

COMPLEMENTARY RELATIONSHIP BETWEEN DOMESTIC CREDIT TO THE PUBLIC AND PRIVATE SECTORS IN NIGERIA

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Abstract

Domestic credit is of paramount importance for sustainable growth in any economy with credit options contributing to accelerating economic growth. This investigation aims to analyze the complementary affiliation between credit to both the public and private sectors in Nigeria, at the domestic level, from the year 1981 to the year 2020. An Auto-regressive Distributed Lag model was applied to elucidate the correlation between the variables in the short and long-term periods. From the findings, the relationship between credit to the public and private sectors is not complementary. Therefore, it is the recommendation of the study that the adoption of a complementary relationship between public and private sector credits at the domestic level of domestic lending and sector-specific credit policies. Furthermore, in order to ensure proper credit monitoring, effective risk management practices should be intensified, with more emphasis on the public sector, so that domestic credit will have an improved impact on the growth of the economy.

Keywords: Domestic credit, complementary, economic growth, autoregressive distributed lag, economy.

1. INTRODUCTION

The Nigerian government undertook financial reforms aimed at promoting sustainable economic growth by implementing several measures. In 1986, the financial sector was deregulated in the Structural Adjustment Programmes (SAP). In the year 2005, the strategy of recapitalization of the banking sector was carried out, and in the year 2008, Credit Bureaus were established. These measures were aimed at stimulating the financial system development and increasing domestic credit to promote sustainable economic development. An advanced financial system is anticipated to enhance banking sector operations, facilitate effective intermediation and allocate credit from the sector with a surplus to the sector with a deficit in the economy. According to Awad and Karaki (2019), credit creation can lead to increased economic activity in several ways. For example, businesses can invest in excess of their capacity to save, households can make purchases on credit, and government expenditure can be structured to manage the system tax returns that is cyclical in nature, and investment in infrastructure projects can be made possible. All of these factors have the potential to contribute to economic growth. The allocation of credit to both the public and the private sectors as well as the volume of credit in an economy is essential in the realization of sustainable economic growth (Levine, 2005; Abina, 2020). According to Erzen (2008) and Alaba & Lawal (2019), providing private sector credit is a crucial catalyst for investment in that sector and the economy as a whole. It promotes efficiency, competition, innovation, and growth. In Nigeria and other developing nations, an inappropriate environment for investment in the private entity and the perceived positive influence of fiscal expenditure in the system, in line with the theory of Keynes, seems to highlight the role of government in managing the economy. This has led to improvements in the banking segment, particularly in the public segment credit by the domestic money banks.

From research, credit extended to the public sector has the potential to serve as a valuable tool for stimulating growth in the economy. This is because such credit can facilitate the provision of business-enhancing amenities that are essential for promoting private-sector credit, as highlighted by Khan and Reinhart (1990). In Nigeria, despite various financial policies implemented to boost credit, aggregate credit (net) to the real GDP ratio has been mostly under 50% during the period under investigation. Although it is generally believed that credit is essential for economic growth, the Nigerian financial sector appears to be inefficient and issues

such as lack of long-term funding, mismatch of financial liquidity, and inefficiency in fund allocation persist which seems to suggest that the credit rate is low and a cause of a persistently weak economy. While credit extension to the private segment is very relevant for growth in the economy, the banking sector's high lending rates and the allocation of credit to the public sector have hindered its potential effect. To address this issue, the Nigerian government implemented financial sector deregulation in the year 1986 and the recapitalization of the banking sector in the year 2005. These measures aimed to boost domestic credit accessibility and promote economic growth by addressing the problem of insufficient credit allocation to the private segment. Investment in the economy is not enough and the unstable growth experienced seems to have hindered the relevant effect of domestic credit on the economy and there has been a growing number of thoughts that domestic public sector credit crowds out domestic private sector credit thereby reducing the potency of the influence of private sector credit to economic growth.

Consequently, the government, usually, puts in place policy measures that will stimulate diverse credit options and credit growth and despite such policy measures in Nigeria, the economic growth in Nigeria seems to remain low. Factors suspected by earlier scholars to be responsible for such a situation in Nigeria are short-tenured funding, poor fund allocation, challenging domestic credit options, and a mismatch in liquidity. Studies have explored how economic growth is influenced by bank lending (Aliyu & Yusuf, 2014; Tomola, Adebisi & Olawale, 2010; Obamuyin, Edun & Kayode, 2010), and the interdependence of domestic debt and private sector credit in Nigeria (Omodero, 2019). Experiences have shown that no indigenous study exists on the complementary relationship between public and private sectors credit, unlike in other developing countries (Makambi, Muhindi & Nduku, 2017).

