EMPIRICAL ANALYSIS OF THE IMPACT OF DOMESTIC PUBLIC DEBT STOCK ON THE PRIVATE SECTOR CREDIT IN NIGERIA

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Abstract
The rising profile of domestic debt in Nigeria calls for the need to reassess the effects of domestic debt stock on private sector credit, since both government and private sector borrow from the same pool. This is more important considering the sudden increase in the deposit bank holdings of domestic debt. This paper analyses the impact of domestic public debt stock on credit to private sector in Nigeria, using time series data for the period of thirty-seven (37) years (1980-2017). In analyzing the data, the paper uses Autoregressive Distributed Lag (ARLD) method. The result indicates that domestic debt stock has significant negative impact on credit to private sector in Nigeria. The study concludes that domestic debt stock crowds out credit to private sector. The main recommendation of the study is that government should reduce the securitized instrument issued mostly to the banking system. This is simply because it crowds out credit to private sector, policymakers should therefore control spending, manage debt and maximize domestic revenue collection.

Keywords: ARDL, Private Sector Credit, Co-integration, Domestic Debt Stock. Public debt

Introduction

One of the major propositions of Keynes for a country to recover from economic recession is to increase government expenditure. Countries like Nigeria with dwindling revenue can only achieve this through borrowing. This could explain the reason why in the Nigeria's economic recession between 2015 to 2016, domestic debt in Nigeria increase by 28.5 percent that is from ₦8, 837 billion to ₦11, 058 billion (Central Bank of Nigeria (CBN), 2016). The adverse effect of increase in domestic debt could be reduction of loanable funds available to the private sector (Reinhart & Rogoff, 2011).

The effects of large government debt on economic growth have been studied and debated in policy circles without a clear consensus (Bahmani-Oskooee, 1999; Adam & Pavan 2005; Christensen 2005; Presbitero 2012; Egbetunde 2012; Traum & yang 2015; Gomez-puig & Sosvilla-Rivero 2017). On the other hand, little attention has been paid to the effects of public debt on credit to private sector, notwithstanding the importance of loanable funds for the stability of financial systems, the business cycle, and the transmission effects of monetary policy. Government securities are usually of high value due to the repayment ability of the government, encourages lending in favour of the government. Also, increase in interest rate caused by the sale of government securities in the financial market reduces the availability of loanable funds, thereby making demand

for credit higher than its supply, (Bua, Pradelli & Presbitero, 2014). Scarcity of loanable funds could bring about rise in interest rate (high cost of borrowing) thereby making it difficult for private firms to borrow from the banking sector. This leads to a decline in the production capacity of some firms, which may lead to retrenchment, inflation, low rate of industrialization, low aggregate demand and low economic growth (Presbitero, 2012). The private sector could also face more binding financing constraints as, particularly in countries with a significant share of domestic debt and underdeveloped financial markets; credit rationing can be the result of increasing interest rates and of banks' preference for risk-free government securities (Christensen, 2005)

This rising profile of domestic debt in Nigeria calls for the need to reassess the effects of domestic debt stock on private sector credit, since both government and private sector borrow from the same pool. This is more important considering the sudden increase in the deposit bank holdings of domestic debt. Deposit bank holdings rose to 54.52% of the total holdings from 2005 to 2016. Also the domestic debts increased by 28.5 percent between 2015 and 2016 (CBN, 2016). The empirical studies of Kumhof and Tanner (2005) suggested that the role of public debt is in the provision of a relatively safe asset. However, Hauner (2009) argued that higher domestic debt may cause a crowding out effect and affect the financial stability if banks become extremely involved in government debt. When banks hold higher proportion of government debt assets the amount of bank credit available to private sector will reduce by same or higher proportion and also restrict private investment (Presbitero, 2012). Ismihan and Ozkan (2012) state that public debt is likely to be harmful to countries such as Nigeria where credit to government makes up a larger share of total bank lending. This could be the reason why Ismihan and Ozkan (2012); De Bonis and Stacchini (2013) investigate the effect of domestic debt on credit to private sector in Turkey and USA respectively, (Asogwa & Chetachukwu, 2013; King'Wara, 2014; Ma'ana, Owino & Mutai, 2008). This study however, examines the effect of domestic debt stock on credit to private sector in Nigeria. In achieving this objective, The paper is structured into five sections, section one introduces the paper, section two reviews literature, section three deals with methodology, section four presents results and discussion and section five concludes the paper.

