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Foreign exchange rate reforms and economic growth in Nigeria: Further reassessment

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Abstract This study examines the impact of foreign exchange rate reforms on economic growth in Nigeria. In this process, gross domestic product was used as a proxy for economic growth. The real effective exchange rate, net trade in goods and services, general government final consumption expenditure, and domestic credit to the private sector were used as independent variables. All the variables achieved stationarity at unequal forms, and therefore confirm that the persistence shock is not an infinite memory. The Bounds test of cointegration was used due to the mixed stationarity of the variables. The result of the Bounds cointegration test showed that there is no cointegration, which led to the autoregressive distributed lag (ARDL) short-run model that measures the short-run impact of foreign exchange rate reform on economic growth in Nigeria. The model was then estimated as short run model without cointegration. The estimated coefficient of the model showed that log of GDP is significantly and positively influenced by its own value with one lag. Also, the current value of the log of domestic credit to private sector positively influences GDP (LGDP), but this effect is not significant. The real exchange rate has a negative and significant impact on gross domestic product with a lag in the short run. On the contrary, its current value has a positive and non-significant relationship with gross domestic product. The value of the coefficient of determination, which is 99.8% shows that the model is a good fit. For Nigeria, the need for maintaining external competitiveness and promoting growth remains a delicate task for policy-makers, as it involves managing an exchange rate regime accompanied by other consistent macroeconomic policies. Based on these results, it is recommended that appropriate monetary and fiscal measures be implemented to ensure that the real exchange rate has more impact on economic growth should be put in place.

Introduction

The effects of a desirable exchange rate regime on economic growth have attracted the attention of economists, politicians and ordinary citizens. Economic growth is a complex phenomenon affected by several variables, such as social, economic, political, and cultural factors. The literature

on economic growth shows diverse channels through which growth can be achieved. Prominent channels through which Nigeria, as a developing African country, can achieve economic growth are international trade and foreign exchange management. International trade accelerates economic growth through foreign exchange earnings and market stimulus (Adewuyi, 2002).

There is no country worldwide that can live in absolute economic independence. The economies of the world are interrelated in one way or the other, be it in terms of trade (imports and exports), foreign exchange (FOREX), foreign direct investment (FDI) and many more. During international trade, foreign exchange plays an important role and therefore, the price (value) of foreign currency in terms of the local currency is very important in understanding the dynamics of growth in all countries. Strong evidence on the alignment between the exchange rate and the growth of per capita output in developing nations abounds (Babatolu, 2015).

Due to the economic costs that can result from exchange rate volatility, most countries have engaged in exchange rate reforms. In particular, many Sub-Saharan African countries have moved towards the independence of their Central Banks to adopt different forms of exchange rate systems. This situation has allowed some of these countries to achieve sustainable levels of growth and development, whereas some have become worse-off. Like other developing countries, the exchange rate arrangement in Nigeria has undergone significant changes over the past four decades. Policymakers in the country have continued to initiate key reforms in the management of the exchange rate with a view to promoting the competitiveness of the domestic economy.

Dada and Oyeranti (2012) assert that the exchange rate policy in Nigeria has passed through significant transformations, from the post-independence era, through the 1970s period of oil boom, to the floating system in 1986. As the apex monetary authority in Nigeria, the Central Bank of Nigeria (CBN) is saddled with the responsibility of exchange rate management and has periodically intervened in the foreign exchange market to achieve specific objectives. One of the strategic reforms in the exchange rate regime was initiated under the Structural Adjustment Programme (SAP) of 1986, which allowed market forces of demand and supply to play an important role in exchange rate determination. This regime assumes the presence of an invisible hand in the foreign exchange market, and that the exchange rate adjusts automatically to clear any deficit or surplus in the market. Before this reform, the fixed exchange regime in operation was believed to have induced an overvaluation of the naira; this engendered significant distortions in the economy and gave vent to massive importation of finished goods, with adverse consequences for domestic production, the balance of payments position, and the nation's external reserves level.

The SAP, which encompasses exchange rate liberalization among other reforms, has since led to the massive depreciation of the naira. Iyoboyi and Muftau (2014) observed that the adoption of SAP prompted the depreciation of the naira in order to achieve a realistic exchange rate capable of enhancing macroeconomic performance. Basically, economic theory recognizes that depreciation is expected to impact positively on exports given that it is believed to attract foreign demand. The actualization of a realistic exchange rate to stimulate aggregate demand has remained a major concern in the Nigerian economy.

