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Impact of Real Exchange Rate Misalignment on Economic Growth in Nigeria

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Abstract
This study analysed the impact of real exchange rate misalignment on economic growth in Nigeria between 1980 to 2021, using the Autoregressive Distributed Lag (ARDL) model. Quarterly data over the period of study were collected from sources such as the World Bank, International Monetary Fund and the Central Bank of Nigeria. The results show that nominal exchange rate, real interest rate differential, foreign direct investment, trade openness, external debt, terms of trade and productivity were the key fundamental variables explaining movements in real exchange rate in Nigeria and in determining its equilibrium path. The real exchange rate misalignment was computed, and the result further showed that the exchange rate was misaligned, while the Naira Real Exchange Rate was on the average overvalued by 0.67% over the period covered by the study. Furthermore, it was discovered that Exchange rate misalignment had negative impact on Economic Growth in Nigeria. Flowing from the empirical findings, the study recommends that policy makers should focus on measures that will ensure that the Naira Exchange Rate remains within its equilibrium path to ensure that the country achieves its objectives of external balance and economic growth. Such measures include the continued implementation of a market-based exchange rate system. In addition, measures to increase productivity, operating an open economy to promote exports and maintaining a positive real interest rate in the domestic economy to attract foreign capital inflows will impact positively on the Naira real exchange rate.
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1.0 Introduction

In the last five decades, exchange rate behaviour has become a critical macroeconomic issue in emerging and frontier economies. This can be linked to various factors including the floating exchange rate system and the quest to manage exchange rate risk exposure in the markets. Exchange rate behaviour has also been influenced by the cross-border expansion of modern businesses, the persistent rise in world trade relative to national economies, the desire to institute economic integration in some regions; and the rapid pace of change in the technology of money transfer (Nortey et al., 2015). The volatility of exchange rate movement in one country has spread to other nations as financial markets around the world have become increasingly linked. This issue gained additional significance during the global financial and economic crisis of 2007–2009, and its effects are still being felt today. The macroeconomic performance of many nations has been negatively influenced by this and other effects of the global economic and financial crisis, such as exchange rate volatility.

Economic theory stipulates that macroeconomic stability is a pre-requisite for sustained and inclusive growth (Akinlo & Onatunji, 2020; Iheanachor & Ozegbe, 2021). Thus, in the '80s the governments of most countries in sub-Saharan Africa were compelled to adopt the International Monetary Fund (IMF)/World Bank sponsored programme, the Structural Adjustment Program (SAP)) as part of the Economic Recovery Program (ERP). This was in an effort to salvage the ailing economies and position them on a consistent growth path. The implementation of the programmes led to the switch from the direct control approaches to the adoption of more market-oriented policies. One of the key policy measures adopted was the liberalisation of the exchange rate (Senadza & Diaba, 2017; Yussif et al., 2022). In Nigeria, like most other developing countries, the Exchange rate policy and regimes have passed through so many changes. In the post-independence period in 1960, Nigeria operated a fixed exchange rate system. This system was supported by high crude oil revenues, while the Naira exchange rate appreciated persistently, following the rising crude oil prices in the global market in the 1970s.

The huge inflow of petrodollars, coupled with the exchange rate appreciation led to the over-dependence of Nigeria on imports, while the country lost its non-oil export competitiveness owing to the associated Dutch Disease. However, Nigeria started to experience external sector imbalance, manifesting in External Reserves depletion and

Balance of Payments problems as from the early 80, when the global oil market began a downturn. The ensuing challenges led to a decline in economic growth rate by an average of 5.21% from 1980 – 1985, according to the data released by the World Bank, leading to the adoption of SAP in September 1986 and the floating of the Naira Exchange rate. Since, 1986 when Nigeria adopted SAP, there has been growing debate on the impact of exchange rate on economic growth and the appropriate exchange rate system for an economy like Nigeria. However, such debate has been backed by very few empirical studies. Given the role exchange rate plays in an economy, policy makers often seek to determine a crucial reference value called the Equilibrium Real Exchange Rate. Hence the concept of Equilibrium Real Exchange Rate (ERER) refers to an ideal exchange rate, which prevails in the absence of price rigidities, frictions, and other short run factors in the economy. In other words, the ERER is that which is established as a function of the underlying macroeconomic fundaments, while the real exchange rate is misaligned if it is not equal to the equilibrium real exchange rate.

Theoretically, persistent departure of the exchange rate from its equilibrium path could have adverse effects and implications for the performance of an economy (Asteriou et al., 2016; Jadoon & Guang, 2019). It could lead to misallocation of scarce economic resources that may be unsustainable. Specifically, a misaligned exchange rate has strong implications for the economy through terms of trade. For instance, if the exchange rate is overvalued, it can cause a loss of international competitiveness (Abbasi & Iqbal, 2021). It can also lead to greater importation because foreign goods become cheaper domestically than goods produced within the country. This can create incentives for more importation, which could have a negative effect on the balance of payments and, hence, trade deficits. If, on the other hand, it is undervalued, one of two phenomena could occur. First, it could influence trade through net exports. It could also stimulate more exports and fewer imports (Abbasi & Iqbal, 2021). While this could result in relative improvements in the trade balance, it may be unsustainable. On the other hand, undervalued exchange rate could induce price level inflation. The reason for this could be the desire for cheaper exports or people shifting their expenses from costly imports to non-tradable goods (Elsenhans, 2020). The effect of exchange rate misalignment on trade and economic growth makes its study quite critical.