2.0 Literature Review

According to Berheim (1989), two schools of thoughts have dominated the theoretical literature of crowding in and crowding out effect of domestic debt (Neoclassical and Keynesian economists). Darrat (2002) is of the view that government borrowing invested in the economy increases current consumption. Assuming full employment of resources, the Neoclassical argue that increased consumption implies a decrease in saving, while excessive borrowing will put pressure on interest rates; which will in turn lead to a decline in credit to private sector and consequently brings about instability in the financial market. Thus, public borrowing could "crowd out" credit to private sector (Spector & Cott, 1988; Berheim, 1989; Aschauner, 1989; Cwik & Wieland, 2011). On the contrary, the Keynesian economists provided a counter argument to the crowding-out effect by making reference to the expansionary effects of government expenditure through public borrowing. They argue that when the government borrows and spend in the economy, it leads to an increase in aggregate demand which in turn induces domestic production; this makes private investors more optimistic about the future of the economy and thus, invests more. This is known as the "crowding in" effect (Baldacci, Hillman & Kojo, 2004).

Perhaps there exist a wide array of empirical studies on the crowding in and crowding out

effects of domestic debt. But this happens in four different channels; credit to private sector, credit growth, government deficit finance and private investment. The argument on the credit to private sector channel is found in the studies of; De Bonis and Stacchini (2013); Hauner (2008; 2009); Mbulawa 2015; Janda & Kravtsov (2017). Bonis and Stacchini (2013) employed Generalised Method of Moment (GMM) in 43 countries to analyze the impact of public debt on credit growth and found that public debt has a negative and significant relationship with credit growth. The result further shows that public debt may be associated with lower credit growth because greater portions of credit are absorbed by government liabilities instead of private sector. On the other hand, Hauner (2008) examined the impact of credit to government on three aspects of banking sector performance for 142 countries. The study employs OLS and dynamic GMM estimator and found out that domestic debt increases the share of bank credit absorbed by the public sector which in turn retards credit advanced by banks to private sectors. The study also concluded that credit to private sector has a negative and significant relationship with domestic debt but cautioned that slow financial deepening caused by low credit to private sector is associated mainly with slower growth, increasing government intervention, more government bank ownership and weaker creditor rights. Similarly, Hauner (2009) in a different work used OLS to study the role of public debt on financial development using credit to private sector as a measure for a number of 142 counties, the study used a "lazy bank" approach. According to the study increase in bank holdings of domestic debt increase the profitability of banks. This on the other hand causes a decrease in their efficiency as the main credit source. Mbulawa (2015) on the other hand used annual panel data for eleven SADC countries to examine the determinants of credit to private sector and the possibility of crowding out effect of government debt. The study employs GMM estimator and finds no significant relationship between domestic debt and credit to private sector. On the contrary, Janda & Kravtsov (2017) used finite distributed lag model in the countries of Central Eastern Europe. The study investigates the time varying effects of domestic public debts and found evidence of domestic debt crowding in credit to private sector in the short run.

Bahmani-Oskooee (1999) used Johansen cointegration technique to determine the crowding-in versus crowding out controversy of budget deficits financed through public debt on private investment. Using quarterly data from the U.S. over 1947–1992 period, the study shows evidence supporting the argument of crowing-in effect. Christensen (2005) discussed the role of domestic debt markets in sub-Saharan Africa (SSA) based on a data set covering 27 SSA countries for 20-year period (1980- 2000). The study uses OLS and finds that domestic debt markets in these countries are generally small, highly short term, and often have a narrow investor base. The use of domestic debt is also found to have significant crowding out effect on the private sector lending in the selected sub-Saharan Africa (SSA) economies. Another study by

Asogwa and Okeke (2013) investigated the crowding out effect of budget deficits from public debt on private investments in Nigeria. Using OLS and Granger Causality test the study confirms that budget deficits crowds out private investments and that private investments granger cause budget deficit with feedback. King'wara (2014) however, investigated the impact of public domestic debt on private investment in Kenya. Cointegration and error correction models were used to anayse the data, and the result indicates that domestic borrowing has negative impact on private investment. Traum and Yang (2016) examine the impact of government debt in crowding out investment for the U.S. economy using an estimated New Keynesian model. The study uses reduced form regression with simulated data, and variance decomposition as well as impulse response functions and concludes that whether investment is crowded in or out in the short term it

all depends on policy shocks.