Chang and Tan (2008) posit that the availability of sound and appropriate exchange rate policy is a prerequisite for improved macroeconomic performance. Thus, deviation from the rates of exchange considered appropriate or realistic tends to generate costs for the economy, in terms of decline in aggregate demand and poor economic performance. The policy measures have different implications in a fixed exchange rate regime compared to a a floating exchange rate regime. It is unanimously agreed in economic literature that fiscal policy is relatively ineffective in a floating exchange rate regime compared to fixed exchange rate regime, while monetary policy is very effective in a floating exchange rate regime compared to a fixed exchange regime.

Foreign exchange rate has a strong relationship with the trade balance, and hence, a balance of trade translates to economic growth As illustrated by Ogunleye (2008), the success of currency depreciation in promoting the trade balance largely depends on switching demand in the proper direction and amount, as well as on the capacity of the home economy to meet the additional demand by supplying more goods. Thus, promoting the trade balance translates to economic growth. The net balance between a country's imports and exports represents a significant share of the gross domestic product (GDP); thus, international trade is correlated with economic growth. In an open economy, the development of foreign trade greatly impacts GDP growth Poprawić na: (Li et al., 2010). The innovation-based growth model of Aghion and Howitt (1992) suggests that international trade provides opportunities for innovation and consequently leads to technological improvements. In the same vein, Romer (1990) argues that international trade enables countries to import intermediate inputs from abroad that are not invented domestically, which can help to foster productivity in the manufacturing sector.

Ghura and Grennes (1993) found that persistent real exchange rate misalignment has been a major factor behind the slow growth in Africa and Latin America, whereas sensible macroeconomic factors, such as trade and exchange rate policies, were behind the rapid growth experienced by Asia and South Asian region. The real exchange rate can facilitate economic growth, but cannot sustain economic growth by itself. However, an appropriate real exchange rate policy can be an important enabling condition for a country seeking to capitalize on opportunities for growth (Eichengreen, 2007).

It is a popular view in economic literature that the exchange rate plays an important role in predicting the extent and dimension of aggregate demand, given its impact on the net-exports component of aggregate demand. Thus, exchange rate variations trigger the economic growth of a country. The effects of trade balance on economic growth have also become an important indicator of a country's competitiveness, and they are important in assessing the country's economy and its relations with the rest of the world (Topalli, Dogan, 2016; Kang, Shambaugh, 2016). From the foregoing, it is therefore the objective of this study to examine the impact of foreign exchange rate reforms on economic growth in Nigeria.

The paper is organized as follows. Section I consists of the introduction. Section II contains a brief theoretical and empirical literature review. Section III describes the theoretical framework, model specification, and method of data analysis. Section IV presents the empirical results and their discussion. Section V provides the conclusion and recommendations.

1. Literature review

1.1 Theoretical review

There is no consensus on choosing the most suitable exchange rate regime to maintain macroeconomic stability. Particular characteristics possessed by each country have continued to determine its appropriate system of exchange rate. Because of different institutions and settings, as well as a well-developed insurance market, the developed nations have been able to adopt a free-floating exchange rate regime. In contrast, the developing countries have not been able to successfully adopt the same system due to the undeveloped nature of their insurance market, which is unable to absorb the risks from exchange rate volatility. Furthermore, an adequate measure of volatility is also difficult to establish. Hence, several studies that have been carried out do not present clear criteria regarding the use of nominal or real exchange rates and their effects on economic growth. This difficulty arises from the fact that the way through which exchange rate regimes can affect economic growth is not clearly articulated by economic theory. It can be inferred theoretically that economic growth can be enhanced by adopting the right exchange rate regime.

Less research has been conducted relating to the exploration of the topic of exchange rates and growth, probably as a result of the fact that nominal variables are considered to be unrelated to longer-term growth performance (Levy-Yeyati, Sturzenegger, 2001). In their study, they explored the implications for macroeconomic variables of choosing a particular exchange rate arrangement by assessing the impact of exchange rate regimes on inflation, money growth, real interest rates, and real output growth. They found that there is a correlation between exchange rate and output growth, even though the influence might not be very clear. In another study carried out by Huang and Malhtora (2004) on 12 developing Asian countries and 18 advanced European countries over the period of 1976-2001, they found two interesting trends. Firstly, that the choice of exchange rate regimes did not have a significant impact on economic growth in European nations, although more flexible regimes were associated with higher growth. Secondly, developing countries in Asia which adopted a managed float seemed to outperform other countries in the area which adopted different regimes. Hence, their study concluded that exchange rates do impact economic growth, but may depend on how developed the economy is. Another type of uncertainty for private agents seems to appear as a result of the fluctuations incorporated by the real exchange rate, and therefore, it is less preferred than the nominal exchange rate (Vanelle, 2001).

