unit root test conducted, d_{max} is 1. A multivariate causality test was performed in a Vector Autoregressive (VAR) system which treat all variables as though they were endogenous. This test is based on a modified Wald statistic which allows valid parameter estimates to be produced even when variables are not co-integrated. Therefore, the T-Y VAR models for this study are stated as follows:

$$lnPCI_t = \omega + \sum_{j=1}^{k} \beta\, lnPCI_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha\, lnPCI_{t-p} + \sum_{j=1}^{k} \rho\, lnCPSL_{t-j} + \sum_{p=k+1}^{k+d_{max}} \sigma\, lnCPS_{t-p}$$
$$+ \sum_{j=1}^{k} \partial\, lnCGS_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha\, lnCGS_{t-p} + \sum_{j=1}^{k} \emptyset\, lnMS_{t-j} + \sum_{p=k+1}^{k+d_{max}} \theta\, lnMS_{t-p}$$
$$+ \sum_{j=1}^{k} \varphi\, lnLIR_{t-j} + \sum_{p=k+1}^{k+d_{max}} \gamma\, lnLIR_{t-p} + \varepsilon_t \qquad ….(1)$$

$$lnCPS_t = \omega + \sum_{j=1}^{k} \rho\, lnCPS_{t-j} + \sum_{p=k+1}^{k+d_{max}} \sigma\, lnCPS_{t-p} + \sum_{j=1}^{k} \beta\, lnPCI_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha\, lnPCI_{t-p}$$
$$+ \sum_{j=1}^{k} \partial\, lnCGS_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha\, lnCGS_{t-p} + \sum_{j=1}^{k} \emptyset\, lnMS_{t-j} + \sum_{p=k+1}^{k+d_{max}} \theta\, lnMS_{t-p}$$
$$+ \sum_{j=1}^{k} \varphi\, lnLIR_{t-j} + \sum_{p=k+1}^{k+d_{max}} \gamma\, lnLIR_{t-p} + \varepsilon_t \qquad ….(2)$$

$$lnCGS_t = \omega + \sum_{j=1}^{k} \partial\, lnCGS_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha\, lnCGS_{t-p} + \sum_{j=1}^{k} \rho\, lnPCI_{t-j} + \sum_{p=k+1}^{k+d_{max}} \sigma\, lnPCI_{t-p}$$
$$+ \sum_{j=1}^{k} \beta\, lnCPS + \sum_{p=k+1}^{k+d_{max}} \alpha\, lnCPS_{t-p} + \sum_{j=1}^{k} \emptyset\, lnMS + \sum_{p=k+1}^{k+d_{max}} \theta\, lnMS_{t-p}$$
$$+ \sum_{j=1}^{k} \varphi\, lnLIR_{t-j} + \sum_{p=k+1}^{k+d_{max}} \gamma\, lnLIR_{t-p} + \varepsilon_t \qquad ….(3)$$

$$lnMS = \omega + \sum_{j=1}^{k} \emptyset\, lnMS_{t-j} + \sum_{p=k+1}^{k+d_{max}} \theta\, lnMS_{t-p} + \sum_{j=1}^{k} \partial\, lnPCI + \sum_{p=k+1}^{k+d_{max}} \alpha\, lnPCI_{t-p}$$
$$+ \sum_{j=1}^{k} \rho\, lnCPS_{t-j} + \sum_{p=k+1}^{k+d_{max}} \sigma\, lnCPS_{t-p} + \sum_{j=1}^{k} \beta\, lnCGS + \sum_{p=k+1}^{k+d_{max}} \alpha\, lnCGS$$
$$+ \sum_{j=1}^{k} \varphi\, lnLIR_{t-j} + \sum_{p=k+1}^{k+d_{max}} \gamma\, lnLIR_{t-p} + \varepsilon_t \qquad ….(4)$$

$$lnLIR_t = \omega + \sum_{j=1}^{k} \varphi\, lnLIR_{t-j} + \sum_{p=k+1}^{k+d_{max}} \gamma\, lnLIR_{t-p} + \sum_{j=1}^{k} \partial\, lnPCI_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha\, lnPCI_{t-p}$$

