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Exchange Rate Dynamics in Nigeria: Does Government Expenditure Matters?

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Abstract

This paper examined the relationship between government expenditure and exchange rate in Nigeria using annual time series data from 1980 to 2020 obtained from the Central Bank of Nigeria Statistical Bulletin 2021. An Autoregressive Distributed Lag (ARDL) model was specified and estimated using ordinary least squares to analyse the relationship. The results show that government and private consumption expenditures, domestic investment activities, and interest rate led to a significant deterioration of the exchange rate over the period under investigation. Openness of the Nigerian economy to trade significantly spurred appreciation of exchange rate while foreign investment activities had insignificant effect on exchange rate in the country. Result also showed that government consumption expenditure complemented private consumption expenditure and affected real exchange rate via consumption-tilting channel. It was recommended amongst others, that government expenditure be channelled via appropriate fiscal and exchange rate policies, to domestically produced commodities, rather than imports, especially when such commodities are available in the country.

Keywords: ARDL approach, exchange rate, government expenditure, Nigeria, private expenditure,

JEL Codes: E62, F4, H5

Introduction

Government expenditures are the costs incurred by government for the provision and maintenance of governance, the economy and society. Government expenditures usually tend to increase with time as the economy becomes large and more developed

or as a result of increase in its scope of activities. According to Taiwo (2012), government expenditure is a fiscal policy instrument which serves a useful role in the process of controlling foreign exchange rate stability and other macroeconomic indicators. Exchange rate is the price of a country's currency in terms of another country's currency Oyakhilome (2017). Oyakhilome asserted that exchange rate is among the most important prices in an open economy due to its influence on commodities and capital in a country as well as pressure it induces on other macroeconomic variables. Thus, the choice and management of exchange rate regimes is essential in controlling an economy to ensure competitiveness and macroeconomic stability.

Exchange rate appreciation increase imports and reduces export while depreciation promotes export and hinders imports (Olasunkanmi & Babatunde, 2013). Olasunkanmi and Babatunde noted that depreciation of exchange rate tends to cause a shift from foreign goods to domestic goods, and leads to income diversion from importing to exporting countries through shifts in terms of trade thereby affecting balance of payments of the countries. Before and after the Structural Adjustment Programme in 1986, the Nigerian government has adopted various exchange rate policies to enhance trade, improve balance of payments and grow her economy. Nonetheless, the effectiveness of these policies in promoting Nigeria's domestic production and exports has remained uncertain.

The Central Bank of Nigeria (CBN) Statistical Bulletin 2021 indicated that prior to the introduction of floating exchange rate regime in 1986, Nigeria's real effect exchange rate was 0.55 naira per US dollar in 1980. This value deteriorated to 102.11 naira per US dollar in year 2000, and further deteriorated to 469.87 naira per US dollar in 2020. This trend suggested that the value of the Nigerian currency has been deteriorating even after the SAP, with a rapid deterioration of this currency recorded after the year 2000. Moreover, government expenditure amount has also been rising in Nigeria.

Available data from CBN (2021) showed that general government consumption expenditure grew steadily from 219.67 billion naira in 1980 to 1493.29 billion naira in 2004. It later rose rapidly from its 2004 value to 4952.99 billion naira in 2012, dropped to 3787.27 billion naira in 2018 and rose sharply to 6656.81 billion naira in 2020.

Upward trend in both exchange rate and government expenditure over time in Nigeria suggest a correlation between the two variables. Despite rising government expenditure in Nigeria, and various exchange rate management policies employed, the challenge of having a stable exchange rate in the country remained daunting. Nigeria economy mainly depends on imports by both government and private sectors since most consumer goods and raw materials are sourced from abroad thereby mounting pressure on the exchange rate because more of foreign currency would be demanded. The flamboyant lifestyles of her citizens coupled with their preference for foreign consumer goods to domestically available or produced ones further increase demand for foreign currency. Attempts by previous studies to explore the relationship between exchange rate and government expenditure have varied conclusions. It is therefore expedient to examine the relationship between Nigeria's government expenditure and exchange rate focusing on these questions: How does government and private consumption expenditure affect exchange rate in Nigeria? Through what channel does government consumption expenditure influence Nigeria's exchange rate? Are government and private consumption expenditures complements or substitutes with regards to their effects on exchange rate? Understanding how government expenditure activities impact on exchange rate is very vital for policy concerns. Policy makers, government bodies, investors and economic analysts, as well the academia would benefit from output of this paper.

This paper is structured into five sections. Following this introductory section is a review of literature in section two. The third section discussed the methods used while the fourth section presented the results and the fifth section concluded the paper.

