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Deposit Money Banks' Credit and Investment Drive of Developing Economies: Empirical Evidence from Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author AJI designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript while authors JS and API managed the analyses of the study. Authors AJI, JS and API managed the literature search. All authors read and approved the final manuscript.

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ABSTRACT

The study analyzed the impact of the Deposit Money banks' credit on investment in Nigeria. Time series data for thirty one year period 1981 to 2012 were collated from secondary sources of the central Bank of Nigeria (CBN) statistical bulletin and was analyzed through Ordinary Least Squares (OLS) regression technique with the aid of E-view to test the hypotheses formulated in line with the objectives of the study while the unit root, Variance Inflation Factor (VIF) and Heterosckedasticity white Test were used for data stationarity and diagnosis. In order to achieve the objective of this study, Deposit Money banks credit to the private sector (DMBC) and the Lending Rate of the

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Nigeria economy are used as explanatory variables while investment (INV) is the dependent variable. The empirical results of this study shows that both total Deposit Money banks credit and Interest rate exert a positive and significant impact on investment in Nigeria. However the result of the interest rate is at variance with the a priori expectation. Considering the empirical results, the study conclude that Deposit Money Banks' credit to the private sector should be sustained as it is a viable source of finance to the private sector of the of the Nigerian economy. The study therefore recommended that greater efforts should be made to make available more medium and long term loans to the productive sectors such as the manufacturing sector, agricultural sector and SMEs as they constitute an integral growth process. Also Interest rate on credit facility granted to private sector should be significantly reduced.

Keywords: Deposit money banks; credit; investment; lending rate.

ABBREVIATIONS

INV : Investment,
DMBC : Deposit Money Banks' Credit

1. INTRODUCTION

Deposit Money banks' have traditionally played an important role in financing various sectors of the economy especially in developing nations such as Nigeria. This is because banks are mainly involved in financial intermediation process, which entails channeling funds from the surplus units to the deficit units of the economy, thus transforming bank deposits into loans or credits [1]. The role of credit on economic growth has been recognized as credits are obtained by various economic agents to enable them invest in new product lines and to also meet operating expenses [2]. [3] noted that with an efficient financial intermediation function of Deposit Money Banks the macro economic growth process which is the productive capacity of the economy will be increased over time.

Aliyu and Yusuf [4] concisely reasoned that a developed financial sector should reflect the ease of entrepreneurs with sound projects to obtain financial resources, and the confidence with which investors anticipate adequate returns. The system should also be able to gauge, subdivide, and spread difficult risks, letting them rest where they can best be borne and should be able to do all these at low cost. With this, more savings, investment and high productivity will be ensured and hence economic growth.

Accordingly the regulatory authorities especially the Central Bank of Nigeria have designed policies aimed at making credit available to the real sectors of the economy some of which include credit ceiling among others [5]. Thus, the CBN bulletin 2012 edition reveals that the share of Deposit Money Bank's loan advanced to the private sector of the economy shows a fluctuation from 1981 to 2012 with an average value of 14.89% with the maximum value of 37.77% in 2009 while the least value was 0.97% in 1990. The disparity value recorded by the overall credit share in GDP is as a result of various monetary policies by the regulatory authorities to regulate the supply of money by bank to the public and private sectors in order to stemmed inflation and encourage growth in the Nigerian economy [6]. They further assert that average value indicates that there is poor financial development in the Nigerian economy despite the various reforms to restructure the sector and facilitate credit accessibility by the private sector.

Nnanna [7] posit that, the average credit allocation to the various sectors shows that the manufacturing sector received the highest credit allocation in Nigerian economy followed by the agricultural sector while the services and economic sectors received the least. The Deposit Money bank's credit advanced to the agricultural sector showed a dynamic value for the period under review with an average of 3.39%. The maximum value was 6.56% in 1986 immediately after the deregulation of the Nigerian financial market which allowed the market forces to determine the demand and supply of credit in the economy.