2. LITERATURE REVIEW

Credit policies are usually employed by monetary authorities to attain macroeconomic objectives, such as stimulating growth in specific sectors. Figure 1 illustrates that the private segment credit ratio relative to real GDP exceeds the public sector credit ratio relative to real GDP. Nevertheless, credit allocation to both sectors exhibited significant instability, declining in the year 2010. The staggered effect of the financial crises that occurred in the United States and spilled over to global financial institutions seems to be the major cause of the decline. Averagely, credit to the private entity, at the domestic level, relative to the real GDP was 9.7% in ratio, while credit allocated to the public sector relative to real GDP was 4.1% in ratio. As reported by The Global Economy (2020), the above figures are below the world averages which were 54.77% in 2019 and 12.06% in 2017.

Conceptual Model

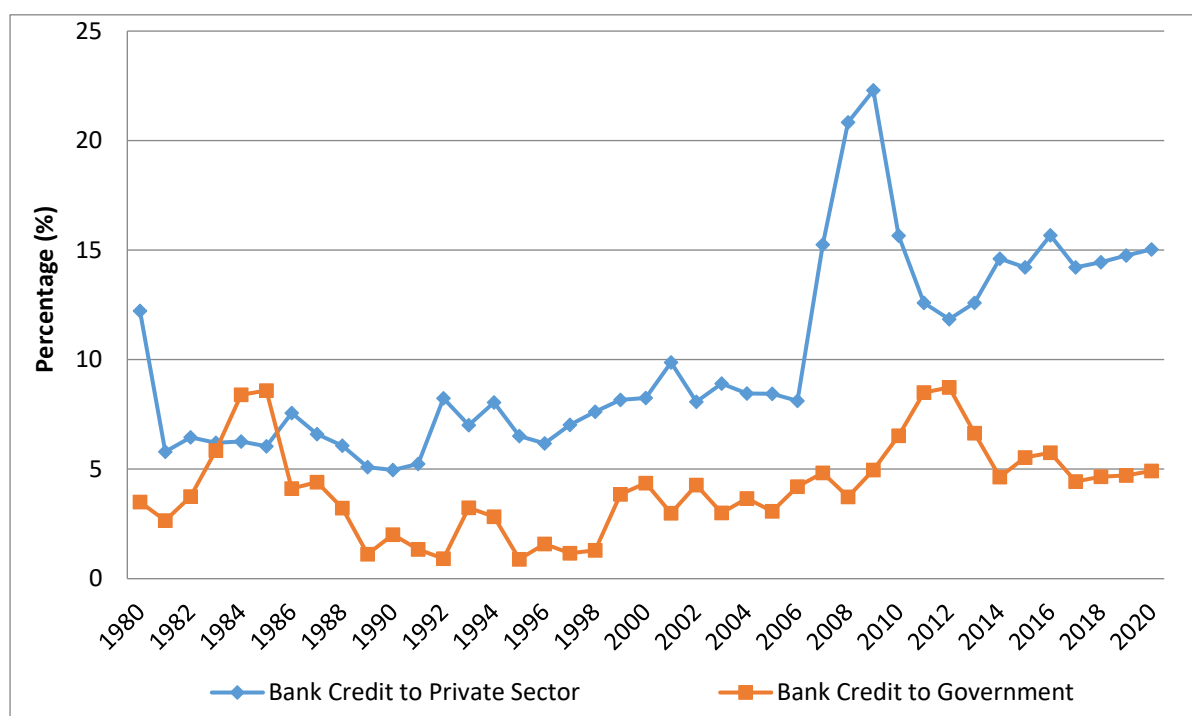


Figure 1: Private Sector Credit and Public Sector Credit in Nigeria

Source: Adapted from Olannye, Maku and Adelowokan.

Considering this, it is therefore expedient to improve private sector credit allocation. From the reports of The World Development Indicators (2020), only 11.2% was the percentage of credit allocated to the private sector as a proportion of GDP in Nigeria. This is significantly lower than the figures of 62% for South Africa, 26.7% for Sub-Saharan Africa, and 98% for the global economy.