Literature Review

The different types of exchange rate arrangements ranged through a continuum of fully flexible exchange rates to pegs fixed exchange rates. Some countries have flexible exchange rates, whereby they have no explicit exchange rate target. They allow their exchange rate to fluctuate considerably. However, some other countries maintain a fixed exchange rate in terms of some foreign currency, while some peg their currency to the dollar, French franc or Euro. Under flexible exchange rates, an expansionary fiscal policy like increased government expenditure increases aggregate demand which leads to an increase in output, to an increase in the interest rate, and to a depreciation of the domestic currency. However, a contractionary policy like reduction in government expenditure reduces aggregate demand which leads to decrease in output, to a decrease in the interest rate and to an appreciation of the domestic currency, (Blanchard, 2003). Whereas, under fixed exchange rate, the central bank cannot let the currency appreciate. As the increase in output leads to an increase in the demand for money, the central bank must accommodate the increase in demand for money by increasing the money supply, so that interest rate and thus, the exchange rates do not change. So, under fixed exchange rates, fiscal policy is more powerful than it is under flexible exchange rates. This is because fiscal policy triggers monetary accommodation (Blanchard, 2003). A currency therefore, is as strong as the demand for it. Currency appreciates the higher the demand for it, and depreciates the lower the demand for it.

Several empirical researches have been carried out to assess the relationship between government expenditure and exchange rate. Saheed (2012) studied the impact of government capital expenditure on exchange rate in Nigeria. The study used a disaggregate approach and a secondary dataset form 1981 through 2010. The ordinary

least squares estimation techniques was adopted in the analyses. The results show that government capital expenditure, particularly government spending on social and community services had a statistically significant impact on exchange rate in Nigeria, while capital expenditures on administration, economic services and transfer were not statistically significant in respect to their impact on exchange rate.

Olasunkanmi and Babatunde (2013) undertook an empirical analysis of fiscal policy shocks and current account dynamics in Nigeria. The study used public expenditure and exchange rate dataset spanning the period 1980Q1–2012Q4. The structural VAR approach was employed in the analyses. The result showed an appreciation of the real exchange rate in response to positive public expenditure innovation over the sample period

Ilzetzki, Enrique, and Vegh (2013) analysed how big or small fiscal multipliers can be in developed and developing countries. The authors adopted a panel of developed and developing countries in the analyses. The study findings documented that while positive public expenditure innovation led to depreciation of the real exchange rate in developed countries, it caused appreciation of the real exchange rate in developing countries.

Çebi and Çulha (2014), explored the effects of government spending shocks on the real exchange rate and trade balance in Turkey. The study used quarterly data for the period 2002–12. Multiple regression analyses was adopted. The findings showed that exchange rate appreciated in response to expansionary public expenditure innovation and showed that the impact relies on the type of public expenditure. Although public non-wage consumption creates exchange rate appreciation, public investment innovations have a negligible impact on the exchange rate.

Alves da Silva, Baerlocher, and de Paiva Fonseca (2015) examined the relationship among fiscal shocks, the real exchange rate and the trade balance in some emerging

economies. Econometric analyses and results demonstrated that the impacts of expansionary public expenditure innovations were not the same among all countries, with a rise in public expenditure causing real exchange rate appreciation in Mexico but depreciation in Brazil and Chile. In a related study, De Castro and Garrote (2015) also assessed the effects of fiscal shocks on the exchange rate in the European Monetary Union and differences with the United States of America. They found that an increase in public expenditure caused real exchange rate appreciation in the euro area but real depreciation in the USA.

Employing econometric techniques, in an open economy framework, Mlilo and Kollamparambi (2016) investigated fiscal policy, employment, and output in South Africa. The authors adopted dataset for the sample period 1994Q1–2008Q4 in South Africa in the investigation. Findings from the study showed that discretionary public expenditure change caused exchange rate appreciation over the period considered.

Auerbach and Gorodnichenko (2016) examined the effects of fiscal shocks in a globalized world using time series dataset spanning more than 20 years in USA. It also examined the responses of exchange rates to public expenditure innovation based on the state of the economy in the USA. The Vector Autoregressive framework was adopted for the analysis. The findings reveal that responses to economic downturn and economic upturn were different, with a weak instantaneous response that gradually appreciated for the USA.

Examining the link between fiscal policy and external competitiveness in Sub-Saharan Africa (SSA), Oyakhilome (2017) sought to answer the question, Does government spending drive the real exchange rate in Sub-Saharan Africa? The study based its analyses on a panel VAR model estimation. The result revealed that public expenditure was associated with real exchange rate appreciation in countries of SSA. Furthermore, the study examined the separate impacts of public consumption, public

investment, and transfer payments on the real exchange rate and showed that public consumption and transfer payments lead to exchange rate appreciation, while public investment causes real exchange rate depreciation in SSA.