Available record from CBN statistical bulletin indicate that Deposit Money banks' loans advanced to the real and manufacturing sector averaged 83.13% and the maximum value was 167.15% in 2009 while the least was 53.48% in 1989. The Deposit Money bank's credit advanced to the services sector has an average of 11.16% with maximum value of 73.74% in 2010. Comparatively, the manufacturing sector dominates the credit allocation in Nigerian economy followed by the services sector and the agricultural sector. However the total amount of

deposit money bank's loans to the private sector witnessed a steady upward trend with the manufacturing sector taking the bulk of the credit allocation between 2011 and 2012 [8].

On the other hand, [6] argued that despite the significant role played by Deposit Money Banks in the growth of the real economy by directing funds from savers to borrowers in an efficient and high productive manner to enable investment in physical capital, spur innovation which adds to economic growth that will ensure poverty reduction, job creation and the stabilization of macroeconomic indices in developing economies such as Nigeria have seemingly yielded little or no positive results.

Also, Abubakar and Gani [8] asserted that despite the implementation of several banking sector Reforms and concerted efforts by the regulatory authorities in providing credit to the productive sectors of the economy, the macroeconomic indicators such as employment, GDP growth balance of payment etc. in Nigeria have not improved.

Based on the above assertion, this study examines the extent to which deposit money banks' intermediation or provision of credit to the private sector of the Nigerian economy has influenced investment considering the seemingly non-significant improvement in the investment and domestic production of the Nigerian economy.

2. LITERATURE REVIEW

2.1 The Link between Deposit Money Banks and Investment

The functions of deposit money banks are numerous, all aimed at satisfying the financial needs of the various sectors of the economy such as agriculture, industry, trade, communication etc, accordingly they play very momentous role in process of economic growth.

The prompt and sustained output growth of the domestic economy of Nigeria since the political independence in 1960 has been of principal importance to successive governments in the country. Thus, various governments have executed several national development plans and programmes designed at enhancing productivity, as well as, diversifying the domestic economic base. However the infrastructural and capital resources necessary for the realization of these objectives have however been limited [6]. This has obliged the intervention of deposit money banks credit in the economy via the provision of the required huge capital outlay needed for large-scale production in industries and for the provision of other credit facilities for economic growth.

The impact of Deposit money banks' credit on the various economic agents which is regarded as bank loans and advances aid in financial intermediation between deficit unit and surplus units enhances productivity, impacting positively on economic growth. In relation to the above [9] strongly support financed lead growth hypothesis, which hypothesized that financial sector play a key role in channeling savings into productive investment, particularly in the formal sectors of the economy.

The banking sector is generally considered as a key channel for financial intermediation in every economy. Hence the vital role of deposit money banks credit in ensuring growth has been widely acknowledged. For instance [10] established that banking sector enable technological invention through their intermediary role, [2] hypothesized that effective allocation of savings through identification and funding of entrepreneurs with best chances of successfully implementing innovative product and production are apparatuses to achieving real economic performance. [11] posits that the banking sector help in the provision of credit by organizing surplus fund from depositors who have no instant needs of such money and consequently channel it in form of credit to investors who have wonderful ideals on how to create additional wealth in the economy but lack the required capital to implement the ideals. This further reveals that the role of Deposit Money Banks credit is recognized as suitable source to the economic agents to enable them meet both new investment opportunities and operating expenses.

In other to strengthen the banking sector to meet up with this herculean tax of providing credit in the economy, various banking reformed has been established by the monetary authority in Nigeria in enhancing credit accessibility [5]. The overall objectives of these reforms have been to guarantee financial stability so as to influence the growth of the economy and also enhance bank o play their role of financial intermediation in provision and accessibility of credit in the Nigerian economy. These various reforms no

doubt have led to the improvement of banking services to the economic units [7].

As noted earlier, available information from Central Bank of Nigeria reveals that the total loans and advances to the Nigerian economy as at 1986 was N15701.6 million immediately after deregulation of the Nigerian Banking sector it increase to N31306.2 million in 1991. It further increase to N144569.2 million, N508302.2 million, N1976711 million and N9611990 million in 1995, 2000, 2005 and 2010 respectively [12].