In spite of the importance of Real Exchange Rate Misalignment (REMIS) on economic growth, only few studies have been conducted in Nigeria to examine this relationship. To the best of the author's knowledge, the studies on Nigeria were those of Usman, 2007, Anigbogu, et al 2014 and Ali et al, 2015. These studies, however, did not capture the impact of the shift in the exchange rate policy in Nigeria in 2014, arising from the sharp drop in oil price and the global economic crisis in 2020, owing to the Covid 19 pandemic. The objective of this study is, therefore, to analyse the impact of real exchange rate misalignment on economic growth in Nigeria, particularly in the light of recent economic developments. The remainder of the article is divided into the following sections: (II) literature review, (III) data and methodological framework, (IV) estimation approach, and (V) Conclusion and recommendation.

2.0 Literature Review

The starting point in the investigation of Real Exchange Rate Misalignment on Economic Growth is first to derive the Equilibrium Real Exchange Rate Model, after which the misalignment series are obtained by comparing estimated real exchange rate with the actual observed real exchange rate. The misalignment series is then included in the growth equation to analyse the impact. This section, therefore, presents some theoretical and empirical reviews that are relevant to the study.

2.1 Theoretical Review

The purchasing power parity (PPP) theory is one of the earliest approaches in literature for determining equilibrium real exchange rate. This theory, however, assumes that the equilibrium real exchange rate is constant over time., which is in contrast to empirical observations in studies such as Driver & Westaway (2005), and Saayman (2007) which suggests that PPP does not hold especially in the short run. Also, the PPP narrowly focuses on monetary sources of exchange rate movements, disregarding the effects of real factors (Edwards, 1989; Ghura & Grennes, 1993). Aside the PPP, other alternative framework for determining the equilibrium real exchange rate are the Fundamental Equilibrium Exchange Rate (FEER) popularised by Williamson (1994), and the Behavioural Equilibrium Exchange Rate (BEER) popularised by Clark & MacDonald (1998). In general, while the FEER assumes macroeconomic balance and external sustainability, the BEER assumes that the equilibrium exchange rate is determined through the behaviour of a relevant set of fundamentals that drive changes in real exchange rates. The BEER is employed as the theoretical basis for the Real Exchange Rate Misalignment Model in this study.

2.2 Empirical Literature

Economic literature is replete with works, which have found correlations between exchange rate misalignment and growth in most developing countries since the 1970s. For instance, Naja (1998) argued that real exchange rate overvaluation is one of the most important factors responsible for weak economic performance globally. Abdelbaky (2003) argued that exchange rate overvaluation hurts exports of developing countries, while Edwards

(1994) also noted that real exchange rate misalignment promotes speculation and usually generates massive capital flight out of the economy. On the other hand, other works have found positive correlations between growth and undervalued currencies and such positive impacts are measured in terms of enhanced exports and the resultant accretion to external reserves. In their study on the effect of real exchange rate misalignment on the collective economic growth of Egypt, Jordan, Morocco and Tunisia, Domac and Shabsigh (1999) constructed three measures of exchange rate misalignment based on Purchasing Power Parity (PPP), black market exchange rate and a structured model. It was found that real exchange rate misalignment adversely affects economic growth, using the three measures of misalignment. They further noted that the real exchange rate misalignment recorded by the countries stemmed from their inappropriate exchange rate policies.

Moosa (2000) examined the extent, possible causes and consequences of misalignment in intra-Arab exchange rates and found that misalignments in the bilateral exchange rates of six Arab countries namely, Bahrain, Egypt, Jordan, Kuwait, Morocco and Tunisia were extensive (some being misaligned by more than 100 per cent) and, in most cases, has no tendency to disappear even in the long run. It was also noted that misalignment adversely affects international trade by distorting comparative advantages. He attributed misalignment to the nominal exchange rate arrangements practiced in those countries. Abdelbaky (2003) noted that persistent misalignment of real exchange rate can impose severe losses of welfare and efficiency. He further observed that misalignments are usually accompanied by the imposition of restriction of exchange and trade controls to slow down the drainage of foreign exchange reserves that occurs when the real exchange rate is overvalued. Exchange and trade controls introduce large inefficiency costs and encourage the creation of strong lobbies that compete for the rents generated by protective measures.

Sallenave (2009) also studied the growth effects of real effective exchange rate misalignments for the G20 countries over the period 1980-2006. He adopted the behavioural equilibrium exchange rate (BEER) approach to estimate real effective equilibrium exchange rates for the countries and thereafter computed the misalignment levels. His results showed that misalignments are more pronounced in the case of emerging countries than in industrialized ones. Based on the dynamic panel growth model estimated, he found that misalignments have negative effect on economic growth in the countries. In contrast, Aratuo et al. (2019) state that the effect of exchange rate volatility on the welfare of the economy depends on how prices are set. Exchange rate volatility is caused by the fluctuation of macroeconomic factors and the dynamic nature of the business environment. The appreciation of currency happens by an upward movement, while a downward movement indicates a loss in value (depreciation) against foreign currency (Anyanwu et al. 2017).