1.2. Empirical review

Various results have been presented by researchers on the impact of exchange rate reforms on economic growth, with the adoption of different methodologies. Some authors found a positive relationship between exchange rate and economic growth, while some authors findings show a negative relationship. Moreover, some studies show no exact relationship, while others revealed mixed results.

Bailliu et al. (2001) used a sample of 25 emerging countries during the period 1973–1998. Their study showed that floating exchange rate regimes have been accompanied by faster economic growth. However, the improved economic performance was recorded only in relatively open countries with international capital flows and developed financial markets. It was also revealed that exchange rate shocks can be absorbed by countries that have a flexible system with a developed financial sector. Similarly, Obansa et al (2013) examined the relationship between exchange rate and economic growth in Nigeria between 1970 and 2010. Their findings indicated that the exchange rate has a strong impact on economic growth, and that exchange rate liberalization has benefited the Nigerian economy by promoting economic growth. Also, Azeez et al. (2012) investigated the effect of exchange rate volatility on macroeconomic performance in Nigeria using data from 1986 to 2010, and they found a positive relationship between exchange rate and economic growth, proxied by GDP.

However, Kizito and Lean (2019) examined the moderating effects of the real exchange rate and its volatility on the finance-growth nexus and determined the marginal effects of financial development on economic growth in the West African region. The findings show that financial development has a long-term positive impact on economic growth, but this impact is weakened by the real exchange rate and its volatility. The marginal effects of financial development on economic growth vary with the levels of the real exchange rate and its volatility. The higher the real exchange rate volatility, the less finance spurs growth.

Similarly, Aguirre and Calderón (2005) developed three fundamentals-based indices of real exchange rate overvaluation using panel cointegration techniques for a panel of 60 developed and developing countries over the 1965–2003 period. They found that GDP per capita growth correlates negatively with all three indices. In the same vein, Morley (1992) using a regression framework, analyzed the effect of real exchange rates on output for twenty-eight developing countries that have devalued their currencies. After the introduction of controls for factors that could simultaneously induce devaluation and reduce output, including terms of trade, import growth, the money supply, and the fiscal balance, he found that depreciation of the real exchange rate reduced output. Also, Barguellil et al. (2018), in order to examine the impact of exchange rate volatility on economic growth, investigated a sample of 45 developing and emerging countries over the period of 1985–2015. They adopted the difference and system generalized method of moments estimators. The findings of the study revealed that the generalized autoregressive conditional heteroskedasticity (GARCH)–based measure of nominal and real exchange rate volatility has a negative impact on economic growth. It was also reported that the effect of exchange rate volatility depends on the exchange rate regimes and financial openness; that is, volatility is more harmful when countries adopt flexible exchange rate regimes and financial openness.

On the contrary, Asher (2012) examined the impact of exchange rate fluctuation on the Nigeria's economic growth for the period of 1980–2010, and found that the real exchange rate has a positive effect on the economic growth of Nigeria. Chowdhury and Wheeler (2008) studied the relationship between the exchange rate volatility in four developed countries–the United Kingdom, the United States, Japan, and Canada. This study applied a vector autoregressive (VAR)

approach and found that exchange rate volatility has a positive and significant impact on the flow of FDI. This result was supported by Shafi et al. (2015) who revealed that exchange rate volatility is positively significant for growth in the selected countries. In another study, Akpan (2008) investigated the foreign exchange market and economic growth in an emerging petroleum-based economy using data ranging from the period from 1970 to 2003. He found that there is a positive relationship between exchange rate and economic growth in Nigeria. However, a different result was found by Akpan and Atan (2012) who based their work on quarterly series for the period 1986–2010. The result of the study pointed out that there is no evidence of a strong direct relationship between changes in the exchange rate and output growth. Rather, Nigeria's economic growth has been directly affected by monetary variables.

Also, Jakob (2015) analyzed whether there is a correlation between exchange rate regimes and GDP. After observing the data from 74 countries for the year 2012, it was found that there is a positive and significant correlation between a pegged exchange rate and growth in GDP. A similar result was found by Kogid et al. (2012). In the study, it was revealed that the ARDL bounds test suggests that long-run cointegration exists between both nominal and real exchange rates and economic growth, with a significant positive coefficient recorded for the real exchange rate in Malaysia for the period 1971–2009.However, Umaru et al. (2018) examine the effects of exchange rate volatility on economic growth of four English-speaking countries of West Africa (Nigeria, Ghana, Gambia, and Sierra Leone) covering the period 1980–2017 and analyzed using panel data regression analysis. The results showed that the real exchange rate is statistically significant and negatively related to GDP in West African English-speaking countries, excluding time-invariant variables. Also, the study carried out by Dollar (1992) showed that overvaluation harms growth.