However, [8] claimed that despite series of efforts through bank reforms and other policies aimed at strengthening the bank's ability to ensure efficient services delivery and funding the real sectors so that it will enable the Nigerian economy to become more vibrant and very dynamic, the problems of inefficient allocation of funds to the real sector, lack of long-dated funding, deterioration in domestic credit by the banking sector to the private sector, high concentration of loans to few sectors and mismatch of liquidity in the Nigeria economy still lingers [6].

It suffice to state that financial intermediaries by providing these services to the economy, influence savings and allocation decisions in ways that may alter long-run growth rates hence banks play effective roles in the economic growth and development of both emerging and developed economies of the world. This role they perform excellently by helping to mobilize idle savings of the Surplus Unit for onward lending to the Deficit Units, thus helping in the capital formation of a nation [1]. It is in realization of the importance of bank's role in financial intermediation that successive governments in Nigeria have been allocating deliberate roles to them in various National Development Plans [13].

2.2 Significance of Deposit Money Banks Credit on Investment

The significance of banks in ensuring growth in an economy has been extensively discussed by several scholars. Many believed that financial intermediaries play important roles in economic growth. Studies by [14,13,[6], Dada [15], confirm that a well-functioning banking system fast-track economic growth. Furthermore, a seminal study conducted by King and Levine as cited by [7] on seventy seven countries made up of developed and developing economies showed that finance not only follow growth; finance seems important in stimulating economic growth. [14] also observed that financial institutions yield better information, improve resource allocation and thereby prompt growth. These studies further strengthen the proclamation that financial intermediation stimulate economic growth.

Notwithstanding the above opinions, some scholars believe that finance is a relatively insignificant factor in economic growth. They hypothesize that economic growth is a causal factor for financial development. [2] argued that as the real sector grows the increasing demand for financial services stimulate the financial sector and as such a holistic approach should be considered to ensure a robust investment in the economy of developing nations. As such a rapid and sustained output growth of the domestic economies of developing nations have been canvassed to be of paramount importance to solving the numerous challenges such as unemployment, balance of payment and exchange rate volatility that has bedeviled the developing economies of the world through suitable programs and policies. Consequently, various governments in Nigeria have implemented several national developmental plans and programmes directed at ensuring Deposit Money Banks' provide adequate boost to productivity efficiency, as well as, diversifying the domestic economic base.

Considering the foregoing, the infrastructural and capital resources required for the realization of these goals have however been scarce. This has obliged the intervention of deposit money banks credit in these economies via the provision of the required mammoth capital outlay necessary for extensive production in substantial industrial activities. This vibrant role of deposit money bank credit in spawning growth in an economy has been widely acknowledge for instance [6,14,8,16] established that banking sector facilitate technological innovation through their intermediary role. They emphasized that efficient allocation of savings through identification and funding of entrepreneurs with best chances of successfully implementing innovative product and production are tools to achieving real economic performance.

There is also a consensus in theoretical literature that the basic activities of banks are acceptance of deposits and lending to a large number of agents, holding of liquid reserves against predicated withdrawal demand, issuing of

liabilities that are more liquid than their primary assets and eliminating or reducing the need for self-financing of investments. In particular, by providing liquidity, banks permit risk adverse savers to hold bank deposits rather than liquid (but unproductive) assets. The funds obtained are then made available for investment in productive capital [14,11,8].

2.3 Theoretical Framework

2.3.1 Supply-leading hypothesis

The "supply-leading" hypothesis posits that the financial sector exists primarily to mobilize and transfer funds to the real sector, by mobilizing all the idle savings that are left idle in the traditional sector, thus providing investment capital and acting as engine of growth. The proponent of this theory argues that a highly developed state of economic growth is characterized by mutual co-existence and re-enforcement of each other by the financial and real sectors. The relationship becomes contemporaneous and causality runs bi-directionally as opposed to the un-directional. Supporting this assertion [17,18] posit that state of no significant causality between financial and the real sector is further, both theoretically and empirically feasible.

In consonance with the above [19] summit that Deposit money banks operate within the business environment and essentially trade on mobilized deposits in addition to other related services. Financial institutions are net liability takers. However, the possible effects of their credit related transactions on the economy could be routed in the theory of financial intermediation and associated hypotheses that attempt to explain the interactions between economic growth vis-As-vis investments. [20] relates financial intermediation to the process of mobilizing saved resources from surplus saving units in the economy by financial intermediaries (institutions) at market determined rates for onward lending of same or part thereof, to efficient spending units for productive investment purposes.