$$+ \sum_{j=1}^{k} \rho\, CPS_{t-j} + \sum_{p=k+1}^{k+d_{max}} \sigma\, lnCPS_{t-p} + \sum_{j=1}^{k} \beta\, lnCGS_{t-j} + \sum_{p=k+1}^{k+d_{max}} \alpha\, lnCGS_{t-p}$$

$$+ \sum_{j=1}^{k} \emptyset\, lnMS_{t-j} + \sum_{p=k+1}^{k+d_{max}} \theta\, lnMS_{t-p} + \varepsilon_t \qquad\qquad ....(5)$$

The optimal lag length (*k)* was determined using the VAR lag length selection criteria with the maximum lag set at 6, as derived based on Final Prediction Error (FPE), Alkaike Information Criterion (AIC) and Hannan-Quinn Information Criterion (HQ). Table 4.1 reports the VAR optimal lag length selection by the different criteria.

Table 4.1: **VAR Lag Length Selection Results**

Lag	LR	FPE	AIC	SC	HQ
0	NA	0.000363	6.267295	6.476267	6.343391
1	380.5673	2.35e-08	-3.386545	-2.132712*	-2.929968
2	42.45797*	2.05e-08	-3.582299	-1.283605	-2.745241
3	28.85628	2.54e-08	-3.517038	-0.173483	-2.299499
4	30.65089	2.55e-08	-3.830070	0.558346	-2.232051
5	35.75427	1.46e-08	-4.994176	0.439101	-3.015676
6	26.17616	1.16e-08*	-6.392280*	0.085858	-4.033299*

Source: Authors' Computation, 2018

Notes: * indicates lag length selected by criterion. Also, each test is performed at 5% significance level.

After estimating the VAR model with a *k* of 6, VAR residual serial correlation test was performed and AR Roots graph was plotted so as to ensure that the VAR model is ideal for this study. The null hypothesis for the VAR residual serial correlation test is that there exist no serial correlation at lag length *k*.

Table 4.2: **VAR Residual Serial Correlation Test Result**

K	LM-Stat	*p*-value
1	42.86181	0.0145
2	33.00058	0.1311
3	31.54382	0.1716
4	37.81717	0.0482
5	8.768537	0.9989
6	20.22280	0.7350

Source: Authors' Computation, 2018

It can be seen from Table 4.2 that the null hypothesis of no serial correlation be accepted at the selected optimal lag length of 6, but could be rejected at lag length 1 and 4. Also, the AR Roots graph shows that the VAR model satisfies stability condition, exhibits good fit and therefore not wrongly specified because no roots lying outside the unit circle. Fig. 1 depicts the graph of the AR Roots.

Fig 1: AR Roots Graph
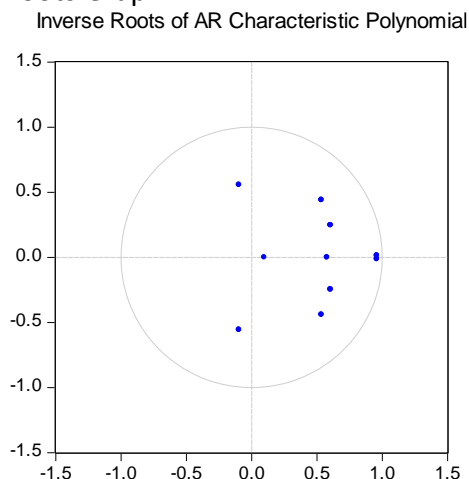
Source: Authors' Computation, 2018

The Toda and Yamamoto Granger non-causality test null hypothesis is that there is no existing causality. The T-Y test uses k + d_{max} as its optimal length; hence the optimal lag length for the T-Y VAR models is 2. *Table 4.3* reports the result of the T-Y Granger non-causality test based on a modified Wald (MWALD) statistic.