Theories that explain this up and down movement in the exchange rate are the real option theory, the interest rate parity theory, purchasing power parity, traditional flow theory, etc. According to the real option theory, investment decisions are tightly connected with the effect of macroeconomic uncertainty (Dixit & Pindyck 1994; Drakos & Tsouknidis, 2023). Thus, the exchange rate volatility as an indicator of uncertainty explains the behaviour of investor decisions. Stable exchange rates become more attractive for firms that decide to increase their investment. Therefore, the real option theory is used to examine the nexus between exchange rate volatility and economic growth by researchers. The empirical literature regarding the effect of exchange rate behaviour on economic growth indicates that this occurs through various channels. As it is mentioned by Morina et al. (2020), the three key channels where exchange rate volatility can impact economic growth are international trade, foreign direct investment, and macroeconomic stability, while some views have been expressed with regards to these.

Alasha (2020) investigated the link between exchange rate volatility and its effects on the Nigerian economic growth using trade balance, inflation rate, interest rate and exchange rate as variables and the data used for the analysis was obtained from the National Bureau of Statistics and the Central Bank of Nigeria. The study employed the ordinary least square method (OLS), classical least regression model and other techniques such as the Cointegration and Granger Causality test, Augmented Dickey-Fuller test, to analyse the data. The study revealed that exchange rate and inflation exerted an adverse effect on economic growth, while interest rates have a positive effect on economic growth.

Iheanachor and Ozegbe (2021) used the autoregressive distributed lag (ARDL) technique to examine the consequences of exchange rate fluctuations on Nigeria's economic performance from 1986 to 2019. The study revealed that exchange rate, inflation rate and foreign direct investment have a negative impact on the economic performance in the long-run. However, some previous studies have also revealed that the exchange rate has a significant positive effect on economic growth performance. Ali et al, 2015 investigated the impacts of Naira real exchange rate misalignment on Nigeria's economic growth form 2000-2014. The study observed that Naira was overvalued by 0.17% during the period and found empirical support for a negative relationship between Real Exchange Rate Misalignment and economic growth in Nigeria. The study recommends the continued use of market-based exchange rate arrangements as a way to ensure that naira real exchange rate follows its equilibrium path.

The key observation from the studies reviewed above is that empirical work investigating the relationship between exchange rate misalignment and economic growth in Nigeria is relatively few, while some of the findings

are conflicting. This study intends to contribute to existing literature by using more recent data in an attempt to further investigate the relationship between exchange rate and economic growth in Nigeria.

3.0 Methodological Framework and Data Requirement.

3.1 The Autoregressive Distributed Lag Model (ARDL)

This section presents a brief overview of the proposed analytical model, which is the Autoregressive Distributed Lag Model (ARDL). The ARDL method was developed by Pesaran et al (2001) to overcome the restrictive assumption upon which the Johansen cointegration test is applicable. Specifically, the Johansen cointegration test was designed on the assumption that the fundamental variables must be integrated by order 1, that is I(1). Regardless of the variables' integration order, ARDL is utilized to calculate the cointegration of the variables. Additionally, the long-run economic ties and the short-run dynamic relations are both examined concurrently using the ARDL approach.

The ARDL cointegration framework (p, q) in accordance to Pesaran et al. (2001) are specified as follows:

$$y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{p} \phi\, y_{t-i} + \beta x_t + \sum_{i=0}^{q-1} \beta^* \Delta x_{t-i} + \mu_t \dots\dots\dots (1)$$

$$\Delta x_t = P_1 \Delta x_{t-1} + P_2 \Delta x_{t-2} + \cdots + P_3 \Delta x_{t-3} + \epsilon_t, \dots\dots\dots\dots\dots\dots\dots\dots (2)$$

where $xt\ is\ k-dimensional\ I(1)$ variables which do not cointegrate among themselves. $u_t\ and\ \varepsilon_t$ are uncorrelated disturbances with zero means and constant variance-covariance. P_i are k x k coefficient matrices such that the VAR process in Δx_t becomes stable. The Pesaran et al. (2001) ARDL framework above is based on the null hypothesis that there is no cointegration between or among our variables of interest against the alternative hypothesis that there exists a cointegration among the variables. Formally, this is presented as follows:

$$Null\ hypothesis\ (H_0): \sum_{t=1}^{n} \phi_t = 0 \dots\dots\dots\dots (3)$$

$$Alternative\ hypothesis\ (H_1): \sum_{t=1}^{n} \phi_t \neq 0 \dots (4)$$

The decision to accept the null hypothesis or not is based on the comparison of the calculated value of the F-test obtained from the estimation of equations (1) and (2) with the lower and upper critical values given in the work of Pesaran et al. (2001). Suppose the calculated value of the F-test is greater than the upper critical value, then there exists a long-run relationship. In other words, there exists cointegration among the variables under consideration. However, if the calculated value of the F-test is less than the critical value, then there is no cointegration. The decision becomes inconclusive if the F-test value lies in between the upper and the lower critical values. Based on the results obtained from the cointegration test exercise, we proceed to the estimation of the error correction term (ECT) employing ARDL. The purpose of ECT is to determine the speed of adjustment to a long-run equilibrium after initial short-run economic disruption. Two steps are involved in the determination of the error term through the error correction estimation technique. First is the derivation of error term which could be obtained by regressing independent variables on dependent variables. The second step entails subtraction of the actual value of dependent variables from the estimated value obtained from the first step. The framework for the error correction term estimation is given as follows:

$$ECT = y_t - \left(\alpha_0 + \lambda_t \sum_{t-1}^{n} X_t\right) \dots\dots\dots (5)$$

where $ECT = error\ correction\ term,\ y_t = dependent\ variable,$ the R.H.S is the set of independent variables and α and λ are constant.