However, most of the studies that investigate the effect of domestic debt on credit growth consider the aggregate domestic debt stock which comprises of stock of banking system and Non-bank. It is in this regards that Hauner (2009) argued that banks serve as major lenders to government and private sector. Therefore to effectively measure the impact of domestic debt on private sector credit, there is need to disaggregate debt stock by considering banking system stock separately from non-banking system stock. Another important issue is that previous studies did not capture the influence of structural breaks in the data gathering process, which is obvious using developing countries' data such as Nigeria, since the existence of structural break can affect the reliability of the findings.

3.0 Methodology

The study uses secondary data which was obtained from the World Development Indicators (WDI) except for Domestic debt holdings of the banking system which was obtained from CBN statistical bulletin. The sample period was from 1980 to 2017. In analyzing the data, ARDL bound testing procedure is employed. The model has several advantages over the traditional techniques of co-integration such as Engle and Granger (1987). The method can be applied irrespective of whether the underlying variables are I(0) or I(1) or a combination of both (Baharumshah, Mohd & Masih, 2009; Umar and Dahalan, 2015). It does not suffer from small sample bias. Furthermore, it can provide a joint estimation of both long run and short run parameters.

The Auto regressive Distributed Lag (ARDL) model used in this study is expressed as follows:

$$\Delta CPS_t=\beta_0+\beta_1 CPS_{t-1}+\beta_2 DDB_{t-1}+\beta_3 INT_{t-1}+\beta_4 GDP_{t-1}+\sum_1 \Delta CPS_{t-i}+\sum_2 \Delta DDB_{t-i}+\sum_3 \Delta INT_{t-i}+\sum_4 \Delta GDP_{t-i}+U_t \quad \ldots\ldots(1)$$

Where

B_0 is the drift component,

Δ is the First difference operator.

CPS is credit to private sector as a ratio of GDP,

DDB stands for Domestic Debt holdings of banking system as ratio of GDP,

INT is the interest rate and

GDP is the real gross domestic product.

β_i, $_i$ are Vectors of the parameter of the variables.

U_t is white noise with zero mean.

All the variables are in ratio except GDP which is transformed into logarithmic value. The terms with the summation signs ($\sum$) in equation 1 above represent the error correction dynamics while the part of the equation with β_i correspond to the long-run relationship.

The null hypothesis in the equation is H_o: $\alpha_1=\alpha_2=\alpha_3=0$. This denotes the absence of long-

run relationship

The calculated F statistics will be compared with two sets of critical values. One set assumes that all the variables are I(0) and the other assumes that all the variables area I(1).

Having established the evidence of cointegration among the variables in the model, the long run parameters are estimated based on the specification in Equation 2:

$CPS_t=\beta_0+\beta_1 CPS_{t-1}+\beta_2 DDB_{t-1}+\beta_3 INT_{t-1}+\beta_4 GDP_{t1}+U_t$……(2)

In order to estimate the short-run relationship between the variables and the speed of adjustment of the model to equilibrium, the corresponding error correction equation is estimated as expressed below:

$\Delta CPS_t=_0+\sum_1 \Delta CPS_{t-i}+\sum_2 \Delta DDB_{t-i}+\sum_3 \Delta INT_{t-i}+\sum_4 \Delta GDP_{t-i}+_5 ECM_{t-1}+U_t$……(3)

Where, ECM is the error correction term of one period lag while the coefficient $_5$ measures the speed of adjustment of the model convergence to equilibrium.

4.0 Results and discussion

After analyzing the data collected using the models specified above we obtained some results which are presented and discussed in this section. The section therefore, comprises of three parts including this introduction. In part two we present result of Unit root analysis and in part three results for bound test for cointegration was presented.