Table 4.3: T-Y Granger non-Causality Test Result

Dependent Variables	Independent Variables					
	lnPCI	LnCPS	lnCGS	lnMS	lnLIR	**All**
lnPCI	DV	{9.418314}	{6.225774}	{8.131695}	{2.872139}	{34.76854}
		[0.1514]	[0.3984]	[0.2286]	[0.8247]	[0.0578]***
lnCPS	{1.834777}	DV	{5.293574}	{6.933813}	{3.137404}	{34.75810}
	[0.9342]		[0.5067]	[0.3270]	[0.7914]	[0.0721]***
lnCGS	{11.83364}	{11.74473}	DV	{19.83668}	{16.54602}	{43.94610}
	[0.0658]-***	[0.0679]***		[0.0030]*	[0.0111]**	[0.0077]*
lnMS	{7.981318}	{4.091230}	{12.79896}	DV	{7.443478}	{36.96626}
	[0.2395]	[0.6643]	[0.0463]***		[0.2818]	[0.0441]**
lnLIR	{14.99038}	{3.253552}	{10.03572}	{8.114185}	DV	{36.13985}
	[0.0203]**	[0.7764]	[0.1232]	[0.2299]		[0.0532]***

*, ** and *** denote rejection of null hypothesis at 1%, 5% and 10% significance level respectively. DV indicates Dependent Variable, MWALD statistic in { } and p-value in [ ].
 Source: Authors' Computation, 2018

The results of the Toda and Yamamoto augmented Granger causality test are reported in Table 4.3. At a 10% significance level, the augmented Granger causality test reveals that all the financial deepening variables in the model jointly have a causal effect on economic development, but not individually (as "lnCPS, lnCGS, lnMS, lnLIR" do not Granger cause "lnPCI" individually).The results also shows that the null hypothesis of no causal direction from lnPCI, lnCPS, lnMS and lnLIR to lnCGS is rejected at 10% significance level in the case of LnPCI and lnCPS, at 5% for lnLIR and 1% for lnMS and there is a reverse causality from lnCGS to only lnMS because its *p*-value of the modified Wald statistic (MWALD) is lesser than 0.1. This result suggests that the economic development, credits to private sectors, money supply and lending interest rate drives the volume of DMBs' credit to government sectors in Nigeria. The feedback effect from credits to government sectors to money supply implies that these two variables can predict each other. Furthermore, causality runs from lnPCI to lnLIR at 5% significance level, but with no feedback effect from lnLIR.

Further assessment reveals that economic development do not have an individual causal effect on credits to private sectors and *vice versa*. Also, credits to government sector does not cause economic development individually, hence the former is not led by the latter. However, it can be inferred that economic development predict credits to government sectors, since the result indicates that a unidirectional causality runs from economic development to credits to government sectors. There is also a feedback effect from credit to government sector and lending interest rate to economic growth. In its overall sense, the causality results supports the view that causality runs from DMBs' credit to private-public sector to economic development and *vice versa*, thus implying that in Nigeria, the feedback hypothesis prevails. Therefore, banks' credit and economic development in Nigeria have mutual effect, as the overall results of the T-Y Granger causality test provides evidence to this. However, attention must be given to DMBs major activities, which are deposit taking and lending, as what are needed to boost the level of economic development in Nigeria. Lending interest rate is also a fundamental variable that have a unidirectional causality with economic development, however it cannot be ignored when it comes to DMBs lending. In Nigeria, the findings of this study varies with that of Akpansung and Babalola (2012); Karimo and Ogbonna (2017); Nyasha and Odhiambo (2018); Okafor *et al,* (2017) whose studies found that the supply-leading hypothesis prevails, but in tandem with the studies of Agu and Chukwu (2008); Odeniran and Udeaja (2010) where evidence was equally found for the mutual existence of both demand-following and supply-leading hypotheses (feedback effect), hence it is important to note that the choice of financial deepening variables employed can inform the results obtained. This study is among the few that have found a feedback effect for Nigeria. In other developing countries, Aurangzeb (2012) confirms bi-directional causality between finance and economic growth for Pakistan. For developed economies, Shan and Jianhong (2006) found a two- way causality for China, while Apergis, Filippidis and Economidou (2007) also reported a bi- directional causality in a panel study of fifteen OECD and fifty non-OECD countries.