Other benefits of the ARDL approach are its robustness and good performance in small samples, coupled with the fact that when the model includes endogenous regressors, it provides valid t-statistics and unbiased long-run estimates (Odhiambo, 2008). Finally, endogeneity is less problematic in the ARDL framework since the model is free of residual correlation with the method able to distinguish between dependent and explanatory variables (Jalil et al, 2013).

3.2 Variables and Measurement Scales

The data employed for this study are quarterly data, obtained from secondary sources such as the World Bank (World Development Indicators), the International Monetary Fund, International Financial Statistics, the Central bank of Nigeria, the National Bureau of Statistics and other reputable sources for the period Q1, 1980 to Q4, 2021. Data that were available annually were converted to quarterly series using the e-views. The data used and sources are presented below in table 3.1

Table 3.1 – Variables and Sources.

Variable	Description	Measurement (Indicator)	Source of Data
Credit to Private Sector	Credit to Private Sector.	Credit to Private Sector (% of GDP)	The World Bank (WDI).
Domestic Income	Proxied by Real Gross Domestic Product (GDP)	Real GDP	The World Bank (WDI).
External Debt Stock	External Debt Stock/ Gross National Income (GNI)	External Debt Stock / GNI	The World Bank (WDI, 2021).
Foreign Direct Investment	Foreign Direct Investment	Foreign Direct Investment (Obtained from CBN)/ GDP (obtained from WB	CBN (Statistical Bulletin) The World Bank (WDI, 2021).
Foreign Income	Proxied by Industrial Production of Advanced Countries	Av, of Industrial Production of Trading Partners	The World Bank (WDI)
Nominal Exchange Rate	Nominal Exchange Rate	Nominal Exchange Rate (N/US$)	IMF (International Financial Statistics).
Productivity	Proxied by Output Gap	Proxied by Output Gap	Obtained from E-Views
Lending Rate	Prime Lending Rate	Prime Lending Rate (%/Annum)	Central Bank of Nigeria
Real Exchange Rate	Real Exchange Rate	Nominal Exchange Rate *USCPI/Nigeria CPI	IMF (International Financial Statistics).
Economic Growth	Real Growth of Gross Domestic Product	Real GDP Growth (%)	The World Bank (WDI, 2021).
Real Interest Rate Differential	Real Interest Rate Differential	Nigerian TB/CPI minus USTB/USCPI	IMF (International Financial Statistics).
Total Government Expenditure	Total Government Expenditure	Total Government Expenditure	CBN
Trade Openness	Proxied by Export/GDP	Export/GDP	WB
Terms of Trade	Terms of Trade	Export Price/Import Price	CBN

Source: Author's presentation.

3.3 Econometric Models

3.3.1 The Naira Equilibrium Real Exchange Rate Model

The Equilibrium Real Exchange Rate (ERER) of the Naira was estimated as a function of carefully selected economic fundamentals in line with theoretical framework and empirical evidence. The model is as follows:

$$LRER_t = \varphi_0 + \varphi_1 LNER_t + \varphi_2 RIRD_t + \varphi_3 FDI_t \quad \varphi_4 LPROD_t + \varphi_5 LTOP_t + \varphi_6 LTOT_t + Q7\ LEXD_t + e_t \text{----------(6)}$$

$Where:$

$LRER = Log\ of\ Real\ Exchange\ Rate$
$LNER = Log\ of\ Nominal\ Exchange\ Rate$
$RIRD = Real\ Interest\ Rate\ differential$
$FDI = Foreign\ Direct\ Investment$
$PROD = Productivity$
$LTOP = Log\ of\ Trade\ Openness$
$LTOT = Log\ of\ Terms\ of\ Trade$
$LEXD = Log\ of\ External\ Debt$
$t = Time\ subscript$
$e_t = Error\ correction\ term$

3.3.2 Description of Variables and A priori Expectations

The Nominal Exchange Rate is used to capture government's exchange rate policy and is expected to have positive sign in the model. This implies that a depreciation or devaluation of the nominal exchange rate is expected to induce a Real Exchange Rate (RER) appreciation and vice versa.

The RIRD indicates the price signals faced by investors. An increase in domestic interest rate is expected to

attract foreign capital inflows, which would cause real exchange rate to appreciate.

An increase in FDI leads to a higher expenditure on all goods, including non-tradeable goods and results in increase in the domestic price level, which will cause the RER to appreciate.

The variable productivity (PROD) included in the model represents the domestic supply side factor, the so called "Balassa-Samuelson effect". An increase in productivity is expected to lead to RER appreciation.

Trade Openness (TOP) is used to capture the impact of trade policy on exchange rate. An increase in openness is expected to lead to increased export, resulting in appreciation of the RER and vice versa, with increased trade restriction.

The Terms of Trade (TOT) captures the impact of external shocks, and it includes both income and substitution effect. Ideally, a positive Terms of Trade could lead to increase in purchasing power, which could lead to increase in demand and push up prices of non-tradable. An increase in the prices of non-tradeable will cause the real exchange rate to appreciate.

External Debt (EXD) is used to capture the fiscal stance of government. Its impact depends on whether increase in government expenditure is spent on tradables or non-tradable. An increase in government expenditure on non-tradables will increase their prices and lead to RER appreciation.