Miyamoto, Nguyen, and Sheremirov (2019) evaluated effects of government spending on real exchange rates using exogenous military expenditure. A panel data framework of developed and developing countries was used in the study. The results showed that expansionary public expenditure innovation led to real exchange rate depreciation in developed countries while it caused real exchange rates to appreciate in developing countries.

Born, D'Ascanio, Müller, and Pfeifer (2019) assessed the worst of both worlds via an investigation of fiscal policy and fixed exchange rates. The study used annual secondary dataset from 1986 to 2018 for Germany. Regression estimations was employed in the analysis. The results showed that the responses of exchange rates to positive and negative discretionary public expenditure changes are symmetric, and found that expansionary public expenditure appreciates the real exchange rate while contractionary public expenditure depreciates it.

Bajo-Rubio, Berke, and Esteve (2020) explored relationship between fiscal policy and the real exchange rate in Spain. The study used annual time series of variables form 1985 to 2019. A multiple regression estimation approach was utilised in the analyses. The findings revealed that not only the type of fiscal expenditure consolidation measures matter for the impact of unanticipated public expenditure innovation on the exchange rate in Spain, but also the definition of the exchange rate. While a reduction in public investment caused appreciation of export price-based and CPI-based exchange rates, a reduction in public consumption led to depreciation of the CPI-based real exchange rate, but not of export-based exchange rates.

Nuru (2020a) sought to examine monetary and fiscal policy effects in South African economy. The study used quarterly data for the period 1994–2014. In the analyses, a multiple regression estimation was performed. The results indicated that nominal exchange rate appreciated due to increase in public expenditure. Similarly, Nuru (2020b) examined the effects of public expenditure innovations on the level of the real exchange rate for the South African economy using quarterly data for the period 1994–2014, and found that the exchange rate appreciated in response to innovations, though the effect differs based on the type of fiscal expenditure innovation.

Nuru and Gereziher (2021) investigated the impacts of public expenditure innovations on exchange rate volatility in South Africa. They used quarterly data for the period 1970–2019 in the study. A version of the vector autoregressive impulse response model proposed by Jordà was employed and the innovations were identified recursively. The impulse response functions indicated that public expenditure innovation had a significant depreciating trend impact on exchange rate volatility, and its impact relied on the type of fiscal expenditure innovation considered. While the impact of public expenditure innovation on exchange rate volatility does not rely on the direction of the innovation, it varied according to the state of the economy. Public expenditure innovation has a depreciating trend impact on exchange rate volatility in the upturn state, and mostly an appreciating trend impact in the downturn state. The impact was greater in the upturn than the downturn state.

There was no clear knowledge on the nexus between government expenditure and exchange rate, thus no consensus reached. Majority of the studies focused on other countries aside Nigeria. Most of the empirical studies on Nigeria measured government expenditure using government total, recurrent, or capital expenditure. These were expenditure incurred by only the federal government, and does not include those by states and local governments. This created a gap in literature as none

of the empirical studies deemed expenditure by states and local governments in Nigeria.

Methodology

Frenkel and Razin (1996) theory used an interpemporal neoclassical framework in a small open economy to explain how government expenditure influences real exchange rate. This theory notes that government expenditure affects real exchange rate and the private sector in mainly two channels viz- resource-withdrawal or consumption-tilting channels. For resource-withdrawal channel, government expenditure is similar to a negative supply shock and its influence on real exchange rate and private consumption depends on the proportion of government expenditure on nontradeables to tradeables. For consumption-tilting channel, government expenditure effect on real exchange rate and private sector consumption level depends on nature of the goods consumed (substitutes or complementary), and qualities of the utility function (risk averse, loving, or neutral). Government expenditure affects real exchange rate through the resource-withdrawal and consumption-tilting channels, when it is exclusively for nontradeables and tradeables, respectively (Frenkel & Razin, 1996; Balvers & Bergstrand, 2002). This Frenkel and Razin theory underpinned the empirical model of this study.

To empirically evaluate government expenditure impact on exchange rate in Nigeria, the basic auto regressive distributed lag (ARDL) model is specified below as

$$EXR_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} EXR_{t-i} + \sum_{i=0}^{p} \beta_{2i} \ln GCE_{t-i} + \sum_{t=0}^{q} \beta_{3i} \ln PCE_{t-i} + \sum_{t=0}^{r} \beta_{4i} \ln GFCF_{t-i} + \sum_{t=0}^{s} \beta_{5i} OPNS_{t-i} + \sum_{t=0}^{w} \beta_{6i} INTR_{t-i} + \sum_{t=0}^{v} \beta_{7i} \ln FDI_{t-i} + u_t \quad (1)$$