4.1 Unit root analysis

The stationarity of the series employed are checked first using ADF test proposed by Dickey & Fuller (1979). The result is shown in Table 1

Table 1: ***Augmented Dickey Fuller Unit Root Test***

Series	Intercept without trend		Intercept with trend	
	Level	1st Difference	Level	1st Difference
LCPS	-.0.3905	-2.8275*	-2.2794	-3.1960*
LDDB	-2.5366	-2.7999**	-2.6891	-3.1494*
INT	-3.5594***	-3.6964**	-4.0756***	-4.0560***
LGDP	-2.3683	-4.1428***	-1.2780	-3.7648**

Source: *Researcher's Computation*

Note: ***, ** and * represent significance level at 1%, 5% and 10% respectively. The figures are the *t*-statistics for testing the null hypothesis that the series has unit root. The lag length is determined and fixed as 4 based on Schwert (1987). The critical values for intercept without trend are -3.479, -2.883 and -2.578 whereas, for intercept with trend the values are -4.028, -3.443 and -3.146 for 1%, 5% and 10% respectively.

Tables 1 presents the estimations of the ADF unit root test on the macroeconomic variables that determine credit to private sector. These comprise of natural logarithm of gross domestic product (LGDP), ratio of credit to private sector (LCPS), domestic debt from banking system (LDDB) and Interest rate (INT). The ADF results show that all the series are not stationary at level except for INT under both intercept without trend and intercept with trend.

According to Lee & Strazicich (2013) and Perron (1989), the existence of structural break in the data generating process will lead to size distortion and spurious conclusion in the ADF model Thus, in addition to the traditional ADF test, this study employs Lee and Strazicich Lagrange multiplier with one structural break to further check the unit root properties of the series. The test is break point independent and nuisance invariant under the alternative hypothesis. It shows neither size nor location dependence and unaffected by incorrect estimation irrespective of the existence or otherwise of break (Lee & Strazicich, 2013). The results are presented in Table 2

Table 2: ***Lee and Strazicich One-Break LM Unit Root Test***

	MODEL A					MODEL C				
Series	*K*			Test Stat.	Critical value break points Λ	*K*			Test Stat.	Critical value break points λ
*d*LCPS	2	1995	1.219	-3.390[C]	0.03	2	1989	-1.434	-4.596[B]	0.07
*d*LDDB	2	1990	3.519***	-4.133[A]	0.10	2	2007	1.945*	-4.329[B]	0.06
*d*INT	2	2000	2.251**	-4.082[B]	0.07	2	1988	3.760***	-4.968[A]	0.10
*d*LGDP	2	1989	2.282**	-2.748	0.07	2	2005	-3.409***	-3.874[C]	0.10
Critical Values		1%	5%	10%						
MODEL A		-4.084	-3.487	-3.185						
MODEL C		-4.699	-4.128	-3.839						

Source: *Researcher's Computation*

Note: *k^* is the optimal number of lagged first-difference terms included in the unit root test to correct for serial correlation. denotes the estimated break points. is the *t* value of DTjt, for *j*=1. A, B and C indicate significance of the LM test statistics at 99%, 95% and 90% significance level, respectively. While ***, ** and * indicates the two-tailed significance level of the break date at 99%, 95% and 90% respectively.

The result indicated mixture in the order of integration in the LS test in table 2. In other words, all the series are found to be nonstationary at level under both crash and trend models with the exception of LINT. LCPS is also characterised by breaks in both level and trend. However, the test established that the break dates are not statistically significant. Therefore, the coefficient of the break date will not be estimated in the model.

4.2 Bound test for Cointegration

The bound test for cointegration is estimated to determine whether there is cointegration among the variables captured in the ARDL model. This has been achieved using the bound testing approach and the results are presented in Table 3.

Table 3: ***ARDL Bound Cointegration Test***

Model	*F*-Stat.	Sig. Level.	Critical Value	
			I(0)	I(1)
LCPS = *F*(*LDDB,INT,LGDP*)	3.827**	10%	2.26	3.35
LDDB = *F*(*LCPS,INT,,LGDP*)	2.117	5%	2.62	3.79
INT = *F*(*LCPS,LDDB,LGDP*)	2.127	1%	3.41	4.68
LGDP = *F*(*LCPS,LDDB,INT,*)	4.600**			

Source: *Researcher's Computation*

Note: ***, ** and * represent significance level at 1%, 5% and 10% respectively. The critical values are based on Narayan (2005), case III for T = 35 due to small sample size of the study.