Conclusion and Recommendations
This study investigated the direction of long run causality between deposit money banks' credit to private-public sectors and economic development in Nigeria over the period 1970-2016. The causal direction between the variables were established using the Toda and Yamamoto Granger

causality test. The analytical results indicated that DMBs' credit to government sectors leads economic development in Nigeria. On the overall, the study draws conclusion that the relationship between economic development and credits to private-public sectors by DMBs' lends credence to the "feedback hypothesis". Among other things, this study recommends that the monetary authorities should regulate the activities of deposit money banks to ensure that they gear up the growth of credits to private sectors by examining factors, such as lending interest rate which can possibly undermine lending to the private sectors, which serves as key engine of economic development in any developing economy. Also, issues relating to non-performing loans can be dealt with by strengthening the policy that has established the Asset Management Corporation of Nigeria (AMCON) so that it can hedge the DMBs' against the financial risk that ensues as a result of loans default. In addition, the regulatory authorities should implement policy that will stimulate DMBs operations in the economy, while setting up committees that will monitor the implementation of formulated policies is also of great importance.

Corresponding author
Email address: temitayoolaniyan.o@gmail.com (T. O. Olaniyan).

References
Acemoglu, D., & Robinson, J. (2010). The roles of institutions in growth and development. *Review of Economics and Institutions, 1*(2), 1-33.

Agu, C. C. (1988). *Nigerian banking structure and performance: The banking system's contribution to economic development in Nigeria*. Lagos: Africana-Fep Publishers Limited.

Agu, C. C., & Chukwu, J. O. (2008). Multivariate causality between financial depth and economic growth in Nigeria. *African Review of Money Financial Bank, 7(*1), 7–21.

Akakabota, E. E. (2015). Financial sector reforms and economic growth in Nigeria. *International Journal of Economics, Commerce and Management, 3(*9), 150-171.

Akpansung, A. O., & Babalola, S. J. (2012). Banking sector credit and economic growth in Nigeria: An empirical investigation. *CBN Journal of Applied Statistics, 2(*2), 51-62.

Anastasiou, D., Louri, H., & Tsionas, M. (2016). Determinants of non-performing loans: Evidence from Euro-area countries. *Finance Research Letters, 18*, 116-119.

Ang, J. B., & McKibbin, W. J. (2007). Financial liberalization, financial sector development and growth: Evidence from Malaysia. *Journal of Development Economics, 84(*1), 215-233.

Apergis, H., & Levine, R. (2007). Financial development and economic growth: A panel data analysis of emerging countries*. International Research Journal of Finance and Economics 8(*1), 225– 238.

Apergis, N., Filippidis, I., & Economidou, C. (2007). Financial deepening and economic growth

linkages: A Panel Data Analysis. *Review of World Economics, 143(*1), 179-189.

Aurangzeb, M. (2012). Contributions of banking sector in economic growth. A case of Pakistan. *Economics and Finance Review, 2(*6), 45-54.

Balago, G. S. (2014). Nexus between bank credit and economic growth in Nigeria: Evidence from VEC model. *Open Access Library Journal, 1(*1), 1-12.

Bekaert, G., Harvey, C. R., & Lundblad, C. (2005). Does financial liberalization spur growth? *Journal of Financial Economics, 77(1*), 3-55.

Berger, A., & De Young, R. (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking and Finance, 21*, 849–870.

Calderon, C., & Liu, L. (2003). The direction of causality between financial development and economic growth. *Journal of Development and Economics, 72(*1), 371–394.

Cameron, R.E., Crisp, O., Patrick, H.T., & Tilly, R. (1967). *Banking in the early stages of industrialization*. New York: Oxford University Press.

