FOREIGN RESERVE CHANGES, DOMESTIC CREDIT AND OUTPUT IN NIGERIA: ANY CAUSALITY?

Augustine C. Osigwe,

Department of Economics and Development Studies,
Federal University, Ndufu-Alike, Ikwo, Nigeria

Anthony I. Okechukwu,

Department of Economics and
Development Studies, Federal University,
Ndufu-Alike, Ikwo, Nigeria

Emmanuel I. Agupusi,

Department of Economics and
Development Studies, Federal University,
Ndufu-Alike, Ikwo, Nigeria

ABSTRACT

This study considered the causality that exist among foreign reserve changes, domestic credit and output in Nigeria. There was a robust review of relevant literature. The estimated empirical model of this study leaned on the reviewed literature to mimic the works of Arshad (2008) for Pakistan, Iwedi (2012), Oluitan (2012) for Nigeria. The Granger causality test results indicated that unidirectional causality runs consistently from domestic credit to foreign reserve across the examined lags. This implies that domestic credit causes total reserve and the converse does not exist. The results also revealed that, output Granger causes total domestic credit at lags one and two. The reverse of this unidirectional causality does not hold. At lag three, causality does not exist between the duos. No causality occurred between domestic credit and output across the three lags. On the basis of the empirical findings of this study, the authors recommended that the authorities concerned should have eye on the foreign reserve whenever they intent to tinker the size of the domestic credit. A reasonable size of output should be maintained in readiness for the time(s) when scaling up domestic credit makes economic sense.

Keywords: Foreign reserve, Domestic credit, Output, Granger causality, Nigeria.
JEL Classification: B22 C22

Introduction:

Domestic credit is the credit that a country's central bank makes available to borrowers within the same nation; this may include commercial banks and even involve the government itself. Oftentimes, a government, whether on a local, municipal, or national scale, has to borrow money in order to fund its projects and offer services to its constituents. It therefore incurs known as government debt. This may either be external debt, which is owed to external financial entities, or internal debt, which is owed to lenders within the same country. A country's central bank, which has the authority to lend currency to the government involved, may also extend credit to commercial banks. However, such banks usually turn to the central bank as a last resort. For both governments and banks, a certain interest rate is charged. This is known as a discount rate, which may serve as basis for interest rates imposed by other financial institutions and is usually seen to be quite competitive.

Foreign reserves in a strict sense are only the foreign currency deposits and bonds held by central banks and monetary authorities (IMF, 2004). However, the term in popular usage commonly includes foreign exchange and gold, special drawing right (SDRs) and international monetary fund (IMF) reserve positions. These are assets of the central bank held in different reserve currencies, such as the dollar, euro and yen, and used to back its liabilities. The quantity of foreign reserves can change as a central bank implements

monetary policy. A central bank that implements a fixed exchange rate policy may face a situation where supply and demand would tend to push the value of the currency lower or higher. In a fixed exchange rate regime, these operations occur automatically, with the central bank clearing any excess demand or supply by purchasing or selling the foreign currency. Mixed exchange rate regimes ('dirty floats', target bands or similar variations) may require the use of foreign exchange operations (sterilized or unsterilized) to maintain the targeted exchange rate within the prescribed limits.

Over the years, there has been an increase of credit from banks to the Nigerian economy. According to World Bank (2012), domestic credit provided by banking sector in Nigeria between1980-2012 has being fluctuating. For instance, in 1980, domestic credit value was 21.3% of GDP. It gradually increased to 49.9% in 1986 which was the highest value for over 30 years now, while the lowest value was 4.9% in 2006. But since 2007 despite the recapitalization exercise in the banking industries, the domestic credit gradually came up, recording 20.2% in 2007, 26.7% in 2008, 36.9% in 2009 and decreased to 30.7% in 2010, before jumping to 37.7% in 2011 and decreased to 35.3% in 2012 (World Bank, 2012).

On the other hand, foreign exchange reserves in Nigeria decreased to 29130.00 USD million in December from 29916.27 USD million in November of 2015. Foreign exchange reserves in Nigeria averaged 10180.12 USD million from 1960 to 2015, reaching an all-time high value of 62081.86 USD million in September of 2008 and a record low of 63.22 USD million in June of 1968 (CBN, 2015). Sanusi (2013) advocated for the immediate implementation of the treasury single account (TSA); the return of government accounts to the Central Bank to reduce the huge cost of government debt due to poor cash flow management; retention of the monetary policy rate (MPR) at 12 per cent, plus or minus 2 per cent; private sector cash reserve ratio (CRR) at 12 per cent; public sector CRR at 50 per cent; and liquidity ratio at 30 per cent. This was in a bid to affect the level and direction of Nigeria's foreign reserve.