Akujuobi and Chima (2012) used a multiple regression model spanning from the year 1960 to the year 2008 to investigate the effect of commercial bank credit on economic development. The study incorporated co-integration analysis and found out that credit to the production activities has a long-term relationship with the level of economic development in Nigeria. Shijaku and Kalluci (2013) applied a Vector Error Correction Mechanism approach to investigate the factors that determine credit from the bank given to the private segment, in the long run, in Albania, focusing on both demand and supply indicators. The outcome of the study established a means of restoring bank credit to equilibrium and demonstrated that lending and economic growth are positively related. The findings from the study showed stimulating factors for lending demand included financial intermediation, financial liberalization, lower lending cost, reduction of domestic borrowing by the government, and better-quality bank lending. The findings was that the exchange rate played a role in demand valuation and consumption smoothing effects.

Banu (2013) examined how Romania's economic growth is influenced by credit and concluded that credits granted to households had a more impact on GDP formation than those provided to the public sector. As a result, the researcher suggested that Romania should consider implementing strategies to draw foreign investments from outside the country and be well-positioned for European funding utilization that will encourage economic growth. Aliero, Abdullahi, and Adamu (2013) investigated how credit given by banks to the private segment is related to economic growth, from the year 1974 to the year 2010, in Nigeria. The Autoregressive Distributed Lag method was used and the results revealed that over a long run period, private segment credit from the banks and economic growth were significantly positively related. The authors suggested that banks in Nigeria could consider adopting and implementing long-term credit facilities that support entrepreneurship ventures rather than the short term.

In a study conducted by Modebe, Ugwuegbe, and Ugwuoke (2014) to examine how economic growth in Nigeria is impacted by bank credit. Time series data from the year 1986 to the year 2012 was used by the study. A negative connection that was significant between the gross domestic product in the long run and the total credit from the bank that is allocated to the private entity was the results of the study. Additionally, the study found that, in the long run, aggregate money supply had an effect on GDP. The authors observed that the informal nature of the significant sector of the economy made it difficult to meet the criteria for obtaining credit in Nigeria's banking industry. Nwakanma, Nnamdi, and Omojefe (2014) adopted the Autoregressive Distributed Lag model and Granger Causality approach to evaluate the long-run link that exists between credits from the bank that is advanced to the private segment and economic growth in Nigeria. The authors looked at the direction of causality between them and found out that there was no causality in any direction that was significant although the study variables witnessed a long run relationship that was significant. The study recommended steps that will involve the establishment of bank credits that will be long-tenured in nature and a system that will enforce the regularization of credit agreements to make the banking activities stronger in Nigeria so that they can finance businesses.

Olowofeso, Adeleke, and Udoji (2015) utilized fully modified version of the ordinary least squares to critically look at the influence of increased credit given to the private sector on output and found that output was improved as a result of a favorable effect of growth in private entity credit. The study also highlighted the crucial role of the banking sector in financial intermediation, which facilitates the mobilization of financial resources for productive investments. Akinlo and Oni (2015) used the error correction model to analyze how the growth of the credit given to the private entity affects output and the findings demonstrated a favourable influence of credit given to the private entity on output. The study also identified the role of the banking sector as a critical medium of financial intermediation for the mobilization of financial resources toward productive investments. Nektarios (2016) examined how the credit given to the private segment affects the growth of real GDP in three Euro-area countries adopting a two-period model and a smooth transition conditional correlation (STCC) model. The study found a positive and yet declining correlation which suggests that assuming other things are equal, private sector lending spurs growth in GDP an all debt-to-GDP ratio.

Emenike (2016) analyzed the dynamics of the connection between monetary policy and credit given to the private segment, while also assessing the influence of a structural break on the connection from the year 2000 to the year 2013 and revealed that there is a positive substantial short-term effect of credit on monetary policy changes. Furthermore, the study highlighted the efficacy of credit given to the private segment as a means of transmitting monetary policy in Nigeria. A study conducted by Okafor and Chijindu (2016) analyzed the influence credit allocated to the public entity on economic growth, between the year 1987 to the year 2013 in Nigeria. Their findings indicated that credit given to the public segment affects growth in the economy in a negative way that is insignificant statistically. Makambi, Muhindi, and Nduku (2017) did a study examining the relationship between lending in Kenya's banks extended to the public segment and the lending extended to the private segment from the year 1966 to the year 2014. To achieve this, the study utilized the Markov switching model to identify fiscal policy regimes and the autoregressive distributed lag model to investigate how private segment credit is impacted by bank lending to the government. The research findings showed that fiscal policy in Kenya was influenced by policy changes and economic shocks. The ARDL analysis revealed that a crucial role was played by the fiscal policy regimes in explaining the interdependence between the credit given to the private entity and government debt. Additionally, the study provided evidence that a consistent upward trend in government debt resulted in a decline in the credit given to the private entity.