Taking the first difference both sides of Equation 1 and specifying the unrestricted version of the basic ARDL model to combine both short-run dynamics and the long-run values, we have

$$\Delta EXR_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} \Delta EXR_{t-i} + \sum_{i=0}^{p} \beta_{2i} \Delta \ln GCE_{t-i} + \sum_{t=0}^{q} \beta_{3i} \Delta \ln PCE_{t-i} + \sum_{t=0}^{r} \beta_{4i} \Delta \ln GFCF_{t-i} + \sum_{t=0}^{s} \beta_{5i} \Delta OPNS_{t-i} + \sum_{t=0}^{w} \beta_{6i} \Delta INTR_{t-i} + \sum_{t=0}^{v} \beta_{7i} \Delta \ln FDI_{t-i} + \delta_1 EXR_{t-1} + \delta_2 \ln GCE_{t-1} + \delta_3 \ln PCE_{t-1} + \delta_4 \ln GFCF_{t-1} + \delta_5 \ln OPNS_{t-1} + \delta_6 \ln INTR_{t-1} + \delta_7 \ln FDI_{t-1} + u_t \quad 2$$

The Error Correction Mechanism (ECM) or restricted version of the ARDL model in Equation 2 above is provided below as

$$\Delta EXR_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} \Delta EXR_{t-i} + \sum_{i=0}^{p} \beta_{2i} \Delta \ln GCE_{t-i} + \sum_{t=0}^{q} \beta_{3i} \Delta \ln PCE_{t-i} + \sum_{t=0}^{r} \beta_{4i} \Delta \ln GFCF_{t-i} + \sum_{t=0}^{s} \beta_{5i} \Delta OPNS_{t-i} + \sum_{t=0}^{w} \beta_{6i} \Delta INTR_{t-i} + \sum_{t=0}^{v} \beta_{7i} \Delta \ln FDI_{t-i} + \phi ECM_{t-1} + u_t \quad 3$$

Where ln is natural logarithm, Δ is difference operator, EXR is exchange rate, GCE is general government consumption expenditure, PCE is private consumption expenditure, GFCF = gross fixed capital formation, OPNS is openness to trade, INTR is Interest rate, FDI is foreign direct investment, ECM_{t-1} is error correction term (which adjusts the short run to the long run equilibrium), u is Stochastic error term. In addition, k, p, q, r, s, w and v are lag lengths in the model, β and δ are short-run and long-run parameters, ϕ is a measure of the speed of adjustment of the short-run deviations to long-run static values. A priori expectations are that all the independent variables are positively related to exchange.

The basic ARDL model (Equation 1) was estimated to examine the relationship between exchange rate and government expenditure. Equations 2 and 3 however, suffice if there was a cointegrating relationship among the variables.

According to Pesaran, Shin, and Smith (2001), the ARDL co-integration technique, compared to other multivariate co-integration methods, enables the co-integration relationship to be estimated by the Ordinary Least Squares (OLS) after determining the lag order of the model. Engle and Granger and the Johansen maximum likelihood co-integration techniques are commonly used co-integration methodologies but

ARDL bound testing methodology has been favoured by researchers in co-integration analyses due to its high predictive power (Shrestha & Chowdbury, 2007). The ARDL model is very flexible because it can accommodate regressors that are stationary either at levels I(0) or first difference I(1) or a combination of I(0) and I(1) variables. This model has advantage of producing both the long- and short- run parameters in a single estimation of the model. Unlike most of the conventional multivariate co-integration procedures, which are valid for large sample size, the bounds test approach is more robust and works better with finite sample size. More so, a dynamic error correction model (ECM) can be obtained from the ARDL model through a simple linear transformation. The ECM form combines the short-run dynamics with the long-run equilibrium without losing long-run information (Shrestha & Chowdbury, 2007). As recorded by Shrestha and Chowdbury (2007), employing the ARDL technique avoids problems that might result from using non-stationary time series.

Annual time series dataset spanning 1980 to 2020 were extracted from the Central Bank of Nigeria (CBN) Statistical Bulletin 2021. Exchange rate was measured by the real effective exchange rate of naira per US dollar (N/$). Government expenditure was measured by general government consumption expenditure in billions of naira. Private expenditure was measured by general household consumption expenditure, while domestic investment was measured by gross fixed capital formation. Both were in billions of naira. Openness to trade was measured by the percentage of the difference between exports and imports in gross domestic product. The domestic interest rate was measured by real interest rate in percentage, while foreign investment was measured by foreign direct investment net inflow in billions of US dollars. For estimation, EVIEW Version 9 software was used.

Results

Table I: Descriptive statistics of variables.

Variable	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera (Prob)
EXR	109.04	469.87	0.55	126.12	1.32	3.82	13.01 (0.00)
GCE	1770.33	6656.81	219.67	1994.63	0.81	2.12	5.82 (0.05)
PCE	23067.64	43699.86	8326.31	13009.81	0.42	1.53	4.86 (0.09)
GFCF	8793.63	15789.67	5668.87	2274.06	1.42	5.30	22.80 (0.00)
OPNS	32.29	53.28	9.14	12.47	-0.37	2.16	2.15 (0.34)
INTR	17.16	36.09	7	6.67	0.38	3.04	0.97 (0.62)
FDI	123547.50	803675.70	1892	217172	2.27	6.86	60.55 (0.00)

Note: StdDev is standard deviation and prob denotes probability.
Source: Researcher's compilation from Eviews version 9.0 output.