3.3.3 Estimating the Real Exchange Rate Misalignment

After establishing co-integration among the variables that are found to affect the equilibrium exchange rate in equation (6) above, the co-integrating relationship was used to generate the Equilibrium Real Exchange Rate (ERER). The explanatory factors' permanent values are substituted into the estimated co-integrating relationship to produce the ERER series. The Hodrick-Prescott (HP) filter is used to extract the permanent values. Therefore, the exchange rate misalignment, which is defined as the actual RER's departure from the HP-filtered equilibrium level, can be computed as follows:

Mist = RERt – REERt (HP_) ---------- (7)

Based on the above, the Naira is overvalued if the difference shows a negative and undervalued if it is positive, while there is no misalignment if the difference is zero.

3.3.4 The Economic Growth Model

The economic growth analysis was predicated on the standard Harrod-Domar growth theory, while considering subsequent improvements offered by the Solow's neoclassical growth model. Hence following other authors such as Ali et al, 2015, this study employed the use of traditional variables affecting growth, in addition to policy variables in recognition of the influence of government policies on economic growth. In view of the objective of this study, the computed naira real exchange rate misalignment (REMIS) is included as an explanatory variable in the growth model.

Hence the economic growth model is specified as follows:

$RGDPG_t = \varphi_0 + \varphi_1 LNER_t + \varphi_2 LGFCF_t + \varphi_3 GEPG_t + \varphi_4 PLR_t + \varphi_5 CPS_t + \varphi_6 RERMIS_t + e_t$ ---------(8).

Where:

$RGDP\ Growth = Real\ GDP\ Growth$
$LNER = Log\ of\ Nominal\ Exchange\ Rate$
$GEXPG = Government\ Expenditure\ Growth$
$GFCP = Gross\ Fixed\ Capital\ Formation$
$PLR = Prime\ Lending\ Rate$
$CPS = Credit\ to\ Private\ Sector$
$RERMIS = Real\ Exchange\ Rate\ Misalignment$
$t = time\ index$
$e_t = Error\ term.$

3.3.5 Description of Variables and A priori Expectations

i. The Nominal Exchange rate indicates government's exchange rate policy and is said to depreciate if exchange rate increase and vice versa. Depreciation of the exchange rate is expected to increase exports and impact positively on economic growth.
ii. Also, Government Expenditure Growth is expected to impact positively on economic growth.
iii. The Gross Fixed Capital formation measures the impact of capital accumulation and is, therefore, expected to impact positively on growth.
iv. The Prime Lending Rate indicates the cost of capital. The coefficient is expected to be negative, indicating that as interest rate decreases, investment increases, which should impact positively on economic growth.
v. Access to credit by the private sector is expected to drive investment and therefore impact positively on growth.
vi. Regarding, the Real Exchange Rate Misalignment, the coefficient is expected to be negative, giving the tendency for currencies in developing countries to be overvalued.

4.0 Empirical Analysis

4.1 The Real Exchange Rate Model

4.1.1 Stationarity Test

The unit root results presented in table 4.1.1 below is the Augmented Dicky Fuller ADF) test for unit roots. This test has been chosen for this study because it is often used and it is known to produce reliable results. Additionally, it is the best choice for balanced and imbalanced data. The stationarity test findings demonstrate that all variables are stationary either at level or at first difference, with no variable stationary at the second difference, making the proposed ARDL appropriate for adoption.

Table 4.1.1 – Unit Root Tests

VARIABLES	LEVEL TEST		TEST IN DIFFERENCE		I(d)
	P-values	Level of Significance	P-values	Level of Significance	
LRER	0.2300	n0	0.0000	***	I(1)
LNER	0.3733	n0	0.0000	***	I(1)
RIRD	0.0034	***	0.0000	***	I(0)
FDI	0.0088	***	0.0020	***	I(0)
PROD	0.0000	***	0.0000	***	I(0)
LTOP	0.4632	n0	0.0001	***	I(1)
LTOT	0.0006	***	0.0000	***	I(0)
LEXD	0.4687	n0	0.0001	***	I(1)

Notes: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant

*MacKinnon (1996) one-sided p-values.

Source: Author's computation using E-views 13

Using ADF test for unit root, RIRD, FDI, PROD, and LTOT are stationary at 1% level of significance while LRER, LNER, LTOP and LEXD are not stationary at level. At first difference all the variables are stationary at 1% level of significance. This mixed order of co-integration makes the ARDL suitable for the estimation of the variables.

4.1.2 Structural Break Test

Given the coverage of the study, which span 42 years (1980 to 2021), it is expected that policy and endogenous shocks may have occurred, which may have caused structural breaks in time series. Accordingly, and in order to avoid biased estimates (see Omotosho 2012), structural break test was conducted using the Bai and Perron (2003) procedure, with the identified break date of 2010Q1, being significant. This break date reflects the time of reforms in the Nigerian banking sector and the second-round effect of the 2007/2008 global financial meltdown. In this regard, a dummy variable was included in the model to capture this date.

Table 4.1.2 – Multiple Break Point Test

Bai-Perron tests of L+1 vs. L sequentially determined breaks

Sequential F-statistic determined breaks:			4
Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	54.65918	382.6143	21.87
1 vs. 2 *	12.12633	84.88434	24.17
2 vs. 3 *	13.48279	94.37950	25.13
3 vs. 4 *	3.794337	26.56036	26.03
4 vs. 5	0.000000	0.000000	26.65

* Significant at the 0.05 level.