Monetary policy in Nigeria has been carried out through the portfolio behaviour of the CBN in terms of the control of its credit and management of reserves. Credit control is being used to check movement in domestic price level, while the exchange rate policy serves as measure for determining the competitiveness and current account performance as well as foreign reserves. The first half of 1980s, CBN's reserves relative to domestic credit witnessed continual decline, it however started to increase from 1986 up till 1990. Around the last quarter of 1990 the reserves nose-dived again until 1991 when it picked up again, recording $3.40 billion in 1996 to $28.28

billion in 2005, till the end of may 2007, when Nigeria's gross reserves stood at $43.13 billion - comprising the CBN's external reserves of $31.5 billion, $9.43 billion in the excess crude account, and $2.18 billion in federal government's savings. It peaked at $62 billion in September 2008 during the Yar'Adua/Jonathan Administration when oil prices reached a peak of $147 per barrel. It again decreased to $40.48 billion in 2010 and falling subsequently to a low of $31.7 billion in September 2011, which was as a result of the downturn of the global economy and oil market. In 2012, the reserve rose to $44.1 billion on December 28 and dropped to $43.6 billion on December 31, 2013, approximately $500 million below its value in 2012 and been depleted further by $2bn since January 2014. External reserves has, in recent times, played significant role in the Nigeria economy. It has increased the level of money supply and therefore impact positively on the level of economic activities as more funds became available for investment in productive activities (Aluko, 2007).

Against this backdrop, this paper examined the causality of reserve changes, domestic credit and output in Nigeria. It is structured as follows: Section two details the profile of foreign reserve and domestic credit and output in Nigeria. Section three outlines the review of relevant literatures. Methodology adopted is contained in section four whereas section five captures the presentation of empirical findings. The paper was concluded in section six.

Profile of foreign reserve, domestic credit and output in Nigeria:

As shown in Figure 1, from 1970 to 2014, domestic credit in Nigeria witnessed obvious instability, having recorded a negative 1.60 per cent of the GDP in 1973. From 1974 to 1985, it constantly increased, recording it highest single year value of 49.90 per cent of GDP in 1985. Within the range of 1986 to 2005, the domestic credit value to the GDP had a clawing movement, recording a lowest average value of 8.60 per cent and 4.90 per cent in 2004 and 2005, respectively. More so, from 2006 to 2014, domestic credit value peaked up on the average of 35 per cent of the GDP. On the other hand, the Nigerian foreign reserve almost maintained a steady rise over the time covered in this study. It recorded 390.71 billion USD for the first time in 1972. In 2000, it rose to 10099.44 billion USD and stood at 10646.59 billion USD in 2001. Reserve had a steady growth pattern; from 17256.54 billion USD in 2004 to 53599.28 billion USD in 2008. In the year 2009, it depreciated to 45509.82 billion USD and jumped to its peak value of 58010.30 billion USD in 2014. (Figure 1).
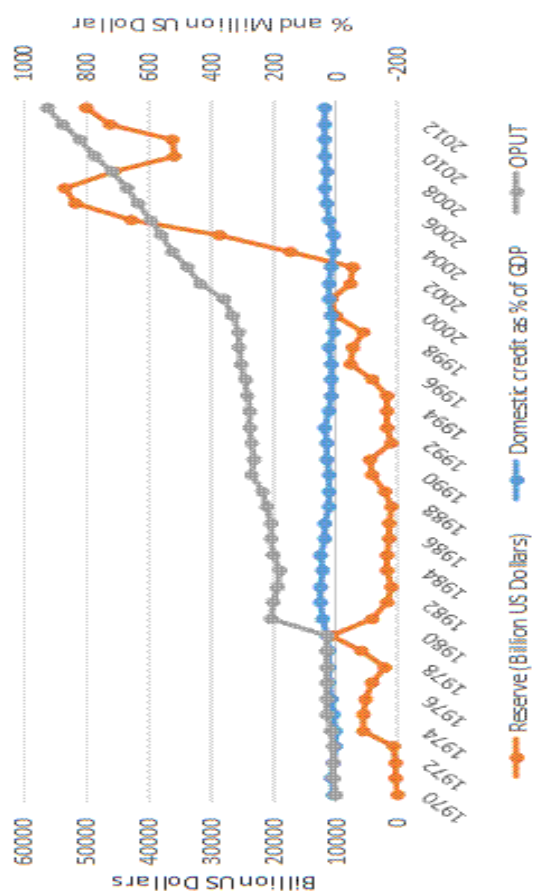
Source: Analysis of data from WDI (2015)