2.3.2 Theory of financial intermediation]

The theory of financial intermediation was initially formalized in the studies of [21,22], they observed the pivotal role played by the financial market in economic development, attributing the differences in economic growth across countries to the quantity and quality of services provided by financial institutions. Other empirical results that support the foregoing are the studies by [23,24] on the Nigerian financial market development and economic growth. However, [25] argued that financial markets are essentially hand maidens to domestic industry, and respond passively to other factors that produce cross–country differences in growth.

2.4 Empirical Review

Several empirical studies have examined the impact of commercial bank credit and economic growth of the Nigerian economy generally. For instance [17,18,26,4,23,27,9,28]. The studies concluded based on their findings that deposit money banks' loans and advances have contributed significantly in financing capital investments in Nigeria.

It suffice to state that the Nigerian economy have seemingly been unproductive with very high unemployment rate, overdependence on foreign goods and services among others even in the face of credit availability to productive sectors of the economy by deposit money banks'. However the empirical evidence reviewed in the foregoing showed that deposit money banks' credit had significant impact on the Nigeria's economic growth hence the need for this study to reassess specifically the impact of deposit money bank's credit and its interest rate on the Nigerian economy to ascertain its impact investment.

3. METHODOLOGY

The study employs annual time series data covering the period 1981-2012. This period is chosen because of the availability of data on the relevant variables. More importantly, the period witnessed tremendous bank reformed that enhanced financial mobility. Data for the study was obtained from Central Bank of Nigeria (CBN) statistical Bulletin and CBN Annual Report and Statement of Accounts various issues.

3.1 Model Specification

The study adopted the econometric model as used by [16,17]. This model is specified in order to capture the research objectives. This research work employed a linear regression model using Ordinary Least Square (OLS) estimation because of its reliable traits as the best linear unbiased estimator. Its error term is also assumed to have a minimum and equal variance.

In order to achieve the stated objective, the hypotheses are specified in a null form:

Ho1: Deposit Money Bank's credit has no significant impact on investment Nigeria
Ho2: Lending Rate has no significant impact on investment Nigeria

The hypothesis will be tested at 5% level of significant.

The functional relationship is specified thus:

$$INV = f(DMBC, LR) \quad (1)$$

The econometric model of this functional relationship is given as:

$$INV = \beta DMBC1 + \beta LR2 + \mu$$

Where:

INV = Investment
DMBC= Total Credit Extended to Private Sector by deposit money banks.
LR = DMB's Lending Rate.
β = Coefficient
μ = Error term
A priori Expectations: $\beta 1 > 0$; $\beta 2 > 0$

4. RESULTS AND DISCUSSION

This section presents the analysis and interpretation of the results relating to the data collected, which is attached in the appendix. The Ordinary Least Squares (OLS) multiple regression technique was used for data analysis with the aid of E-view to test the formulated hypotheses to ascertain the relationship between DMBC on investment from 1981 to 2012.

4.1 Unit Root Test

In order to determine the stationarity properties of the variables used in the study, the Augmented Dickey Fuller Test was performed. The unit root results which indicate the order of integration of each of the variables is presented in Table 1.

The results of the Augmented Dikker Fuller Test in the Table 1 revealed that, all the variables are stationary at level and are integrated of order zero. This implies that, no long run information is lost thus, the application of ordinary least squares in the estimation process is therefore appropriate and not likely to yield spurious estimates.

4.2 Diagnostic Test

To ensure that the data for this study was fit for the model, three diagnostic tests were carried out on the data. These include the Breusch-Godfrey serial correlation test, Ramsy Reset test which is a test for misspecification of the first order, including incorrect functional form and the exclusion of relevant variables and the Heterosckedasticity white test which test whether the estimated variance of the residuals from a regression are dependent on the values of the independent variables.