Kouam and Mua (2020) investigated the influence of credit given to the private sector and public segment on real GDP growth in Cameroon. The results indicated that credit given to the private segment had a positive effect on economic growth which is significantly more than public-sector lending. The study highlighted that those closer connections between the money deposit banks and the public sector could heighten risks in the stability of the financial system, as weaker oil prices might affect the government's capacity to repay its loans to commercial banks in Cameroon.

3. METHOD

The AK model of the endogenous theory developed by Pagano (1993) forms the framework for this study. The model holds the believe that financial development positively affects economic growth.

Thus, without diminishing returns, a basic production function of endogenous type, can be represented below:

$$y = Ak \quad (1)$$

At the level $A > 0$, the average product of capital and marginal product of capital are constant for Equation (1), which represents output per capita.

From equation (1) ($y = Ak$), Lucas (1988) posits that, capital (k) is included as a component of (k_H^α) human capital as well as (k_P^β) physical capital.

$$\text{Therefore, } k = (k_H^\alpha, k_P^\beta) \quad (2)$$

Putting equation (2) into the endogenous production function:

$$y = Ak_H^\alpha k_P^\beta \quad (3)$$

In this regard, the physical capital k_P^β can be disintegrated into accumulated capital k_{CP}^ϕ and incremental capital or investment k_{IP}^ϕ . Putting this into equation (3) we have:

$$y = Ak_H^\alpha k_{CP}^\phi k_{IP}^\phi \quad (4)$$

Investment k_{IP}^ϕ in equation (4) can be divided into public investment k_{PB}^γ and private investment k_{PR}^η . Thus equation (4) becomes:

$$y = Ak_H^\alpha k_{CP}^\phi k_{PB}^\gamma k_{PR}^\eta \quad (5)$$

In equation (6), the parameters represent the elasticities as follows: α for human capital; ϕ for accumulated capital; γ for public investment; and η for private investment. In this study, investment in the public sector is represented by domestic public credit and investment in the private sector is represented by domestic private credit.

An increase in domestic public and private sector credits applied for productive use will engender an increase in economic activities, including economic growth. Human and accumulated capital are expected to contribute to the increase in domestic credit and economic growth.

Model Specification

Endogenous growth model forms the models for this study since it highlights the influence that endogenous factors such as credit, at domestic level, granted to both the public and private segments have on the growth of the economy, as shown in equation (5). Therefore, the model used in this study is derived from Recuero and Gonzalez (2019) and Pagano (1993) and, and can be specified as follows:

$$y = f(Ak_H^\alpha k_{CP}^\varphi k_{PB}^\gamma k_{PR}^\eta) \quad (6)$$

Putting this in natural logarithms, it becomes:

$$\ln y = \ln A + \alpha \ln k_H + \varphi \ln k_{CP} + \gamma \ln k_{PB} + \eta \ln k_{PR} \quad (7)$$

Natural logarithmic format gives a better result and also reduces the problem of heteroscedasticity.

In equation (7), economic growth is (y), human capital (lab) is (k_H), (cps) cumulative capital stock is (k_{CP}), (cpb) public sector domestic credit is (k_{PB}), and (cpr) private sector domestic credit is (k_{PR}). After introducing the relevant control variable, government expenditures (gxp), identified by literature (Farkas, 2012), equation (7) can be rearranged into estimation form as follows:

$$\ln y_t = \delta_0 + \delta_1 \ln lab_t + \delta_2 \ln cps_t + \delta_3 \ln cpb_t + \delta_4 \ln cpr_t + \delta_5 \ln gxp_t + \varepsilon_t \quad (8)$$

Expectedly, δ_1 , δ_2 , δ_3 , δ_4 , and δ_5 would promote economic growth.