Review of Related Literature:

Khan (2008) studied the long-run and short-run dynamics of foreign reserves and domestic credit in Pakistan. The study formulated and examined the monetary approach to the balance of payments by incorporating the currency substitution version of money demand function for Pakistan over the period 1962-2005 using FM-OLS and Johansen- Juselius co integration techniques. The results suggested that real output, real exchange rate and domestic credit play an important role in the determination of foreign reserves in Pakistan in long-run as well in short-run. Moreover, the monetary authorities sterilized foreign exchange reserves by 12% in long-run and 34% in short-run. The results supported the evidence of long-run causality running from foreign reserves to domestic credit. The policy implication from the empirical analysis was that the validity of the monetary approach to the balance of payments and the effectiveness of monetary policy depend on the nature of the money demand function.

On the other hand, Oluitan (2012) assessed the significance of real bank credit in stimulating real output growth in Nigeria. Annual time series data on Real Private Sector Credit (RPSC), Real Gross Domestic Product (RGDP), Real Total Export (REXP), Real Total Capital Flow (RCAPAC), and Real Import

(RIMP), covering the period from 1970 - 2005 was used. Employing the Engle Granger and Johansen based ECM method in establishing the direction of causality, it was observed that credit Granger causes output. In testing the factors that mobilized credit, she found that exports in general are negatively related to credit. However, while oil exports were negatively related to credit, non-oil export had positive relationship with credit. Credit was also positively linked to capital inflows and imports. These findings suggested that bank credit is inextricably linked to the opening of the economy to international trade and capital flows in the non-oil sector.

Emecheta and Ibe (2014) examined the impact of bank credit on economic growth in Nigeria. The study applied the reduced form of vector autoregressive (VAR) technique and used time series data from 1960 to 2011. Using current gross domestic product (GDP) as the dependent variable and bank credit to the private sector (CPS) to GDP ratio and broad money (M2) to GDP ratio as the explanatory variables. The study further used the Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) unit root tests in testing the stationarity of the variables, and found out that the variables were integrated of order one. Their finding showed that there is a significant positive relationship between bank credit to the private sector, broad money and economic growth. Also, past values of all the variables were significant in predicting their current values. This result implied that the bank consolidation and recapitalization exercise was a welcome development and that further steps should be taken to ensure the stability of the banking sector.

Iwedi, et al (2015) examined the direction of causality between banking sector credit and economic growth in Nigeria over the period 1980-2013. The causal links between the pairs of variable of interest were established using pairwise Grangers causality test. The granger causality test results revealed that there exist unidirectional causality flowing from gross domestic product (GDP) to credit to the private sector (CPS) and credit to government sector (CGS). Bi-directional causality runs between Contingent Liability and GDP. These suggested that growth in the volume of contingent, liabilities could boost investment in the economy and exert a positive impact on level of productivity; hence having a contagious effect on the output level of goods and services in the economy. In the opposite direction, growth in GDP can also boost the total amount of new funds needed through the window of investment, productivity, inventions, innovation and diversification, thereby giving birth to the issue of new credits to fund new businesses and the expansion of already existing ones in the economy. The study recommended that the managers of the Nigeria economy should fashion out appropriate policies that will enhance the bi-directional flow of influence between the banking sector where investable

funds are sourced and the real sector of the economy where goods and services are produced.

Theoretical Framework and Methodology:
Theoretical Framework:

The basic objective of this paper is to examine the casual relationship among reserve changes, domestic credit and output in Nigeria. The model of this study draws heavily on the reviewed literature to mimic the empirical works of Arshad (2008) for Pakistan, Iwedi (2012), Oluitan (2012) for Nigeria.

Methodology :

The ADF and Philip-Perron [PP] methods of unit root test were adopted to test for the stationarity of the variables. The causality among the variables is traced with the Johansen co-integration technique and the Granger causality test (GCT). Long-run relationship (co-integration) between two variables indicates that causality runs in at least one direction. It is one of the major thrust of this study to determine the causal relationship (if any) among reserve changes, domestic credit and output. The pairwise GCT was adopted to achieve this objective. A time series X is said to Granger cause a time series Y if and only if it can be clearly shown through series of *t*-tests and *F*-tests on the lagged values of X (with lagged values of Y inclusive) that all the lagged X values provide statistically significant information about the future values of Y. The null hypothesis underlying the GCT is that the variable under study (say X) does not Granger-cause the other (say Y). Initially, the GCT is based on estimating a pair of regression models in the following generic fashion:

$$Y_t = \sum_{i=1}^{n} \alpha_i Y_{t-1} + \sum_{j-1}^{n} \beta_i X_{t-j} + v_{1t} - - - -$$
$$- - - -(1)$$

$$X_t = \sum_{i=1}^{n} \delta_i Y_{t-1} + \sum_{j-1}^{n} \lambda_i X_{t-j} + v_{2t} - - - -$$
$$- - - -(2)$$