4.2.1 Correlation coefficient for serial correlation

The result of the Breusch–Godfrey serial correlation as contained in Table 2 indicates that there is no serial correlation in the model with an F-statistic of 9.440002 and a prob. of 0.0008 which is statiscally significant at 5% level.

4.2.2 Heteroscedasticity white test

The white test is a statistical test that establishes whether the residual variance of a variable in a regression model is constant (i.e Homoskeasticity). In cases where the White test is statistically significant, heteroscedasticity may not necessarily be the cause, but specification errors. In other words, the White test can be used to test of heteroscedasticity or specification of error or both. Table 2 revealed that, the null hypotheses of the presence of heteroscedasticity for the White tests in the model is rejected. This is because the F-statistic of 4.478915 and a prob. value of 0.0045 for the model is statistically significant at 5% alpha level (p-value < 0.05). The conclusion is that, the presence of heteroscedasticty is minimal if not completely absent in the model there by satisfying the classical OLS assumption of homoscedasticity (constant variances). It therefore implies that, the application of OLS on this model will yield Best Linear and Unbiased Estimates (BLUE).

In order to ensure that the results are robust, a diagnostic test was performed. In an attempt to detect multicollinearity. Hence the variance inflation factor (VIF) test was computed as indicated in the able above.

The Variance Inflation Factor (VIF) measures the impact of Collinearity among the variables in a regression model. The Variance Inflation Factor (VIF) is always greater than or equal to 1. There is no formal VIF value for determining presence of multicollinearity. Values of VIF that exceed 10 are often regarded as indicating multicollinearity, but in weaker models values above 2.5 may be a cause for concern (A. Kouisoyiannis, 1977: Gujarati and Sangeetha, 2007). Thus, the study adopts the "Rule of thumb" of 10, this shows the appropriateness of fitting of the model of the study with the dependent variable. In addition the tolerance values are consistently smaller than 0.7, this further substantiates the absence of multicollinearity. The two measures for testing multicollinearity indicate that there is no multicollinearity problem in the model.

4.3 Regression Analysis

Following the result of the ADF and the Diagnostic test above, the study adopts the technique of ordinary least squares for the regression analysis. This is based on the premise that, all the variables in the data set are stationary and can yield best linear unbiased estimates.

The regression result in Table 4 revealed that, all the variables passed the t-test at the 5% level of significance. The results also showed that all the variables are positive and correctly signed. The positive effect of DMBC showed that, there is a positive relationship between DMBC with INV. A unit change in DMBC affects INV by 0.316269. Also, a unit change in INTR will have a positive effect on INV. This means that a unit change in INTR will affect INV by 2.038478. The result also shows that interest rate (INT) has a positive coefficient, which is not consistent with the a priori expectation that B2<0. The degree of the coefficient is 2.038478, and a prob. of 0.0105 by implication, one per cent increase in interest rate will lead to 2.038478 per cent increase in investment which is statistically significant at 5% level. The positive nature of this variable is as a result deliberate effort to reduce interest rate for the real sector of the Nigerian economy which has the ability to promote investment and maximum economic output.

An adjusted R^2 of 0.852582 showed that 85 percent of the systematic variations in the Investment is influenced by the combined effect of the explanatory variables put together while 15% is accounted for by other factors. The robustness of this result is further buttressed by an F-statistic of 90.64352. An estimated probability values (Prob. (F-stats) of 0.0000 is significant enough to conclude that, the model has performed well. The coefficient of constant was -4.291184 which determine the value of INV given a unit increase or decrease in any of the independent variables, while all other variables are rendered zero. This findings are also in line

Table 1. Unit root test for data stationarity i.e. INV, DMBC and INTR

Variable	ADF value @test statistic	Mackinnon critical value @ 5%	Order of integration
INV	-1.214285	-2.960411	1(0)
DMBC	-4.033530	-2.960411	1(0)
INTR	-3.752338	-2.960411	1(0)

Author's computation 2016

Table 2. Diagnostic test for serial correlation test, RESET test, heterosckedasticity white test

Type of test		Serial correlation LM test	Heterosckedasticity white test
Model	F-stat	9.440002	4.478915
	P-value	0.0008	0.0045