Other studies have shown the presence of a negative relationship between exchange rate volatility and some macroeconomic aggregates that may affect economic growth, such as international trade, investment, and employment (Barguellil et al., 2018; Belke, Gros, 2001). Khosa et al. (2015) also revealed that a significant negative effect exists between exchange rate volatility and the performance of exports. Also, David et al. (2010) while examining the effect of exchange rate fluctuations on the Nigerian manufacturing industry, found a negative relationship between the performance of the manufacturing sector and exchange rate volatility. Furthermore, a mixed result was found by Yeyati and Sturzenegger (2003). Using annual data of 183 countries during the period 1974–2000, they found that pegged exchange rate regimes are associated with lower growth in developing countries, where as in industrialized countries, it was found that the exchange rate regime has no significant effect on growth.

2. Methodology and data sources

2.1. Theoretical framework

Most previous studies on the impact of foreign exchange rate reforms on economic growth have not adopted a specific theoretical framework to derive the model for their empirical estimation. They have adopted frameworks that are unstructured, with no specific underpinnings in economic

theory. For instance, the vector autoregression (VAR) analysis adopted by some of the studies possesses some shortcomings and is +also considered as atheoretical. Therefore, there is a need for a theoretical foundation for the specification of the empirical model for the present study.

The simple three-market model in Rhodd's (1993) framework is adopted in this study. This model derives a reduced-form equation for empirical estimation. It integrates the goods market, the money market, and the foreign exchange market. First, the goods market is represented by the equation below in Rhodd's model:

1) $Y = C + I + G + X - M$
2) equally, $Y - C - G = I + X - M$
3) $S = Id + If$
4) $S = S(Y, r)$; $\partial S/\partial Y > 0$, $\partial S/\partial r > 0$
5) $Id = Id(Y, r)$; $\partial Id/\partial Y > 0$, $\partial Id/\partial r < 0$

$If = If(Y, e)$; $\partial If/\partial Y < 0$, $If/\partial e > 0$,

Here, Y, C, I, S, G, X–M, r, and e represent total expenditure, consumption expenditure, domestic investment expenditure, savings, government spending, net exports or foreign investment (If), domestic interest rate, and exchange rate respectively.

Equation (3) captures the equilibrium between aggregate demand and aggregate supply. Equations (4), (5) and (6) show how S, Id, and If are determined in the model. If, which defines the net build-up of claims on the rest of the world, or (X–M), is expected to vary inversely with domestic income, Y, and directly with the exchange rate, (e). As Y increases, imports increase, and (X–M) worsens. An increase in e, or nominal devaluation, causes the trade balance to increase. Second, in the money market, money supply is determined by the monetary authority, while money demand is determined by income and the interest rate, so that 7) $Ms0 = Md$.

8) $Md = L(Y, r)$; $LY = \partial Md/\partial Y > 0$, $Li = \partial Md/\partial r < 0$

The third and final market in the model is the foreign exchange market. The trade flows determined by Y, and financial flows determined by r, influence the balance of payments under a fixed exchange rate regime. According to Rhodd (1993), the trade balance becomes worse as the level of income rises. Although, the trade balance in the short run can be improved by capital flows, the long-run effect is not known due to loan repayment and repatriation of dividends and interest.

9) $B = T(Y) + F(r)$
10) $\partial B/\partial Y < 0$, $\partial B/\partial r = ?$.

The empirical model for this study will capture the relationship between real output, money supply, the exchange rate, and public expenditure. By including fiscal and monetary measures, Rhodd's model shows that devaluation is not undertaken by itself, but is associated with other policy measures. Therefore, a theoretical framework that captures the relationship between growth and movements in the exchange rate alone would be inappropriate in examining the combined impact of the exchange rate on economic growth.

2.2. Model specification

The empirical model for this study draws from the above theoretical framework. It captures the relationship that exists between aggregate output and other variables. comprising the exchange rate, money supply, and public expenditure. In some studies, an external term of trade is included. based on the fact that it is an important determinant of net exports. In this study, the net trade in goods and services captures the trade balance. General government final consumption expenditure is used to measure fiscal policy. However, different indicators have been used to represent monetary policy. The use of total domestic credit could be justified based on its impact on income through domestic investment, and because the control of total bank credit represents a main instrument of monetary policy in many developing countries. Due to the fact that part of domestic credit is included in government expenditure, domestic credit to the private sector was used as an indicator of monetary policy to avoid multicollinearity.