Table I showed that Nigeria's real effective exchange rate (EXR) ranged from 0.55 naira per dollar to 469.87 naira per in the period 1980 to 2020 with average of 109.04 naira per dollar and standard deviation of 126.12 naira per dollar. Thus, the coefficient of variation (standard deviation divided by mean) value of 1.16 implied that there was a high variation in real effective exchange rate of Nigeria in the period. The skewness statistic value was 1.32 indicated that the annual data had more observations clustered on the right hand of its distribution. The kurtosis value of 3.82 showed that the data was leptokurtic in nature. The Jarque-Bera statistic value of 13.01 significant at the 5 percent level suggested that annual real effective exchange rate data was not normally distributed.

Annual government consumption expenditure of Nigeria ranged from 219.67 billion naira to 6656.81 billion naira with an average of 1770.33 billion naira, and standard deviation 1994.63 billion naira in same period. The coefficient of variation value 1.13 suggested that there was a high variation in Nigeria's annual consumption expenditure over the period. The skewness value of 0.81, and kurtosis value of 2.12, indicated that annual government expenditure data was skewed to the right and platykurtic, respectively. The Jarque-Bera value of 5.82 was not significant at the 5 percent level implied that data was normally distributed.

In same period, Nigeria's private consumption expenditure (PCE) average was 23067.64 billion naira; real gross fixed capital formation (GFCF) average was $8793.63 million; trade openness (OPNS) average was 32.29 percent; real interest rate (INTR) average was 17.16 percent; and foreign direct investment (FDI) net inflows average was $123547.50 million.

Table II: Pearson's Correlation Matrix of EXR Model

	EXR	GCE	PCE	GFCF	OPNS	INTR	FDI
EXR	1.000000						
GCE	0.756791	1.000000					
PCE	0.731341	0.715334	1.000000				
GFCF	0.367986	0.298077	0.351236	1.000000			
OPNS	0.222122	0.310292	0.427355	-0.04706	1.000000		
INTR	0.229994	-0.06312	0.036946	-0.16931	0.264167	1.000000	
FDI	0.369246	0.463715	0.578014	0.072083	0.600874	-0.02946	1.000000

Source: Researcher's compilation from Eviews version 9.0 output

Table II provided the Pearson's correlation matrix of variables. The results showed that the pairwise Pearson's correlation coefficients ranged from -0.063 to 0.756. This indicated that all the pairwise Pearson's correlation coefficients were less than 0.8, and

absence of multicollinearity among independent variables is expected in the estimation of the model.

Table III: The ADF and PP Unit Root Tests at Level

Variable	ADF Stat	5% Critical Value	Remark	PP stat	5% Critical Value	Remark
EXR	-0.44607	-3.52661	I(1)	-0.11136	-3.52661	I(1)
GCE	-1.89852	-3.52661	I(1)	-2.04736	-3.52661	I(1)
PCE	-3.19096	-3.52661	I(1)	-3.12119	-3.52661	I(1)
GFCF	-5.53865	-3.52661	I(0)	-3.67839	-3.52661	I(0)
OPNS	-2.52451	-3.52661	I(1)	-2.47305	-3.52661	I(1)
INTR	-2.63919	-3.52661	I(1)	-2.58497	-3.52661	I(1)
FDI	-2.86087	-3.52661	I(1)	-2.86554	-3.52661	I(1)

Source: Researcher's compilation from Eviews version 9.0 output

Table III displayed both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test statistics of the variables at level. All the variables had ADF test statistical values which were greater, in absolute terms, than their corresponding critical values at 5 percent level, except gross fixed capital formation (GFCF). The Phillips-Perron test statistics also showed similar results. This indicated that all the variables, except gross fixed capital formation, were not stationary at level. It meant that gross fixed capital formation was integrated of order zero [I(0)], stationary, at level, while the rest variables were integrated of order one [I(1)], not stationary, at level.