From Table 3, the bound test results revealed the existence of two cointegration vectors among the four vectors. When credit to private sector is the dependent variable, the null hypothesis of no cointegration between credit to private sector and the independent variables of LDDB, INT and LGDP is rejected at 5% level of significance. This is because the F-statistic, 3.827 is greater than the upper critical values of 3.79 indicating

that there is cointegration among LDDB, INT, LGDP and credit to private sector (LCPS). Such cointegration also exists when LGDP is taken as the dependent variable, the null hypothesis of no cointegration between gross domestic product and the independent variables of LDDB, INT and LCPS is rejected at 5% level of significance. However, no cointegration when LDDB and INT are taken as the dependent variables.

Table 4:*Long Run and Short Run Coefficients*

Variables	*Long Run Coefficients*	*Short Run Coefficients*	
LDDB	-0.262**	D(LDDB)	-0.372***
	(-2.630)		(-3.552)
INT	-0.099**	D(INT)	-0.034**
	(-0.985)		(-0.966)
LGDP	0.630**	D(LGDP)	0.214**
	(2.542)		(2.244)
CONSTANT	-9.517***	CointEq(-1)	-0.340***
	(-2.977)		(-3.236)

Note: *** (**) * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The figures in parentheses are the T-statistics.

Source: *Researcher's Computation*

From Table 4, LDDB coefficient is -0.262 indicating a negative effect of domestic debt stock on credit to private sector in the long run. The coefficient is significant at 5% level of significance. Therefore, a percentage point increase in domestic debt stock decreases credit to private sector by 0.26 percent. This means that there is the possibility of crowding out where government borrowing through excessive bond subscription of the banking system replaces private borrowing in the banking sector portfolios. The relationship is also negative and significant in the short run. However, the magnitude is higher in the short run with a coefficient of 0.372. The negative effect of domestic public debt stock on credit to private sector is in line with the results of Mun and Ismail (2015), De Bonis and Stacchini (2013) and Ismihan and Okzan (2012).

The coefficient of INT is -0.099 indicating a significant negative effect of interest rate on credit to private sector at 5% significant level in the long run. This indicates that a percent change in interest rate decreases credit to private sector by 0.099 percent. This means that a rise in interest rate increases the cost of borrowing, hence reduces demand for borrowing, which in turn decreases credit advanced to private sector. The result also shows a significant negative effect of interest rate on credit to private sector in the short run. Nevertheless, the magnitude is less with a coefficient of 0.034 in the short run. This is also in conformity with the loanable funds framework developed in Beetsma and Bovenberg (1999). The framework hypothesized an inverse relationship between interest rate and credit advanced to private sector.

The log of gross domestic product (LGDP) shows a significant positive effect on credit to private sector in the long run, with a coefficient of 0.630. This signifies that a percentage point increase in gross domestic product increases credit to private sector by 0.63 percent. The result also indicates significant positive effect of GDP on credit to private sector in the short run. Even though, Coefficient of 0.214 shows that the magnitude is less in the short run. Therefore, when there is higher economic growth, credit advanced to private sector tends to improve. This finding is in agreement with the findings of De Bonis and Stacchini (2013), which denotes that a strong economic growth is a factor that boosts credit to private sector.

The error correction coefficient (ecm) which is approximately -0.340 does not only has the expected sign but also statistically significant at 1% level of significance. The value of the error correction term implies a fairly slow speed of adjustment to equilibrium after a shock.

Table 5: ***Diagnostic Test***

Test Statistics	Chi-Square/LM Test	Probability Value
Serial Correlation	0.289	0.959
Functional form	0.783	0.384
Normality	1.645	0.456
Heteroscedasticity	0.029	0.864