Therefore, in order to appropriately capture the impact of foreign exchange rate reform on economic growth, a multiple regression model was used, with economic growth (proxied by Gross Domestic Product) as the dependent variable, and real effective exchange rate, net trade in goods and services, general government final consumption expenditure, and domestic credit to the private sector as the independent variables. Similar variables were used in the study of Khondker et al (2012) where they empirically assessed the exchange rate and economic growth in Bangladesh.

The structural form of the model after modification becomes:

$$GDP = f(RER, NGS, GCE, DCP) \quad (11)$$

The stochastic form of the model in log form, excluding NGS, is:

$$LGDP = \beta 0 + \beta 1\ LRER + \beta 2\ LNGS + \beta 3\ LGCE + \beta 4\ LDCP + \mu \quad (12)$$

Where:

- LGDP = log of Gross Domestic Product,
- LRER = log of Real Effective Exchange Rate,
- LNGS = log of Net Trade in Goods and Services,
- LGCE = log of General Government Final Consumption Expenditure,
- LDCP = log of Domestic Credit to Private Sector.

Our a priori expectation is that β3 and β4 should be positive, but β1 and β2, which captures the foreign exchange rate reform as the effect of real devaluation on real output growth – being of primary interest of this study – and trade balance, respectively, cannot be predetermined.

2.3. Data sources

The data employed were obtained mainly from the World Development Indicators of the World Bank. The estimation period covered is from 1986 to 2019. Based on the results from the stationarity test, in which the variables of the study are mixed, the paper adopted the ARDL technique to determine the impact of foreign exchange reforms on economic growth in Nigeria, with the inclusion of real effective exchange rate, net trade in goods and services, general government final

consumption expenditure, and domestic credit to the private sector as the control variables. The individual plot of all the variables used was also produced.

Table 1. Variables description and data sources

Variables	Description	Source
Gross Domestic Product (LGDP)	This is a measure of aggregate output of the economy. It entered the model in log form.	WDI
Real Exchange Rate (LRER)	Real effective exchange rate is the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs. (2010 = 100). It also entered the model in log form.	WDI
General government final consumption expenditure (LGCE).	General government final consumption expenditure (includes all government current expenditures for the purchase of goods and services. Its log form was used.	WDI
Domestic credit to private sector (LDCP)	Domestic credit to the private sector by banks refers to financial resources provided to the private sector by other depository corporations. Its log form was used.	WDI
Net trade in goods and services (NGS)	Net trade in goods and services is derived by offsetting imports of goods and services against exports of goods and services.	WDI

Source: Author's compilation.

3. Results and discussion

To ascertain the appropriate method for the estimation of the parameters of the model for this study, preliminary investigations on the properties of the variables were carried out. These include the examination of the descriptive statistics and correlation of the variables, stationarity, and cointegration tests. Table 2 presents the descriptive statistics of the variables used in the study. The standard deviation of each variable gives a more accurate and comprehensive estimate (overall, between, and within) of dispersion, because an outlier can largely overstate the range of observations. According to the Table, the standard deviations of the variables are not too large, except for real exchange rate, and the measures of central tendency are not too far from each other. However, the standard deviation value for real exchange rate was less than 0.5. LNGS and LGDP have the highest and the second-highest mean values, respectively, while LRER and LGCE have the lowest mean values. Finally, the minimum and maximum values describe each variable as it appears, in terms of the lowest and highest values in each series. As such, the minimum observation, when compared to the maximum observation, gives the range of the observation value for each of the variables of analysis.

Table 2. Descriptive statistics of variables

	LGDP	LRER	LNGS	LGCE	LDCP
Mean	29.87721	4.608385	53.08956	26.35451	27.51301
Median	30.15571	4.564806	54.03594	25.79202	27.68906
Maximum	32.61215	5.609179	60.45688	29.77991	30.42461
Minimum	26.01215	3.906668	34.50224	22.06411	23.43184
Std. Dev.	2.079673	0.411106	5.467886	2.758058	2.405848
Skewness	-0.40647	0.919001	-1.265716	-0.163969	-0.338156
Kurtosis	1.881408	3.579261	5.125233	1.492593	1.754213
Jarque-Bera	2.708830	5.261212	15.47675	3.371410	2.846625
Probability	0.258098	0.072035	0.000436	0.185314	0.240915
Sum	1015.825	156.6851	1805.045	896.0534	935.4425
Sum Sq. Dev.	142.7263	5.577273	986.6266	251.0272	191.0075
Observations	34	34	34	34	34

Source: Author's computation from E-Views 11.