Cevik, S., & Rahmati, M. (2013). Searching for the finance-growth nexus in Libya. *IMF working paper WP/13/92*, Middle East and Central Asia Department.

Demetriades, P. O., & Hussein, K. A. (1996). Does financial development cause economic growth? Time-series evidence from 16 countries. *Journal of Development Economics, 51(*2), 387-411.

Demetriades, P., & Luintel, K. (1996). Financial development, economic growth and banking sector controls: Evidence from India. *Economic Journal, 106*, 359-374.

Fapetu, P. O., & Obalade, A. A. (2015). Sectorial allocation of banks' credit and economic growth in Nigeria. *International Journal of Academic Research in Business and Social Sciences, 5(*6), 161-169.

Galbis, V. (1982). An analytical aspect of interest rate policies in less developed countries: A theoretical approach. *Journal of Developmental Studies, 13(*2), 59-72.

Gazdar, H., & Cherif, M. (2012). Institutions and the finance-growth nexus: Empirical evidence from MENA countries. *Economic Research Forum*, Working Paper series, (704).

Ghosh, A. (2015). Banking-industry specific and regional economic determinants of non-performing loans: Evidence from US states. *Journal of Financial Stability, 20*, 93-104.

Goldsmith, R. W. (1969). *Financial structure and development*. New Haven CT, USA: Yale University Press.

Gurley, J., & Shaw, E. (1967). Financial structure and economic development. *Economic Development and Cultural Change, 15(*1), 333–346.

Harrod, D. F. (1939). An essay in dynamic theory. *The Economic Journal, 49(*1), 119-133.

Harrod, R. F. (1939). An essay in dynamic theory. *Economic Journal, 49(*193), 14-33.

Ihemeje, J. C., & Ikwuagwu, H. C. (2016). Sectorial distribution of deposit money banks' credit and economic growth in Nigeria. *International Journal of Innovative Research and Development, 5(*1), 51-57.

Iwedi, M., Igbanibo, D. S., & Onuegbu, O. (2015). Bank domestic credits and economic growth nexus in Nigeria. *International Journal of Finance and Accounting, 4(*5), 236-244.

Jung, W. S. (1986). Financial development and economic growth: International evidence. *Economic Development of Cultural Change, 34(*1), 333–346.

Kar, M., & Pentecost, E. J. (2000). Financial development and economic growth in Turkey: Further evidence on the causality issue. *Economic Research Paper No. 00/27,*

Loughborough University: Loughborough, UK.

Karimo, T. M., & Ogbonna, O. E. (2017). Financial deepening and economic growth nexus in Nigeria: Supply-leading or demand-following? *Economies, 5(*4), 1-18.

King, R. G., & Levine, R. (1993). Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics, 108(*1), 717–737.

Korkmaz, S. (2015). Impact of bank credits on economic growth and inflation. *Journal of Applied Finance & Banking, 5(*1), 57-69.

Levine, R. (1997). Financial development and economic growth: Views and agenda. *Journal of Economic Literature, 35*, 688-726

Levine, R., & Zervos, S. (1998). Stock markets, banks, and economic growth. *The American Economic Review, 88(*3), 537-558.

Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking & Finance, 36*, 1012–1027.

Lucas, R. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22(*1), 3-42.

Makri, V., Tsagkanos, A., & Bellas, A. (2014). Determinants of non-performing loans: The case of Eurozone. *Panoeconomicus, 61(*2), 193-206.

McKinnon, R. (1973). *Money and capital in economic development.* Washington, DC, USA: Brookings Institution.

Naceur, S. B., & Ghazouani, S. (2007). Stock markets, banks, and economic growth: Empirical evidence from the MENA region. *Research in International Business and Finance, 21*(2), 297– 315.

Ndlovu, G. (2013). Financial sector development and economic growth: Evidence from Zimbabwe. *International Journal Economic Financial Issues, 3(*1), 435–446.

Neelam, T. (2014). Impact of bank credit on economic growth in Nepal. *NRB Working Paper, No 22. Nigeria Journal of Economics and Social Studies, 49(*1), 209–234.