Source: Author's computation using E-views 13

Break dates:

	Sequential	Repartition
1	1993Q3	1986Q4
2	1986Q4	1994Q2
3	2010Q3	2002Q4
4	2002Q4	2010Q2

Source: Author's computation using E-views 13

4.1.3 Bounds Test for Co-integration and Long-run relationship

Table 4.1.3 reports the bounds co-integration test of the ARDL approach. Thus, since the F-statistics (26.74187) exceeds all the critical values for the upper bound at 1%, 5% and 10% levels of significance respectively, there is evidence of long run relationship among the variables. In other words, the real exchange rate (LRER), nominal exchange rate (LNER), real interest rate differential (RIRD), foreign direct investment (FDI), productivity (PROD), trade openness (LTOP), terms of trade (LTOT) and external debt (LEXD) appear to have long run relationship in spite of having different orders of integration among the variables. Thus, the Equilibrium Real Exchange Rate model is free from spurious regression.

Table 4.1.3 – Bounds Test

F-statistic	645.0444	Durbin-Watson stat	1.748261
Prob(F-statistic)	0.000000		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	26.74187	10%	2.22	3.17
k	7	5%	2.5	3.5
		2.5%	2.76	3.81
		1%	3.07	4.23

Source: Author's computation using E-views 13

4.1.4 Error Correction Results

As shown in table 4.1.4, the short run estimation yields a negative and statistically significant coefficient of -0.23 of the ECT (error correction term) called the speed of adjustment coefficient. As expected, the coefficient lies between -1 and 0 for convergence. Thus, the speed of adjustment coefficient indicates that the real exchange rate (LRER) adjusts to LNER, RIRD, FDI, PROD, LTOP, LTOT and LEXD in the long run. In other words, the system corrects its disequilibrium in the previous period (short run) at a speed of 23%, thereby restoring equilibrium in the quarter. This does, in fact, demonstrate a very high convergence rate, which implies a robust cointegration in the data.

Table 4.1.4 Error Correction Results

Dependent Variable: D(LRER)

ECM Regression

Case 4: Unrestricted Constant and Restricted Trend

Variable	Coefficient	Prob.
C	-0.066812	0.0000
D(LRER(-1))	-0.304091	0.0001
D(LNER)	0.979116	0.0000
D(LNER(-1))	0.288219	0.0001
D(RIRD)	-0.005936	0.0000
D(RIRD(-1))	0.001195	0.0000
D(FDI)	-0.015770	0.0003
D(PROD)	-0.003329	0.0372
D(LTOP)	0.011409	0.4515
D(LTOP(-1))	0.025940	0.0825
D(LTOT)	0.014025	0.0039
D(LTOT(-1))	-0.037826	0.0000
D(LEXD)	0.075236	0.0014
D(LEXD(-1))	-0.063719	0.0294
D_2010Q1	-0.021106	0.0000
CointEq(-1)*	-0.022809	0.0000

Source: Author's computation using E-views 13

4.1.5 Estimated Short-run Coefficients.

The analysis as presented in table 4.1.5 indicates that variables such as LNER, RIRD, FDI, LTOT, LEXD and LTOP affect the Real Exchange Rate in the short run, all of which were statistically significant at 5% level. However, productivity (PROD) was found to be insignificant in this model, though significant at 10%, given its p-value of 0.0697.

Therefore, 1% change in NER will cause the RER to depreciate by 0.97%, while a unit change in RIRD will

cause the RER to appreciate by 0.005 per cent in the short run. In the same vein, a unit change in FDI will cause RER to appreciate by 0.15 per cent in the short run. Furthermore, 1% change in external debt (EXD) will cause RER to depreciate by 0.075 per cent in the short run.

Table 4.1.5 – Estimated Short run coefficients.

Dependent Variable: LRER

Variable	Coefficient	Prob.*
LRER(-1)	0.673101	0.0000
LNER	0.979116	0.0000
LNER(-1)	-0.663028	0.0000
RIRD	-0.005936	0.0000
RIRD(-1)	0.002915	0.0000
FDI	-0.01577	0.0104
FDI(-1)	0.006757	0.2209
LPROD	-0.003329	0.0697
LTOP	0.011409	0.5399
LTOP(-1)	-0.001714	0.9409
LTOT	0.014025	0.0111
LEXD	0.075236	0.0021
LEXD(-1)	-0.165262	0.0001
D_2010Q1	-0.021106	0.0286
C	-0.065649	0.2922
@TREND	-0.001163	0.0268
R-squared	0.999463	4.9127

Source: Author's computation using E-views 13

4.1.6 Estimated Long-run Coefficients.

Table 4.1.6 shows the Long run estimates. From the results, the factors that determine the real exchange rate in the long run are nominal exchange rate (NER), real interest rate differential (RIRD), foreign direct investment (FDI), productivity (PROD) trade openness (TOP), terms of trade (TOT), and external debt (EXD). All these variables exhibited strong causal relationships and are statistically significant in determining the real exchange rate in the long run at 5% level of significance.

Hence, a 1% change in NER will cause RER to depreciate by 1.22 per cent while a unit change in RIRD will cause RER to appreciate by 0.18 per cent. In the same vein, a unit change in FDI will cause exchange rate to appreciate by 0.39 per cent while a unit change in productivity will cause RER to appreciate by 0.18 per cent.