Author's computation 2016

Table 3. Variance inflation factor

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
DMBC	0.001125	1.113027	1.008713
INTR	0.554493	2.010515	1.008713
C	4.331660	123.6473	1.002126

Author's computation 2016

Table 4. OLS regression result

Variable	Coefficient	Std. error	t-statistic	Prob.
DMBC	0.316269	0.033541	9.429264	0.0000
INTR	2.038478	0.744643	2.737525	0.0105
C	-4.291184	2.081264	-2.061816	0.0483
R-squared	0.862093	Mean dependent var		4.686744
Adjusted R-squared	0.852582	S.D. dependent var		2.757626
S.E. of regression	1.058790	Akaike info criterion		3.041191
Sum squared resid	32.51007	Schwarz criterion		3.178604
Log likelihood	-45.65906	Hannan-Quinn criter.		3.086739
F-statistic	90.64352	Durbin-Watson stat		1.724169
Prob(F-statistic)	0.000000			

Author's computation 2016

with the a priori expectation of this study that ($\beta 1 > 0$) but however at variance in the a priori expectation of ($\beta 2 < 0$) and empirical evidence of [6].

4.4 Test of Hypothesis

The null hypotheses of the study states that; "There is no significant effect of deposit money bank's credit and interest rate on INV in Nigeria was tested at 5% level of significance. Consequently the null hypotheses for the aforementioned variables are rejected as the result showed that DMBC and INTR contribute significantly and positively on investment.

5. CONCLUSION

This study has investigated the impact of Deposit Money banks' credit on investment for from 1981-2012. This has become necessary in the wake of unproductive nature of the Nigerian economy even after the availability of credit facilities to the private sector of the economy by the various Deposit money Banks' in Nigeria. To achieve this objective an Econometric model was specified and estimated via the Ordinary Least Square (OLS) technique to ascertain the relationship between investment and the explanatory variables. The variables were tested for stationarity and other diagnostic analyses were also carried out. Regression analysis was performed to test the hypotheses of the study. The study found that the Deposit Money Bank's credit to the private sector and lending rate has a significant effect on investment in Nigeria within the period under study. This result is however at variance with the a priori expectation as in the case of Deposit Money Banks' Lending rate. The findings of this study are in line with the submissions of the empirical studies reviewed in the foregoing except for lending rate.

6. RECOMMENDATIONS

Considering the findings of this study, the following recommendations are made:

1. Greater efforts should be made to make available, short, medium and long term loans to productive investments like the manufacturing sector, Agricultural sector and SMEs as they constitute an integral part of the growth and transformation process of an economy like that of Nigeria as this will induce employment and income of the various economic agent and a productive economy.
2. Interest rate on credit facilities granted to private sector should be drastically reduced, Deposit Money bank's should grant soft loan to this important sector of the economy and also reduced stringent policies in supply of credit to productive sectors of the economy as this will make Deposit Money bank's credit to have a robust effect on economic growth.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

Appendix I. Unit root test result

Null Hypothesis: INV has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=2)

		t-statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.214285	0.6555
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller test equation
Dependent Variable: D(INV)
Method: Least Squares
Date: 12/01/16 Time: 15:21
Sample (adjusted): 1982 2012
Included observations: 31 after adjustments

Variable	Coefficient	Std. error	t-statistic	Prob.
INV(-1)	-0.040280	0.033172	-1.214285	0.2344
C	0.446225	0.176007	2.535268	0.0169
R-squared	0.048384	Mean dependent var		0.261901
Adjusted R-squared	0.015570	S.D. dependent var		0.499916
S.E. of regression	0.496009	Akaike info criterion		1.497895
Sum squared resid	7.134721	Schwarz criterion		1.590411
Log likelihood	-21.21738	Hannan-Quinn criter.		1.528053
F-statistic	1.474489	Durbin-Watson stat		2.172172
Prob(F-statistic)	0.234435			

Appendix II. Regression result

Dependent variable: INV
Method: Least squares
Date: 12/01/16 Time: 15:21
Sample: 1981 2012
Included observations: 32