Table IV: The ADF and PP Unit Root Tests at First Difference

Variable	ADF Stat	5% Critical Value	Remark	PP stat	5% Critical Value	Remark
EXR	-5.33848	-3.52976	I(0)	-5.15619	-3.52976	I(0)
GCE	-6.38203	-3.52976	I(0)	-6.40726	-3.52976	I(0)
PCE	-6.90838	-3.52976	I(0)	-7.10909	-3.52976	I(0)

OPNS	-7.39951	-3.52976	I(0)	-7.67624	-3.52976	I(0)
INTR	-6.62506	-3.53308	I(0)	-6.96078	-3.52976	I(0)
FDI	-8.88466	-3.52976	I(0)	-9.84198	-3.52976	I(0)

Source: Researcher's compilation from Eviews version 9.0 output

Table IV highlighted both the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test statistics of the variables at first difference. All the variables had ADF test statistical values which were greater, in absolute terms, than their corresponding critical values at 5 percent level, and same results were found for the Phillips-Perron test. These results suggested that the variables in Table IV were stationary after first differencing. Therefore, these variables were integrated of order one [I(0)], stationary, after first difference, implying that these variables were integrated of order one [I(1)].

Table V: ARDL Bounds Test of Cointegration Results

Model	5% Lowe Bound	5% Upper Bound	F Statistic	Degree of Freedom
EXR	2.45	3.61	1.08	6

Source: Researcher's compilation from Eviews version 9.0 output

Table V showed results of the autoregressive distributed lag (ARDL) bounds test of co-integration. In the bounds test of co-integration, a null hypothesis of no co-integration among the variables in a model is rejected if the F-statistic is greater than the 5 percent upper bound value. The table showed that there was co-integration among the variables in the model. A null hypothesis of no co-integration among variables the model was rejected since the F-statistic value of 4.82 was greater than the 5 percent upper bound value of 1.08 which was less than the 5 percent critical value of 3.61. This suggested that a null hypothesis of no co-integration among variables in the real exchange rate model was retained. Thus, the basic ARDL model is most appropriate for the analysis of the model.

Optimal Lag Length Selection for ARDL Models

Tables 6 provided results of the optimal lag selection adequate for the estimation of the ARDL model using different selection criteria. The selection criteria were sequential modified LR test statistic (each test at 5% level), final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SIC), and Hannan-Quinn information criterion (HQ).

Table VI: Optimal Lag Length Selection for the EXR Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-597.688	NA	69188.78	31.00965	31.30824	31.11679
1	-408.415	300.8956*	54.18235*	23.81617*	26.20487*	24.67321*
2	-379.542	35.53602	195.4054	24.84832	29.32714	26.45528

Source: Researcher's compilation from Eviews version 9.0 output

Table VI displayed results of the various lag selection criteria for the real effective exchange rate model. From the table, all the selection criteria indicated that the optimal lag length for this model was one lag. The results suggested that the real effective exchange rate model required an optimal lag length of one in its ARDL estimation.