In addition, the Jarque-Bera (JB) statistics of the variables indicated that, besides LNGS, all the other variables were normally distributed, as shown by their corresponding probability values.

Table 3 below presents the correlation matrix among the variables.

Table 3. Covariance/Correlation result

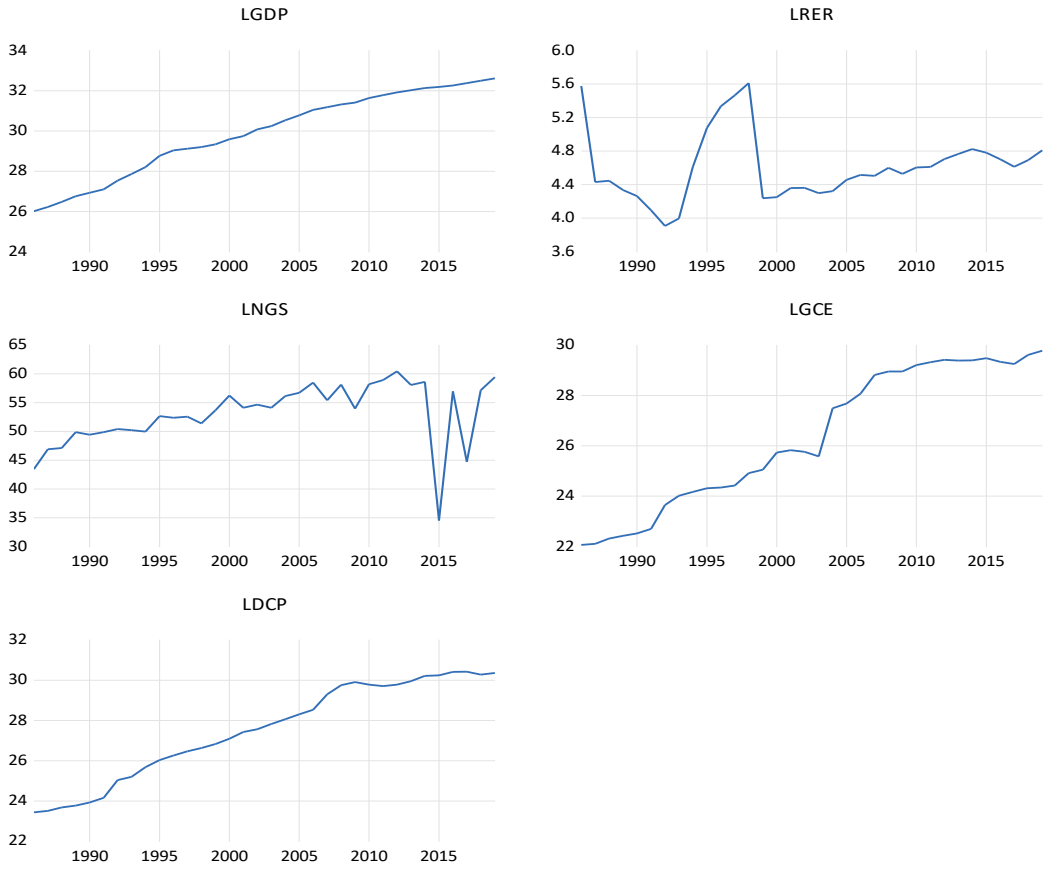
Covariance analysis: Ordinary					
Cov/Correlation	LDCP	LGCE	LGDP	LNGS	LRER
LDCP	5.617868				
	1.000000				
LGCE	6.364773	7.383150			
	0.988272	1.000000			
LGDP	4.832865	5.466176	4.197831		
	0.995191	0.981862	1.000000		
LNGS	6.050166	7.099789	5.418682	29.01844	
	0.473854	0.485051	0.490958	1.000000	
LRER	0.101102	0.077552	0.090966	-0.171933	0.164037
	0.105318	0.070470	0.109621	-0.078805	1.000000

Source: Author's computation from E-Views 11.

As shown in Table 3, except for the log of real effective exchange rate, all other variables have a positive association with the log of gross domestic product. Also, except for the correlation between LGCE and LGDP, LDCP and LGDP, and LDCP and LGCE, all other variables exhibit

a moderate correlation relationship. As a preliminary investigation of stationarity of the series, they are plotted individually in Figure 1 below.

Figure 1. Trend of study variables



Source: World Bank WDI (2020).