Accordingly, the empirical model on the complementarity or substitutability effect of public and private sectors credits at domestic level is derived below:

$$\ln cpr_t = \delta_0 + \delta_1 \ln lab_t + \delta_2 \ln cps_t + \delta_3 \ln cpb_t + \delta_4 \ln y_t + \delta_5 \ln gxp_t + \varepsilon_t \quad (9)$$

The signs of the coefficient δ_3 in equation (9) will determine the complementarity or substitutability influence of (*cpb*) public sector credit on (*cpr*) private sector credit, at domestic level. If the sign of the coefficient δ_3 is positive, then both variables are complementary credit options. However, if the coefficient δ_3 has a negative sign that is significant, then both variables are substitutes. Then, if the coefficient δ_3 is insignificant, then both credit options are unrelated.

Similarly, equation (9) is also the long run estimating model to examine the connections among the variables. Since this study uses the ARDL estimating technique, the short-run equation for this is:

$$\begin{aligned} \Delta \ln cpr_t = & \delta_o + \sum_{i=1}^n \delta_{1i} \Delta \ln lab_{t-i} + \sum_{i=0}^n \delta_{2i} \Delta \ln cps_{t-i} + \sum_{i=0}^n \delta_{3i} \Delta \ln cpb_{t-i} + \\ & \sum_{i=0}^n \delta_{4i} \Delta \ln y_{t-i} + \sum_{i=0}^n \delta_{5i} \Delta \ln gxp_{t-i} + \delta_{6i} \ln cpr_{t-1} + \delta_7 \ln lab_{t-1} + \\ & \delta_8 \ln cps_{t-1} + \delta_9 \ln cpb_{t-1} + \delta_{10} \ln y_{t-1} + \delta_{11} \ln gxp_{t-1} + \mu_{1t} \end{aligned} \quad (9a)$$

Where δ_o is the intercept; $\delta_1 - \delta_{5i}$ are the short-run elasticities and $\delta_6 - \delta_{12}$ are and the long-run elasticities of private sector domestic credit with respect to the variables as defined earlier; while μ_{1t} represents the error term. Difference operator is Δ ; and n is the lag length.

Using the ARDL model specification is to estimate both together, as suggested by the technique. The associated error correction model for the model of complementarity and substitutability is:

$$\begin{aligned} \Delta \ln cpr_t = & \delta_o + \sum_{i=1}^n \delta_{1i} \Delta \ln lab_{t-i} + \sum_{i=0}^n \delta_{2i} \Delta \ln cps_{t-i} + \sum_{i=0}^n \delta_{3i} \Delta \ln cpb_{t-i} + \\ & \sum_{i=0}^n \delta_{4i} \Delta \ln y_{t-i} + \sum_{i=0}^n \delta_{5i} \Delta \ln gxp_{t-i} + \beta_1 ECM_{t-1} + \mu_{1t} \end{aligned} \quad (9b)$$

So, the coefficient of the ECM is represented by β_1 ; and the error correction term lagged by one period is denoted by ECM_{t-1} while all other variables have been previously defined.

The study estimated equation (9), the sign of the coefficient of the public sector domestic credit (*cpb*) will determine the complementarity or substitutability impact of public sector credit (*cpb*) on private sector credit (*cpr*) at domestic level. If the sign of the coefficient of credit given to the public sector (δ_3) is positively significant in relation to the credit given to the private sector, at domestic level, then both variables are complementary credit options. If the sign of the coefficient of the domestic to the public sector is negatively significant, then both variables

are substitute credit options. However, if the coefficient of domestic credit to the public segment is insignificant, then both credit options are unrelated.

Illustration of the estimation technique from (9):

If $\delta_3 = +/\text{Sig.}$ \Rightarrow cpb is C \rightarrow cpr

If $\delta_3 = - / \text{Sig.}$ \Rightarrow cpb is S \rightarrow cpr

If $\delta_3 = I$ \Rightarrow cpb is U \rightarrow cpr

Where C = Complementary, I = Insignificant, U = Unrelated and S = Substitute.