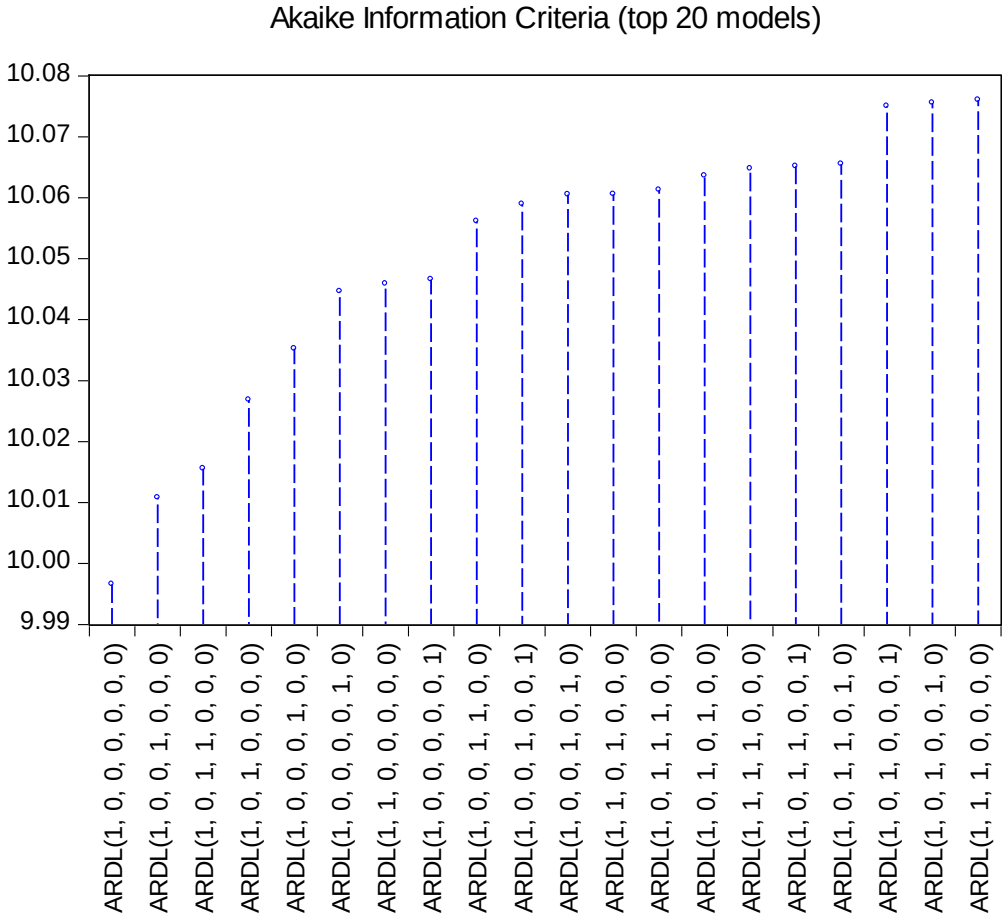

Figure I: Summary of Real Effective Exchange Rate Model Selection
Source: Researcher's compilation from Eviews version 9.0 output

Figure I showcased a summary of real effective exchange rate model selection. The top 20 parsimonious ARDL models were presented. The selected ARDL model for this analyses was the ARDL (1,0,0,0,0,0,0) process. This was because it had the lowest AIC among the 20 models. Thus, ARDL (1,0,0,0,0,0,0) process was selected and estimated. The variables of this model were not co-integrated and thus its basic form was adopted.

Table VII: Estimated Result of Exchange Rate Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
EXR(-1)	0.93385	0.095792	9.748755	0
GCE	2.022952	0.815153	2.481684	0.0191
PCE	26.145055	9.348044	2.796848	0.0091
GFCF	19.741265	7.827766	2.521954	0.0174
OPNS	-1.384907	0.155928	-8.881696	0.0000
INTR	1.69849	0.944994	1.797355	0.0817
FDI	-1.1102	4.36062	-0.2546	0.8007
C	-431.446	320.1897	-1.34747	0.1873
R-squared	0.944791	Durbin-Watson statistic		1.854796
F-statistic	78.23105	Prob(F-statistic)	0.00	

Source: Researcher's compilation from Eviews version 9.0 output

The estimated result of the real effective exchange rate model was presented in Table VII. The ARDL (1,0,0,0,0,0,0) process was quite impressive and had a good fit. The R-squared value of 0.944791 showed that about 94.5 percent of the fluctuations in real effective exchange rate were explained by the explanatory variables. The F-statistic value of 78.23 was significant at 1 percent level. This suggested that there was a significant relationship between real effective exchange rate and all the explanatory variables taken together. The Durbin-Watson statistic value of 1.85 indicated that there was no threat of autocorrelation among the residual terms of the model.

The estimated coefficient of one year lag of real effective exchange rate was positive and significant at the 1 percent level. The coefficient value of 0.93385 showed that on the average, a 10 percent rise in real effective exchange rate in previous year led to 9.34 percent rise in real effective exchange rate in a current year. This indicated a positive and significant correlation between previous and current levels of real effective exchange rate. The current level of exchange rate therefore depended on its previous level as shown in the result. This highlighted the degree of expectation or speculation in the value of exchange rate in the country.

Government consumption expenditure had a positive coefficient significant at the 5 percent level. Its estimated value of 2.022952 implied that on average, a 10 percent rise in government consumption expenditure led to 20.2 percent rise in real effective exchange rate. This finding is similar to Nuru and Gereziher (2021) who found that government expenditure lead to depreciation of nominal exchange rate in South Africa. Moreover, private consumption expenditure had a positive coefficient significant at the 1 percent level. The estimated value of 26.145055 showed that on average, a 10 percent increase in private consumption expenditure led to 261.5 percent increase in real effective exchange rate. Bajo-Rubio *et al* (2020) found a similar result in their study of Spanish economy.

Gross fixed capital formation also had a positive coefficient significant at the 1 percent level. The estimated value of 19.741265 indicated that holding all factors constant, a 10 percent increase in gross fixed capital formation led to 197.4 percent increase in real effective exchange. Oyakhilome (2017) earlier found that public investment caused exchange rate depreciation in SSA.

On the other hand, trade openness had a negative coefficient significant at the 1 percent level. The coefficient value -1.384907 showed that on the average, a 10 percent increase in trade openness led to a 13.8 percent decrease in real effective exchange rate. This corroborates an earlier study by Olasunkanmi and Babatunde (2013). However, real interest rate had a positive coefficient significant at the 10 percent level. The coefficient value of 1.69849 implied that on the average, a 10 percent increase in real interest rate led to 16.9 percent increase in real effective exchange rate. This differs from Nuru (2020a) who found that nominal exchange rate appreciated in South Africa due to monetary policy. Lastly, foreign direct investment net inflow had an estimated negative coefficient that was not significant at 10 percent level. The coefficient value of -1.1102 showed that, holding all other factors constant, a 10 percent in foreign direct

investment net inflow led to 11.1 percent decrease in real effective exchange rate. This supports the finding by Ilzetzki *et al* (2013) on developing countries.