Nyasha, S., & Odhiambo, N. M. (2018). Financial development and economic growth nexus: A revisionist approach. *Banca Monte dei Paschi di Siena SpA, 47(*1), 223-229.

Odeniran, S. O., & Udeaja, E. A. (2010). Financial sector development and economic growth: Empirical evidence from Nigeria. *Central Bank of Nigeria Economic and Financial Review, 48(*3), 21-31.

Ogege, S., & Boloupremo, T. (2014). Deposit money banks and economic growth in Nigeria. *Financial Assets and Investing, 5(1*), 41-50.

Ogege, S., & Shiro, A. A. (2013). Does depositing money in bank impact economic growth? Evidence from Nigeria. *African Journal of Business Management, 7(*3), 196-205.

Ogege, S., & Shiro, A. A. (2013). Does depositing money in bank impact economic growth? Evidence from Nigeria. *African Journal of Business Management, 7(*3), 196-205.

Okafor, I. G., Ezeaku, H. C., & Ugwuegbe, U. S. (2016). Relationship between deposit money bank credit and economic growth in Nigeria under a VAR G-causality environment. *Journal of Economics and Finance, 7(*2), 41-46.

Okpara, G. C. (2009). A synthesis of the critical factors affecting performance of the Nigerian banking system. *European Journal of Economics, Finance and Administrative Sciences, 17*, 34-44.

Okwo, I. M., Mbajiaku, B., & Ugwunta, D. O. (2012). The effect of deposit money banks credit on Nigerian economic growth. *International Journal of Current Research, 4(*12), 555-559.

Omotor, D. (2007). Financial development and economic growth: Empirical evidence from Nigeria. *Nigeria Journal of Economics and Social Studies, 49*, 209–234.

Pagano, M. (1993). Financial markets and growth: An overview. *European Economic Review, 37*, 613-622.

Patrick, H. T. (1966). Financial development and economic growth in underdeveloped countries. *Economic Development and Cultural Change, 14(*1), 174-189.

Robinson, J. (1952). *The generalisation of the general theory, in the rate of interest, and other essays*. (2nd Edition). London: Macmillan.

Roubini, N., & Sala-i-Martin, X. (1992). Financial repression and economic growth. *Journal of Development Economics, 39,* 5-30.

Saba, M. (2016). Causality between bank's major activities and economic growth: Evidence from Pakistan. *Mushtaq Financial Innovation, 2(*7), 1-11.

Saint-Paul, G. (1992). Technological choice, financial market and economic development. *European Economic Review, 36(*4), 763-782.

Schumpeter, J. A. (1911). *The theory of economic development*. Cambridge, MA, USA: Harvard University Press.

Shan, J., & Jianhong, Q. (2006). Does financial development lead economic growth? The case of China. *Annals of Economics and Finance, 1(*1), 231–250.

Shaw, E. (1973). *Financial deepening and economic development*. London: Oxford University Press*.*

Singh, A., & Bruce, W. A. (1998). Emerging stock markets, portfolio capital flows and long-term economic growth: Micro and macroeconomic perspectives. *World Development, 26*, 607- 622.

Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics, 70(*1), 65-94.

Swamy, V., & Dharani, M. (2018). An alternate approach in exploring the causal link between financial development and economic growth- Evidence from advanced economies. *International Journal of Finance & Economics, 23(*1), 55-76.

Swan, T. W. (1956). Economic growth and capital accumulation. *Economic Record, 32,* 334-361.

Toda, H. Y., & Yamamoto, T. (1995). Statistical inferences in vector auto-regressions with possibly integrated processes. *Journal of Economics, 66(*1), 225–250.

Ufort, L. (2004). *The Nigerian Financial System and the Role of Central Bank of Nigeria*. Lagos: CBN Training Centre.

Werner, R. A. (2014). Can banks individually create money out of nothing? - The theories and the empirical evidence. *International Review of Financial Analysis, 36*, 1-19.