Source: Author's Illustration

4. RESULTS AND DISCUSSION

The descriptive statistics is demonstrated in Table 4.1 and key measures used for the variables were indicated. The economic growth (Y) value, at the average, is ₦46,855.79b and ₦46,012.52b is the median value. The labor force (lab) has an average value of 48,157,271 billion and while 48,620,127 billion is the mean value, suggesting a consistent increase in the labor force. The average value of the capital stock (cps) is ₦4,683.1b and the median value is ₦2,053.01b. The credit given to the public sector (cpb) has an average value of ₦18.59b and that of the credit given to the private segment (cpr) is ₦9,335.28b. Similarly, the median values of public segment domestic credit (cpb) private segment domestic credit (cpr) are ₦5.30b and ₦6,920.5b, respectively, indicating an unstable trend in credit to both the public and private sectors during the period, partly due to the staggered effects of the financial crises that emanated from the United States of America in the years 2007/2008. Furthermore, the government expenditure's average value is ₦3541.48b and the median value is ₦3240.8b.

The range of values for the variables in Table 4.1 is quite large. The values for economic growth, labor force, and capital stock range from ₦21,177.92b to ₦73,681.8b, 34,803.27m to 6,322,671.8m, and ₦204,047.6b to ₦11,815.13b, respectively. Meanwhile, credit given to the public sector ranges from ₦0.079m to ₦137.61b and credit given to the private sector ranges from ₦238.6m to ₦25,835.01b, with the highest values being ₦137.61b for public segment and ₦25,835.01b for private segment.

Based on the kurtosis values, it appears that the distributions of (Y) economic growth, (lab) labour force, (cps) capital stock, and (cpr) private sector domestic credit are flatter than normal, or platykurtic, with values less than 3. Conversely, credit to the public sector (cpb) is

characterized by a peak relative to the normal distribution, or leptokurtic. Government expenditure (gxp) is relatively normal, or mesokurtic. The Jarque-Bera statistic indicated that normal distribution null hypothesis was rejected only for public sector domestic credit (cpb), while for the other variables, the null hypothesis of normal distribution was not rejected at a critical value of five percent.

Table 4.1 Descriptive Statistics

	<i>rgdp</i>	<i>lab</i>	<i>cps</i>	<i>cpb</i>	<i>cpr</i>	<i>gxp</i>
Maximum	73681.83	63226718	11815129	137.6100	25835.01	9925.13
Minimum	21177.72	34803279	204047.6	0.079	238.60	337.218
Std. Dev.	18944.56	8301981	4546249	38.07368	9196.297	2837.776
Mean	46855.79	48157271	4683101	18.85863	9335.279	3541.481
Median	46012.52	48620127	2053006	5.3043	6920.5	3240.82
Jarque-Bera	2.465913	1.03007	3.515555	37.24829	2.791554	2.682149
Skewness	-0.02082	0.122046	0.363342	2.324766	0.499231	0.792412
Kurtosis	1.461968	2.036005	1.312735	6.760348	1.702708	2.748612
Probability	0.29143	0.59748	0.172428	0.0000	0.247641	0.261564

Source: Adapted from Olannye, Maku and Adelowokan.

Presented in Table 4.2 is a correlation matrix that shows the positive correlation between economic growth and several variables, including (*lab*) labour force, (*cps*) capital stock, (*cpb*) public sector credit, (*cpr*) private sector credit, as well as (*gxp*) government expenditure. The level of correlation between economic growth these variables is over 60%, except for credit to the public segment, that is 48%. These findings indicate that there is no significant multicollinearity issue in the estimation models since high correlation does not exist between the variables. Therefore, the regression estimates will provide further evidence to support the findings from the correlation matrix.

Table 4.2 Correlation Matrix

	<i>rgdp</i>	<i>lab</i>	<i>cps</i>	<i>cpb</i>	<i>cpr</i>	<i>gxp</i>
Rgdp	1.0000	0.8732	0.7551	0.4869	0.6588	0.7299
lab		1.0000	0.8162	0.6245	0.7519	0.6670
cps			1.0000	0.4864	0.7667	0.6130
cpb				1.0000	0.5831	0.7119
cpr					1.0000	0.7656
cpi						0.4345
gxp						1.0000

Source: Authors' computation, 2023.

Tests - Lag Order Selection; Co-Integration and Unit Root

In table 4.3 the results of the Augmented Dickey Fuller and Phillips-Perron tests are presented. They were adopted to examine the stationarity of the variables. The findings showed that at their levels, the variables were not stationary, but after the first differencing, they became stationary. Thus, the variables were integrated of order one, indicating that they were I(1) series.