Table 4.1.6 Estimated Long run coefficients.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNER	1.221827	0.346001	3.531286	0.0006
RIRD	-0.184832	0.053528	-3.453013	0.0008
FDI	-0.395136	0.187116	-2.111723	0.0367
PROD	-0.180382	0.080680	-2.235765	0.0271
LTOP	-0.712207	0.315626	-2.256489	0.0258
LTOT	2.483061	0.766032	3.241460	0.0015
LEXD	-1.153333	0.350625	-3.289365	0.0013
@TREND	-0.050991	0.015704	-3.246979	0.0015

EC = LRER - (1.2218*LNER -0.1848*RIRD -0.3951*FDI -0.1804*LPROD
-0.7122*LTOP + 2.4831*LTOT -1.1533*LEXD -0.0510*@TREND)

Source: Author's computation using E-views 13

Furthermore, 1% change in trade openness will cause RER to appreciate by 0.71 per cent while 1% change in TOT will cause RER to depreciate by 2.48 per cent. Finally, 1% change in external debt will lead to an appreciation in real exchange rate by 1.15 %.

4.1.7 Computed Real Exchange Rate Misalignment

Figure 4.1.1 below shows the actual and fitted real exchange rate series, based on the methodology outlined earlier. In this study it was observed that the Naira exchange rate has been misaligned over time with 82 occurrences of undervaluation and 82 occurrences of overvaluation over the sampled period. On the average, Naira was found to be overvalued by 0.67% over the selected quarterly period.

Figure 4.1.1: Actual and Fitted Real Exchange Rate Series

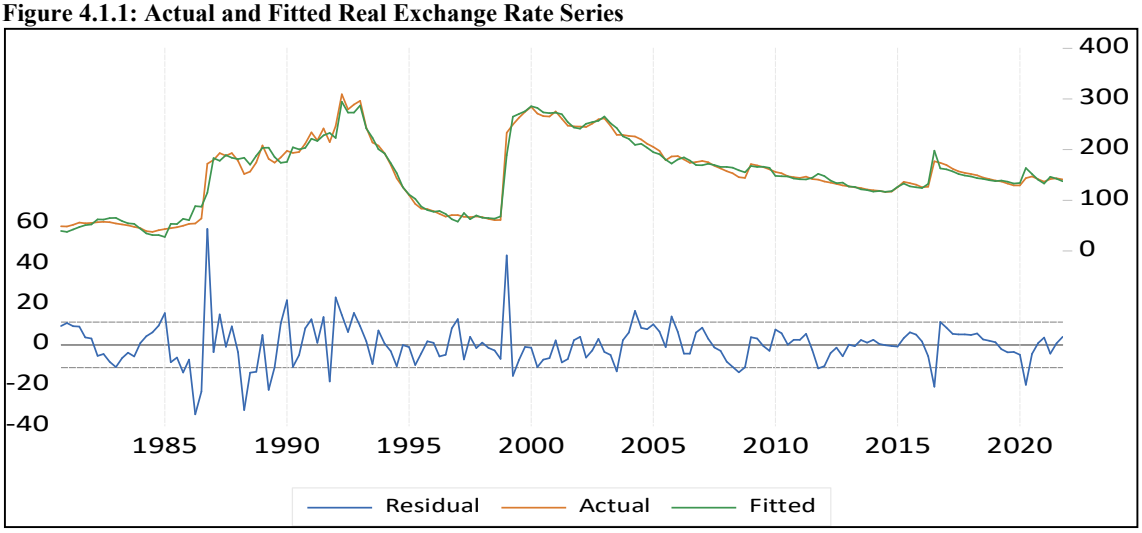

Table A.1.11 in the Appendix shows the Real Exchange Rate Misalignment (RERMIS) series. As would be observed, there were 82 occurrences of undervaluation and 82 occurrences of overvaluation over the sampled period. On the average, Naira was found to be overvalued by 0.67% over the selected quarterly period.

4.2 Economic Growth Model

4.2. 1 Stationarity Test

The unit root results for the growth model, using Augmented Dicky Fuller (ADF) test for unit roots are presented in table 4.2.1. The stationarity test findings demonstrate that all variables are stationary at either first difference or at level, with no variable stationary at the second difference, making the proposed ARDL appropriate for adoption. Using ADF test for unit root, all the variables are stationary at levels at 1% level of significance excepts CPS which is stationary at 10% level of significance. Meanwhile, LNER and GFCF and PLR were not stationary at all. At first difference, all the variables were stationary using ADF. This mixed order of cointegration also makes the ARDL suitable for the estimation of the variables.

Table 4.2.1 Unit Root Test

VARIABLES	LEVEL TEST		TEST IN DIFFERENCE		I(d)
	P-values	Level of Significance	P-values	Level of Significance	
RGDPG	0.0095	***	0.0092	***	I(0)
GEXPG	0.0000	***	0.0000	***	I(0)
LNER	0.2530	n0	0.0000	***	I(1)
GFCF	0.1166	n0	0.0008	***	I(1)
PLR	0.1739	n0	0.0000	***	I(1)
RERMIS	0.0000	***	0.0000	***	I(0)
CPS	0.0794	*	0.0011	***	I(0)

Notes: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant
*MacKinnon (1996) one-sided p-values.
Source: Author's computation using E-views 13

4.2.2 Structural Break Test

The structural break test conducted on the growth model using the Bai and Perron (2003a) approach, identified the break dates of 1990Q4, 2001Q2 and 2015Q2 over the sample period. However, only the break dates of 2001 and 2015 were significant in the model. The year 2001 captured the period of positive oil price shock in the global market, which increased by 58% over the price in 1999, impacting government revenue and enhancing economic growth from 0.58% in 1999 to 5.91% in 2001. The global oil price slump in 2014 through to 2016, however, produced the opposite effect.