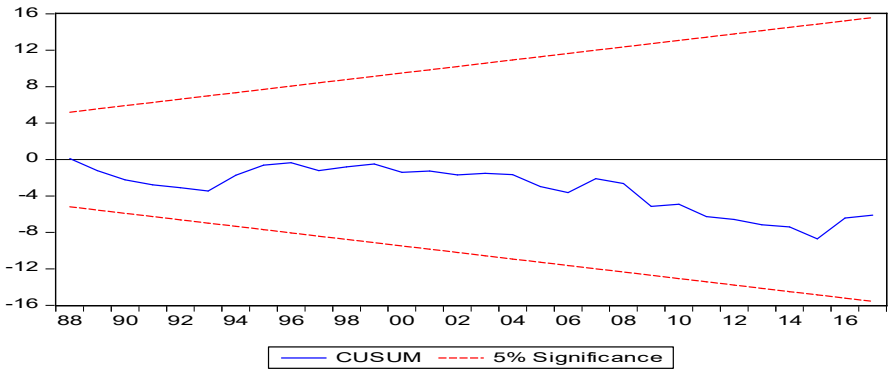
Source: *Researcher's Computation*

Note: Serial correlation is examine using Lagrange Multiplier test of residual, functional form is based on Ramsey's RESET test, normality base on skewness and kurtosis while Heteroscedasticity is based on squared residuals on squared fitted values

The diagnostic test results are presented in Table 5. Hence we conclude that there is no problem of serial correlation, model misspecification, non-normality of residuals and heteroscedasticity in the estimated model. Therefore, the results of the diagnostic test indicate that the coefficients of the estimated model are efficient and consistent.

The stability of the estimated coefficients is also examined using cumulative sum of recursive residuals and cumulative sum of squares of recursive residual. This is shown in figures 1 and 2 below.

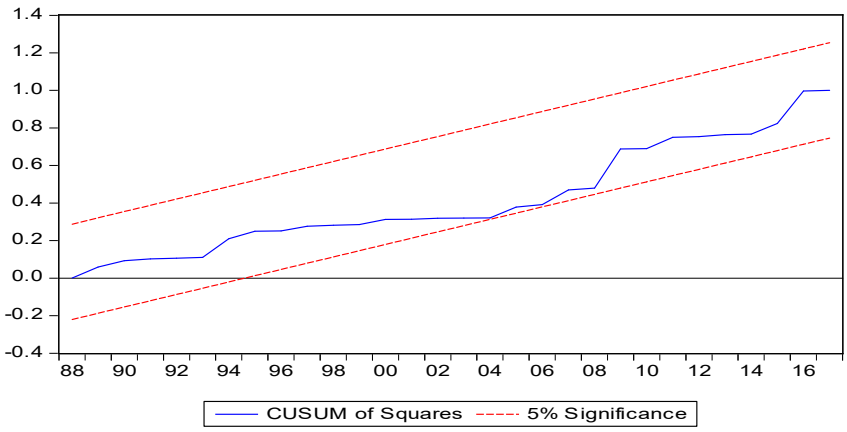
Figure 1
Plot of Cumulative Sum of Recursive Residual



We checked the stability of the long-run relationship between credit to private sector and its determinants. We used the CUSUM tests to test for consistency of long-run parameters. The tests are applied to the residuals of the model. The plot of the CUSUM statistics stays within the 5% significance level, therefore, the estimates are stable.

Figure 2

Plot of Cumulative sum of Squares of Recursive Residual



Next, we checked the stability of the long-run relationship between credit to private sector and its determinants. We used the CUSUM-squared tests to test for consistency of long-run parameters. The tests are applied to the residuals of the model. The plot of the CUSUM-squared statistics stays within the 5% significance level, and then the estimates are stable. The coefficients are found to be stable over the period under study. Figures 1 and 2 show that the parameters are within the upper and lower critical bounds at five percent level of significance.

5.0 Conclusion and Recommendations

Arising from the findings of this study it could be concluded that domestic debt stock has a significant negative impact on credit to private sector in Nigeria, which implies that when government excessively borrows domestically, it tends to crowd out the availability of credit to private sector. Therefore, since the findings of the study revealed that increase in domestic public debt stock crowds out private sector credit, there is need to reduce the level of domestic debt stock of government from the banking sector, so as to free

resources for private sector growth. Secondly, there is the need to diversify the economy so as to increase and improve the various revenue generating sources. This is expected to reduce the deficit financing which in turn reduces the domestic public debt profile. The importance of developing and maintaining strong institutions with respect to public debt management cannot be overemphasized, it is therefore suggested that government must be involved in building stronger institutions for effective and efficient public debt management.

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