As shown in Figure 1, none of the series is without fluctuations. The log of gross domestic product fluctuated less, as it depicts an upward and relatively stationary trend, followed by the log of domestic credit to the private sector and the log of government final consumption expenditure, respectively. However, the log of net trade in goods and services and the log of real effective exchange rate fluctuated more often during the period. Specifically, the results of the stationarity tests on the variables, using the Augmented Dickey-Fuller and Phillips-Perron tests are presented in Tables 4 and 5, respectively.

Table 4. Augmented Dickey-Fuller unit root tests

Augmented Dickey-Fuller unit root tests at level					
Variable	ADF Statistics	5% critical values	1% CV	Prob.	Remark
LGDP	-3.608080	-2.954021	-3.646342	0.0110	Stationary at 5%.
LRER	-3.441396	-2.954021	-3.646342	0.0165	Stationary at 5%.
LNGS	-4.807770	-2.954021	-3.646342	0.0005	Stationary at 5% and 1%.
LGCE	-0.973984	-2.954021	-3.646342	**0.7509**	Non - stationary at 5% and 1%
LDCP	-1.877474	-2.957110	-3.653730	0.3382	Non - stationary at 5% and 1%
Augmented Dickey-Fuller unit root tests at first difference					
Variable	ADF Statistics	5% critical values	1% CV	Prob.	Remark
LGCE	-5.866084	-2.957110	-3.653730	0.0000	Stationary at 5% and 1%
LDCP	-3.960059	-2.957110	-3.653730	0.0046	Stationary at 5% and 1%

Source: Author's computation from E-views 11.

Table 5. Phillips-Perron unit root tests

Phillips- Perron unit root tests at level					
Variable	PP Statistics	5% CV	1% critical values	Prob.	Remark
LGDP	-3.608080	-2.954021	-3.646342	0.0110	Stationary at 5%.
LRER	-3.649984	-2.954021	-3.646342	0.0099	Stationary at 5% and 1%.
LNGS	-4.835208	-2.954021	-3.646342	0.0004	Stationary at 5% and 1%.
LGCE	-0.973984	-2.954021	-3.646342	**0.7509**	Non - stationary at 5% and 1%
LDCP	-1.735315	-2.954021	-3.646342	0.4048	Non - stationary at 5% and 1%
Phillips - Perron Unit Root Tests at First Difference					
Variable	ADF Statistics	5% CV	1% critical values	Prob.	Remark
LGCE	-5.866745	-2.957110	-3.653730	0.0000	Stationary at 5% and 1%
LDCP	-3.945978	-2.957110	-3.653730	0.0048	Stationary at 5% and 1%

Source: Author's computation from E-views 11.

The unit root test results

Spurious regressions are produced with the use of data that are non-stationary, and hence, the result may be misleading. Therefore, it is necessary to establish the stationarity form of the series for the study. The test results of the Augmented Dickey-Fuller and Phillips-Perron stationarity tests for all the variables used in the estimation are presented in Tables 4 and 5. The presence of a unit root indicates that the variables have mixed order of integration. The result of the Augmented Dickey Fuller unit root test shows that only LRER and NGS were stationary in their level forms at 5% level of significance. However, LRDP, LGCE, and LDCP were not stationary in their level forms at both 5% and 1% level of significance, but became stationary after first differencing. At the first difference, all the variables, except LRDP were stationary at both 5% and 1% levels

of significance. The null hypothesis of the presence of a unit root in the series was rejected as indicated by their probability values, which were less than 0.05, or 0.01, and the values of their ADF statistics (in absolute terms) which were higher than their critical values.

The economic implications of the non-stationarity of these variables is that the proportional effect of the log of real effective exchange rate, the log of net trade in goods and services, the log of general government final consumption expenditure, and the log of domestic credit to the private sector on the log of gross domestic product may generate a persistent shock. How long the shock will be remembered is confirmed by the unit root tests of both ADF and PP at the various stages. However, all variables achieved stationarity, although at unequal forms. This also confirms that the persistent shock is not an infinite memory.

With these mixed results, the appropriate estimation technique to be used is the ARDL. However, there is still a need to ascertain whether the variables are cointegrated or not. The main implication of the mixed stationarity result is that the Engle-Granger and the Johannsen techniques are not appropriate for testing the cointegration of the variables. We, therefore, use the Bounds test of cointegration that is embedded in ARDL. The result of this test is presented in Table 6.

Table 6. Bounds test for cointegration

ARDL Bounds test				
Null Hypothesis: No long-run relationships exist				
Test Statistic	Value	k		
F-statistic	1.010488	4		
Critical Value Bounds				
Significance	I0 Bound	I1 Bound		
10%	3.03	4.06		
5%	3.47	4.57		
2.5%	3.89	5.07		
1%	4.4	5.72		

Source: Author's computation from E-Views 11.