Table 4.3. Stationarity Test.

Test - (ADF) Augmented-Dickey Fuller				(PP) Phillip-Perron		
Variables	Level	1 st Difference	Status	Level	1 st Difference	Status
<i>lgxp</i>	-1.5875	-8.1797*	I(1)	-2.0608	-8.0339	I(1)
<i>lcpb</i>	-1.2641	-6.0005*	I(1)	-1.2641	-6.1784*	I(1)
<i>llab</i>	-1.2335	-3.7721*	I(1)	-1.3709	-3.5152**	I(1)
<i>lcpr</i>	-1.4880	-4.6468*	I(1)	-1.8636	-8.2778	I(1)
<i>lcps</i>	-1.2157	-4.3126*	I(1)	-1.2322	-4.3138*	I(1)
<i>ly</i>	-1.6723	-4.4803*	I(1)	-1.2604	-5.3045*	I(1)
Critical values			Critical values			
10%	-2.635542	-2.638752	10%	-2.635542	-2.638752	
5%	-2.991878	-2.998064	5%	-2.991878	-2.998064	
1%	-3.737853	-3.752946	1%	-3.737853	-3.752946	

Source: Adapted from Olanye, Maku and Adelowokan. Note: * and ** denote significant values at the 1% 5% levels, respectively. natural logarithm of real GDP = *ly*; natural logarithm of labour force = *llab*; natural logarithm of capital stock = *lcps*; natural logarithm of public sector credit = *lcpb*; natural logarithm of private sector credit = *lcpr*; and government expenditure = *lgxp*.

Lag Order Selection

The study conducted a lag order selection analysis to determine the appropriate estimation technique. Based on the results presented in Table 4.4, it was found that for the estimated model, two was the most appropriate lag value, as suggested by four of the selection criteria. As a result, the study progressed to estimate the complementary relationship between credit to the public and private sectors at the domestic level, adopting the autoregressive distributed lag method at order two.

Table 4.4. Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
2	209.9704	88.7610*	1.51e-12	-9.1279*	-3.9441*	-7.8242*
1	82.3766	152.7530	2.94e-10*	-2.2936	0.4711	-1.5983
0	-34.7341	NA	8.89e-08	3.6291	3.9746	3.7160

Source: Adapted from Olannye, Maku and Adelowokan.

The * symbol represents the selected lag order at a significance level of 5%. FPE = Final Prediction Error estimate the complementary relationship between credit to the public and private sectors at domestic level, adopting autoregressive distributed lag technique at order two.

, while AIC = Akaike Information Criterion, SC = Schwarz Information Criterion, and HQ = Hannan-Quinn Information Criterion, as indicated in Table 4.4.

The study utilized an autoregressive distributed lag co-integration style to examine whether the variables have long-term associations with one another. From Table 4.5, the findings of the estimation demonstrate co-integrated variables. This is confirmed by the F-statistic value of 55.37, which surpasses the upper limit critical value (4.43 at a one percent level of significance), indicating the existence of a long-term association among the variables.

Table 4.5 Test of ARDL Bounds Co-Integration

MODEL ESTIMATED	Value of F-Statistic	
$\ln cpr_t = \delta_0 + \delta_1 \ln lab_t + \delta_2 \ln cps_t + \delta_3 \ln cpb_t + \delta_4 \ln y_t + \delta_5 \ln gxp_t + \varepsilon_t$	55.3681	
Critical Value Bounds	I(0)/Lower Bound	I(1)/Upper Bound
1%	3.15	4.43
5%	2.45	3.61
10%	2.12	3.23

Source: Adapted from Olannye, Maku and Adelowokan.