Table VIII: Diagnostics of Estimated Exchange Rate Model

Test	F Stat	DF	Pob
Breusch-Godfrey Serial Correlation LM Test	1.297107	(2,30)	0.2882
Heteroskedasticity Test: Breusch-Pagan-Godfrey	1.731563	(7,32)	0.1368
Ramsey RESET Test	0.134393	(1, 31)	0.7164
Jarque-Bera		6.62	0.73

Source: Researcher's compilation from Eviews version 9.0 output

Table VIII contained the diagnostic results of estimated real effective exchange rate model. The result showed that there was no threat of serial correlation in the estimated model since Breusch-Godfrey Serial Correlation LM Test F-statistic value of 1.297107 was not significant. There was also no heteroskedasticity problem in the estimated model as Breusch-Pagan-Godfrey F-statistic value 1.731563 was not significant. Furthermore, the estimated model was adequately specified judging from Ramsey's regression specification error test (RESET) F-statistic that was not significant. The error terms obtained from the model estimation were normally distributed. This conclusion was drawn from the JB statistic value 6.62 which was statistically insignificant. Therefore, all the underlying assumptions of the regression analysis were not violated. Hence, the estimates from the model are reliable for decision making.

The implication of government consumption expenditure significant positive impact on real effective exchange rate was that government expenditure in Nigeria spurred depreciation of the naira. Government purchases in Nigeria are largely composed of foreign goods and services priced in foreign currency, usually US dollars. The need for such expenditure create demand for the foreign currency and cause same to appreciate relative to the domestic currency (naira). It indicated that more of the

domestic currency would be used in exchange for less of the foreign currency due to increased demand for the foreign currency. Thus, a depreciation of the domestic currency. Private consumption expenditure significant positive effect on real effective exchange rate also implied that it supported the deterioration of the naira. Its higher coefficient value (26.15) relative to government consumption expenditure coefficient (2.02) implied that it contributed more than 10 times to deterioration of naira than its counterpart. Private consumption activities and demand for foreign currency therefore exerted more pressure on the exchange rate than government consumption activities or demand for such currency. Government consumption expenditure was complementary to private consumption expenditure in Nigeria since both variables had significant positive effect on real exchange rate as shown by the result. Drawing from Frenkel and Razin (1996), and Balvers and Bergstrand (2002), this suggests that government expenditure in Nigeria affects the real exchange rate in Nigeria through the consumption-tilting channel. Domestic investment activities also spurred exchange rate deterioration by nearly 10 times the effect of government consumption activities on same. Interest rate contributed less to exchange rate deterioration compared to government consumption expenditure, whereas, trade openness and foreign direct investment net inflow supported appreciation of the naira drawing from their negative influence on the exchange rate. It indicated that through trade openness and foreign direct investment inflow less naira would be used in exchange for more dollars due to increased demand for naira.

Conclusion and policy recommendations

Government expenditure is an important component of aggregate demand. Both theoretical and empirical literature have established the nexus between government expenditure and exchange rate. This paper investigated whether government consumption expenditure mattered in exchange rate dynamics in Nigeria. Findings from the estimated exchange rate model show that both government and private

consumption expenditure led to a significant deterioration of the exchange rate over the period considered, with the latter having a greater effect than the former. Domestic investment activities, and interest rate also led to significant deterioration of exchange rate in the country, while trade openness and foreign investment inflow led to significant appreciation of the exchange rate in Nigeria.

Since government expenditure spurred depreciation of the Nigerian currency relative to the US dollars, and other foreign currencies, it is hereby recommended that government expenditure be channelled as much as possible, via appropriate fiscal and exchange rate policies, to domestically produced commodities, rather than imports, especially when such commodities are available or can be produced in the country. Same should be applicable to private consumption expenditure activities. This will reduce the demand pressure of foreign currencies which often lead to deterioration of the local currency, and support a stable exchange rate while domestic production and exports are being encouraged. Government should ensure strict compliance with the procurement act in the awards of government projects contracts to avoid over invoices. More so, high percentage local content should be ensured in all government projects to minimize imports which may increase demand for foreign currency and put pressure on exchange rate. It is also recommended that relevant authorities closely supervise and monitor exchange rate transaction of deposit money banks, as well as curb excesses of bureau de change operators to prevent activities capable of destabilising the exchange rate.

Dynamicsin exchange rate is a reflection of activities in a domestic economy relative to economic activities in other countries. Researchers have linked activities of government in an economy to changes in exchange rate. This paper explored this link and concluded that government expenditure, private expenditure, domestic investment activities, interest rate, and trade openness were the significant

determinants of exchange rate in Nigeria. Nonetheless, foreign investment activities in the country has a great potential in influencing exchange rate pattern in the country.

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