As shown in Table 6, the F-Statistic is below the I0 bound, showing that there is no cointegration. The model is then estimated as a short run ARDL model without cointegration. The result of the estimation for the short run is presented in Table 7 below.

Table 7. Estimated short run ARDL model

Dependent Variable: LGDP				
Method: ARDL				
Selected Model: ARDL(1, 0, 0, 0, 1)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LGDP(-1)	0.864078	0.107937	8.005398	0.0000
LDCP	0.100302	0.087641	1.144469	0.2633
LGCE	-0.009303	0.041176	-0.225939	0.8231
LNGS	0.003796	0.003596	1.055529	0.3013
LRER	0.066379	0.057218	1.160104	0.2570
LRER(-1)	-0.125967	0.048195	-2.613668	0.0150
C	1.799731	1.460003	1.232690	0.2292
@TREND	-0.000148	0.011642	-0.012701	0.9900
R-squared	0.998483	Mean dependent var		29.99433
Adjusted R-squared	0.998058	S.D. dependent var		1.994797
F-statistic	2350.284	Durbin-Watson stat		1.914351
Prob(F-statistic)	0.000000			
*Note: p-values do not account for model selection.				

Source: Author's Computation from E-Views 11.

As depicted in Table 7, the coefficient of the ARDL short run model showed that the log of GDP is significantly and positively influenced by its own value with one lag. Also, the current value of the log of domestic credit to the private sector positively influenced LGDP, but was not significant. The current value of the log of government final consumption expenditure has a negative, but not significant, influence on LGDP. The current value of the log of net trade in goods and services positively, but insignificantly, influences aggregate output. Regarding the relationship between the real effective exchange rate and gross domestic product, the real effective exchange

rate shows a negative and significant impact on gross domestic product with a lag in the short run. On the contrary, its current value shows a positive and non-significant relationship with gross domestic product. The value of the determination coefficient indicates that 99.8% from the LGDP variation is explained through the ARDL model in relation to LRER, LNGS, LGCE, and LDCP.

Conclusions and recommendations

In this study, the objective was to examine the impact of foreign exchange rate reforms on economic growth in Nigeria using annual time series data spanning 1986-2019. In this process, gross domestic product was used as a proxy for economic growth. The real effective exchange rate, net trade in goods and services, general government final consumption expenditure, and domestic credit to the private sector were used as independent variables. This study employed the Autoregressive Distributed Lag (ARDL) model as the estimation technique.

All the variables achieved stationarity, although at unequal forms, and therefore confirmed that the persistent shock is not an infinite memory. We, therefore, use the Bounds test of cointegration due to the mixed stationarity of the variables. The F-Statistics was below the I0 bound, showing that there is no cointegration. The model was then estimated as a short run model without cointegration. The coefficient of the ARDL short run model showed that the log of GDP is significantly and positively influenced by its own value with one lag. Also, the current value of the log of domestic credit to the private sector positively influenced LGDP, but was not significant.

Regarding the relationship between the real effective exchange rate and gross domestic product, the real exchange rate shows a negative and significant impact on gross domestic product with a lag in the short run. On the contrary, its current value shows a positive and non-significant relationship with gross domestic product. The negative impact of LRER on LGDP is in line with the study of Rhodd (1993) on the effect of real exchange rate changes in Jamaica, and Khondker et al. (2012) on the exchange rate and economic growth in Bangladesh.

The value of the coefficient of determination, which is 99.8%, shows that the model is a good fit. It is therefore concluded, based on the findings of this study, that real effective exchange rate and net trade in goods and services in Nigeria have not been instrumental in enhancing the growth of the Nigerian economy. Hence, the transmission mechanism of REER through aggregate demand does not hold in the case of Nigeria, and this result is not compatible with the traditional approach to exchange rate. It is therefore recommended that Nigeria should not use the real exchange rate as one of its macroeconomic policies, but should adopt an appropriate exchange rate for sustainable economic growth. Also, the study recommends the control of import content of both private and public expenditure in order to improve the trade balance effect on economic growth.

For Nigeria, the need for maintaining external competitiveness and promoting growth remains a delicate task for policymakers, as it involves managing an exchange rate regime accompanied by other consistent macroeconomic policies. Based on these results, we, therefore, recommend that appropriate monetary and fiscal measures, that will make the real exchange rate more responsive to variations in economic growth, should be put in place.

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