It is assumed that v_{1t} and v_{2t} are uncorrelated. Granger (1969) posits that X is said to Granger-cause Y if β_i is not equal to zero and Y will also Granger-cause X if λ_i is not equal to zero. If these two situations simultaneously exist, then bi-directional causality exist. The first two scenarios represent unidirectional causality and if none of them prevails, then it is concluded that there is independence between the two variables X and Y. This situation presents the simplest form of Granger causality specification which involves only two variables (X and Y), dealing with bilateral causality. However, in this study, the situation is more complex, involving three variables, thus, making it multivariable causality through the

technique of vector autoregression (VAR). Thus, the GCT is based on estimating the following VAR model:

$$RESV_t = \sum_{i=1}^{n} \alpha_i RESV_{t-i} + \sum_{j=1}^{n} \beta_j DCRE_{t-j} + \sum_{k=1}^{n} \delta_k OPUT_{t-k} + \xi_{1t}$$
$$(3)$$

$$DCRE_t = \sum_{i=1}^{n} \gamma_i RESV_{t-i} + \sum_{j=1}^{n} \theta_j DCRE_{t-j} + \sum_{k=1}^{n} \eta_k OPUT_{t-k} + \xi_{2t}$$
$$(4)$$

$$OPUT_t = \sum_{i=1}^{n} \vartheta_i RESV_{t-i} + \sum_{j=1}^{n} \varsigma_j DCRE_{t-j} + \sum_{k=1}^{n} \varpi_k OPUT_{t-k} + \xi_{3t}$$
$$(5)$$

Where; RESV = Foreign Reserve, DCRE = Domestic Credit and OPUT = Output.

The hypothesis of no causality between variables is rejected if the F-statistic for the restricted and unrestricted residual sum of squares is significant at the conventional 1% or 5% level of significance. In testing for just causality, one needs not present the estimated coefficients of the VAR model explicitly (Gujarati and Porter, 2009). Data for this study which spanned from 1970 to 2013 were sourced from WDI (2014). This period was chosen as a result of uniform availability of data for the selected variables.

Empirical Results:

The results of the ADF and PP unit root test for stationary of the variables presented in Table indicate that the variables became stationary after first differences. In other words, they are integrated of order one, I(1). Thus, we rejected the null hypothesis of non-stationary for all the variables.

Table 1: ADF and PP Unit Root Results

Variable	ADF Statistic	Order of Integration	PP Statistic	Order of Integration
LRESV	-5.567962**	I(1)	-6.370511**	I(1)
LDCRE	-6.197402**	I(1)	-5.747095**	I(1)
LOPUT	-6.043227**	I(1)	-9.334190**	I(1)

NB: ** implies significant at 1% level of significance.

Ganger Causality Test Results:

The optimal lag length fails at three for AIC lag selection criteria and at one for the SIC. Granger causality remains sensitive to lags. Thus, the empirical findings are guided by the optimal lags. The results of the Granger causality test indicate that unidirectional causality runs consistently from domestic credit to foreign reserves across the three lags. This implies that domestic credit causes total reserve and the converse does not exist. The results also revealed that, output Granger causes total domestic credit at lags one and two. The reverse of this unidirectional causality does not hold. At lag three, causality does not exist between the duos. No causality existed between domestic credit and output across the three lags (Table 2).