Variable	Coefficient	Std. error	t-statistic	Prob.
DMBC	0.316269	0.033541	9.429264	0.0000
INTR	2.038478	0.744643	2.737525	0.0105
C	-4.291184	2.081264	-2.061816	0.0483
R-squared	0.862093	Mean dependent var		4.686744
Adjusted R-squared	0.852582	S.D. dependent var		2.757626
S.E. of regression	1.058790	Akaike info criterion		3.041191
Sum squared resid	32.51007	Schwarz criterion		3.178604
Log likelihood	-45.65906	Hannan-Quinn criter.		3.086739
F-statistic	90.64352	Durbin-Watson stat		0.724169
Prob(F-statistic)	0.000000			

Appendix III. Diagnostic test result

Breusch-Godfrey serial correlation LM test:			
F-statistic	9.440002	Prob. F(2,27)	0.0008
Obs*R-squared	13.16827	Prob. Chi-Square(2)	0.0014

Test equation:

Dependent variable: RESID
Method: Least squares
Date: 12/01/16 Time: 15:22
Sample: 1981 2012
Included observations: 32
Presample missing value lagged residuals set to zero.

Variable	**Coefficient**	**Std. error**	**t-statistic**	**Prob.**
DMBC	0.002327	0.027010	0.086157	0.9320
INTR	-0.341246	0.640797	-0.532533	0.5987
C	1.014402	1.798918	0.563896	0.5775
RESID(-1)	0.684379	0.191588	3.572146	0.0014
RESID(-2)	-0.048837	0.208777	-0.233921	0.8168

R-squared	0.411508	Mean dependent var	-3.40E-16
Adjusted R-squared	0.324324	S.D. dependent var	1.024066
S.E. of regression	0.841777	Akaike info criterion	2.635999
Sum squared resid	19.13191	Schwarz criterion	2.865020
Log likelihood	-37.17598	Hannan-Quinn criter.	2.711913
F-statistic	4.720001	Durbin-Watson stat	1.933504
Prob(F-statistic)	0.005106		

Heteroskedasticity test: White			
F-statistic	4.478915	Prob. F(5,26)	0.0045
Obs*R-squared	14.80799	Prob. Chi-Square(5)	0.0112
Scaled explained SS	6.465239	Prob. Chi-Square(5)	0.2635

Variance inflation factors
Date: 12/01/16 Time: 15:23
Sample: 1981 2012
Included observations: 32

Variable	**Coefficient Variance**	**Uncentered VIF**	**Centered VIF**
DMBC	0.001125	1.113027	1.008713
INTR	0.554493	2.010515	1.008713
C	4.331660	123.6473	1.002126

Appendix IV. Raw data for INV, DMBC and DMBC LR

Year	INV	DMBC to the private sector (000)	LR
1982	9.67	10,668.04	10.25
1983	10.43	11,668.04	10.00
1984	13.18	12,462.93	12.50
1985	13.64	13,070.34	9.55
1986	14.83	15,247.45	10.50
1987	15.23	21,082.99	17.50
1988	17.56	27,326.47	16.50
1989	26.83	30,403.22	26.80
1990	40.12	33,547.70	25.50
1991	45.19	41,352.46	20.01
1992	70.81	58,122.96	29.80
1993	96.92	127,117.71	18.32
1994	105.58	143,424.21	21.00
1995	141.92	180,004.76	20.18
1996	204.05	238,596.56	19.74
1997	242.90	316,207.80	13.54
1998	242.26	315,956.19	18.29
1999	231.66	431,168.36	21.32
2000	331.06	530,373.30	17.98
2001	372.14	764,961.52	18.29
2002	499.68	930,493.93	24.85
2003	865.88	1,096,535.57	20.71
2004	863.07	1,421,664.03	19.18
2005	804.40	1,838,389.93	17.95
2006	1,546.53	2,920,617.76	16.94
2007	1,936.96	3,668,657.82	15.14
2008	2,053.01	6,920,498.75	18.99
2009	3,050.58	9,102,049.11	17.59
2010	4,012.92	10,157,021.18	16.02
2011	3,908.28	10,660,071.84	16.69
2012	3,432.98	14,649,276.46	16.51

Source: CBN statistical bulletin 2014

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