*Regression Results***Table 4.6: Complementary relationship between domestic credit to the public and private sectors in Nigeria**

Regressors	Estimated Co-efficient	Co-Standard Error	t-Statistics	Prob.
Long Run Regression Estimate				
<i>Llab</i>	1.059533	2.445740	0.433216	0.6751
<i>Lcps</i>	0.110041	0.322596	0.341112	0.7408
<i>Lcpb</i>	-0.005231	0.002700	-1.937741	0.0846
<i>Lrgdp</i>	0.600825	1.066524	0.563348	0.5870
<i>Lgxp</i>	1.108068	0.409401	2.706562	0.0241
<i>C</i>	-27.02137	38.06569	-0.709861	0.4958
Short Run Regression Estimate				
$\Delta(cpr(-1))$	0.733869	0.210006	3.494511	0.0068
$\Delta(lcps)$	-0.074354	0.156732	-0.474400	0.6465
$\Delta(lcps(-1))$	0.289057	0.124978	2.312862	0.0460
<i>CointEq(-1)</i>	-0.619089	0.183259	-3.378218	0.0081
R² = 0.9285			F-stat. (Prob.) = 478.40 (p < 0.05)	
Adjusted R² = 0.8065			Durbin-Watson = 1.9583	
Diagnostic Tests				
Serial Correlation			Normality Test	
F-Statistics: 0.065557			Jarque-Bera: 1.411226	
Prob: 0.9371			Prob: 0.493806	

* signifies 1% level of significance and ** signifies 5% level of significance.

Source: Authors' computation, 2023.

In order to examine the complementary or substitute relationship between domestic credit granted to the public and private sectors in Nigeria, the sign of the coefficient of the domestic credit to the public sector (*cpb*) will determine the complementarity or substitutability impact of (*cpb*) credit to public sector on (*cpr*) credit to private sector at domestic level. If the sign of the coefficient of credit to public sector is positive and significant in relation to domestic credit given to the private segment, then both variables are complementary credit options. If the sign of the coefficient of the domestic credit to the public sector is negative and significant, then both variables are substitute credit options. However, if the coefficient of domestic credit to the public sector is insignificant, then both variables are unrelated.

From the results of the regression estimate, it was found that credit to the public sector (*lcpb*) had negative but insignificant impact on domestic credit given to the private sector. This implies that domestic credit given to the public sector and domestic credit given to the private sector are unrelated credit options / variables in Nigeria. This approach addresses the shortfalls associated with previous studies that have investigated complementary and substitutability relationships. The findings from this study contradicts that of Makambi *et al.* (2017) and Omodero (2019). The unrelated nature of credit to the public and private segments, at domestic level in Nigeria can be attributed to the lack of commitment on the part of government in providing the needed production enhancing facilities capable of complementing credit granted to the private sector in stimulating long-term economic growth. From the autoregressive distributed lag technique adopted to test if the variables have long-term connections with each other. Table 4.5 presents the estimation results, which revealed that the variables are indeed co-integrated. The negative signs displayed by the error correction term lends credence to the conclusion, which imply a steady long-run relationship existing among the variables in the model. The error correction term's coefficient of -0.619 shows that 61.9% of the short-term disequilibrium in the model is adjusted towards equilibrium in the long-run. The (R²) coefficient of determination indicates a good model fit, with approximately 92.85% of the variation in credit to the private sector explained by the independent variables, while the remaining 7.15% is due to unobserved factors. Moreover, the Durbin-Watson statistic of 1.958 suggests that the regression model is free from autocorrelation issues, implying that it is suitable for policy applications. The Durbin- Watson's statistics' results was also supported by the diagnostic tests adopting the serial correlation LM and normality estimates.

5. CONCLUSION

This study aimed to cross-examine the relationship between credits given to the public and the private sectors in Nigeria, at domestic level, between the year 1981 and the year 2020. Both descriptive statistics and econometric methods were used to examine this relationship. The study utilized the autoregressive distributed lag co-integration test to determine if there was a long-term connection between credit given to the public sector and credit given to the private sector at domestic level in Nigeria. According to the results of the co-integration test, no co-integration null hypothesis between the variables was rejected, which indicates a long-term

relationship existing between them. However, there was no indication of a complementary or substitutable relationship between both variables. Therefore, the study's conclusion is that the credit given to the public and the private sectors at domestic level in Nigeria are unrelated and do not have an impact on each other in terms of complementarity or substitutability.

Consequently, the recommendations from this study are, firstly, the implementation of sector-specific credit policies is recommended to foster a complementary relationship between public and private sector credits. The study suggests that a uniform policy for promoting both public and private sector credits in Nigeria should be avoided. Secondly, it is recommended that efficient and effective risk management be implemented in credit administrations, particularly those given to the public segment, to enhance the influence of credit, at domestic level, on economic growth. This will aid in the development of growth-enhancing infrastructure such as good roads, uninterrupted power supply, and technologically advanced communication facilities, among others.

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