Table 2: Granger causality test results

Null Hypothesis	Lag Order	F-Statistic (Prob.)	Decision
RESV does not Granger Cause DCRE	1	3.27977 (0.0013)	Accept
DCRE does not Granger Cause RESV		6.76160* (0.0129)	Reject
RESV does not Granger Cause DCRE	2	1.33149 (0.2761)	Accept
DCRE does not Granger Cause RESV		4.81528* (0.0137)	Reject
RESV does not Granger Cause DCRE	3	0.85701 (0.4724)	Accept
DCRE does not Granger Cause RESV		3.17991* (0.0359)	Reject
GDP does not Granger Cause RESV	1	4.66948* (0.0367)	Reject
RESV does not Granger Cause GDP		3.10430 (0.0857)	Accept
GDP does not Granger Cause RESV	2	6.15003 ** (0.0049)	Reject
RESV does not Granger Cause GDP		1.58874 (0.2178)	Accept
GDP does not Granger Cause RESV	3	2.66731 (0.0632)	Accept
RESV does not Granger Cause GDP		1.03896 (0.3878)	Accept
DCRE does not Granger Cause GDP	1	0.10952 (0.7424)	Accept
GDP does not Granger Cause DCRE		0.27430 (0.6034)	Accept
DCRE does not Granger Cause GDP	2	0.59505 (0.5567)	Accept
GDP does not Granger Cause DCRE		0.37018 (0.6931)	Accept
DCRE does not Granger Cause GDP	3	0.40779 (0.7484)	Accept
GDP does not Granger Cause DCRE		0.13430 (0.9389)	Accept

NB: ** (*) denote rejection of the null hypothesis at 1%(5%) level; p-values in Parenthesis.
Source: Authors' Compilation using Eviews.

Conclusion:

In the main, this study considered the casual relationship among foreign reserve changes, domestic credit and output in Nigeria. The model of this study leaned on the reviewed literature to mimic the empirical works of Arshad (2008) for Pakistan, Iwedi (2012), Oluitan (2012) for Nigeria. The results of the Granger causality test indicate that unidirectional causality runs consistently from domestic credit to foreign reserve across the three lags. This implies that domestic credit causes total reserve and the converse does not exist. The results also revealed that, output Granger causes total domestic credit at lags one and two. The reverse of this unidirectional causality does not hold. At lag three, causality does not exist between the duos. No causality existed between domestic credit and output across the three lags. On the basis of the empirical findings of this study, the authors hereby recommend that the authorities concerned should have eye on the foreign reserve at any moment they intent to tinker the size of the domestic credit. A reasonable size of output should be maintained in readiness for the time(s) when scaling up domestic credit makes economic sense. A future study may consider the causality that runs among foreign reserve changes, domestic credit and selected sectoral output as against the aggregate output as done in this study.

References:

[1] Aluko, J. J. (2007). The Monetization of the Nigeria's Foreign Exchange Inflows. CBN Bullion. Vol. 21(4).

[2] CBN (2007). Building and managing External Reserves for Economic Development. The CBN Bullion Vol.31, No.2.

[3] Emecheta B.C. and Ibe R.C (2014). Impact of bank credit on economic growth in Nigeria: application of reduced vector autoregressive (VAR) technique. *European Journal of Accounting Auditing and Finance Research Vol.2, No .9, pp.11-21, November 2014.* Published by European Centre for Research Training and Development UK (www.eajournals.org).

[4] Granger, C. W. (1969). Investigating Causal Relations by Econometric Models and Cross-Spectral Methods, Econometrica: Journal of the Econometric Society, Vol. 37, No. 3, pp. 424-438.

[5] Gujarati, DN and DC Porter (2009). Basic Econometrics, 5th edition, New York: McGraw-Hill.

[6] IMF (2004). Annual Report on Exchange Arrangements and Exchange Restrictions.

[7] Iwedi M., Okey-Nwala P. O. and Wachukwu I. P. (2015). Causality Modelling of the Banking Sector Credits and Economic Growth in Nigeria. *IIARD International Journal of Banking and Finance Research Vol. 1 No. 7 2015 www.iiardonline.org.*

[8] Khan, M. A. (2008). Long-Run and Short-Run Dynamics of Foreign Reserves and Domestic Credit In Pakistan. *International Journal of Applied Econometrics and Quantitative Studies* Vol.5 1.

[9] Okonjo (2015). Nigeria: Why Foreign Reserves, Excess Crude Account Depleted. The Guardian Newspaper.

[10] Oluitan R. O. (2012). Bank Credit and Economic Growth: Evidence from Nigeria. *International Business and Management Vol. 5, No. 2, 2012, pp. 102-110. Canadian Research & Development Center of Sciences and Cultures.*

[11] Osuji E. (2015). International Oil Prices and Exchange Rate in Nigeria: A Causality Analysis. *International Journal of Academic Research in Economics and Management Sciences 2015, Vol. 4, No. 3 ISSN: 2226-3624.*

[12] Sanusi L. (2013). Depleting the Excess Crude Account (ECA), a Report. Retrieved from www.investorwords.com/17647/international_re serves.html#ixzz3gd7mNgd.

[13] World Bank (2012). World Bank Statistical Database.

******