Table 4.2.2 - Multiple breakpoint tests
Bai-Perron tests of L+1 vs. L sequentially determined breaks
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05

Sequential F-statistic determined breaks:			3
Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	18.32742	128.2919	21.87
1 vs. 2 *	7.169381	50.18567	24.17
2 vs. 3 *	10.05913	70.41393	25.13
3 vs. 4	0.623978	4.367847	26.03

* Significant at the 0.05 level.
** Bai-Perron (Econometric Journal, 2003) critical values.

Break dates:

	Sequential	Repartition
1	2001Q2	1990Q4
2	2015Q2	2001Q2
3	1990Q4	2015Q2

Source: Author's computation using E-views 13

4.2.3 Cointegration and Long Run Relationship

The model is tested for cointegration, prior to exploring the long and short-run relationships between the variables. The bound test for cointegration using ARDL technique was used.

As shown in the table 4.2.3, the short run estimation yields a negative and statistically significant coefficient (-0.21) of the ECT (error correction term) called the speed of adjustment coefficient. As expected, the coefficient lies between -1 and 0 for convergence. Thus, the speed of adjustment coefficient indicates that the Real GDP Growth (RGDPG) adjusts to LNER, GFCF, PLR, RERMIS and CPS in the long run. In other words, the system corrects its disequilibrium in the previous period (short run) at a speed of 21%, thereby restoring equilibrium in the quarter. Also, the F-statistics of 13.01 is higher than the values at both the upper and lower bound at 1%, 5% and 10% levels of significance respectively, indicating that there is long run relationship between the dependent and the explanatory variables.

Table 4.2.3 Error Correction Results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	13.01224	10%	2.53	3.59
k	6	5%	2.87	4
		2.5%	3.19	4.38
		1%	3.6	4.9

Source: Author's computation using E-views 13

4.2.4 Estimated Short Run Coefficients.

The short run result of the impact of exchange rate misalignment on economic growth in Nigeria is shown below. The results show that the impact of real exchange rate misalignment on growth is negative with a value of -0.012, -0.011 and -0.010 at RERMIS (-1), RERMIS (-2) and RERMIS (-3) respectively in the short-run.

Table 4.2.4 – Estimated short run coefficients.

Dependent Variable: RGDPG

Method: ARDL

Variable	Coefficient	Prob.*
RGDPG(-1)	1.349645	0
GEXPG	0.013278	0
LNER	-1.190796	0.1036
LNER(-1)	1.793044	0.0164
GFCF	4.25E-13	0.1308
GFCF(-1)	-7.33E-13	0.0058
PLR	0.029977	0.2997
PLR(-1)	-0.033564	0.5191
RERMIS	0.010434	0.2897
RERMIS(-1)	-0.011703	0.0901
RERMIS(-2)	-0.011002	0.05
RERMIS(-3)	-0.009435	0.0453
RERMIS(-4)	-0.010485	0.1459
CPS	-0.006357	0.7684
D_2001Q2	0.679921	0.0501
D_2015Q2	-0.520564	0.0129
C	3.474257	0
@TREND	-0.017383	0.0293

Source: Author's computation using E-views 13

4.2.5 Estimated Long-run Coefficients.

Table 4.2.5 Estimated Long run coefficients.

Levels Equation
Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GEXPG	0.063453	0.016672	3.806050	0.0002
LNER	2.877993	0.736084	3.909870	0.0001
GFCF	-1.47E-12	3.13E-13	-4.711466	0.0000
PLR	-0.285995	0.100250	-2.852815	0.0050
RERMIS	-0.153834	0.071904	-2.139455	0.0341
CPS	-0.030379	0.102016	-0.297790	0.7663

EC = RGDPG - (0.0635*GEXPG + 2.8780*LNER -0.0000*GFCF - 0.2860
*PLR -0.1538*RERMIS -0.0304*CPS)

Source: Author's computation using E-views 13

Table 4.2.5 indicates that in line with a priori expectation, the RERMIS impacts negatively on economic growth. This implies that a 1% increase in RERMIS will lead to growth decline of 0.15%. The analysis indicates that GEXPG has positive impact on economic growth, which is quite plausible, given the impact of government expenditure multiplier. Also, a nominal depreciation of the exchange rate will positively impact growth. The Prime Lending Rate also has a negative relationship with economic growth, implying that an increase in interest rate will hurt growth. However, contrary to expectation, GFCF has a negative relationship with growth, implying that an increase in investment impacts negatively on growth. In addition, Credit to Private Sector (CPS), though not significant, also has negative relationship with economic growth. Indeed, the negative signs of GFCF and CPS are curious and needs to be further investigated. Incidentally, these results corroborate the findings by Ali et al. (2015), who attributed such outcome to the weak credit channel of monetary policy.

5.0 Conclusion and Recommendations

The main objective of this study is to investigate the impact of real exchange rate misalignment on economic growth in Nigeria, particularly in the light of recent economic distortions. To achieve this, the study estimated two models, namely the Real Exchange Rate (RER) Model and the Economic Growth Model. The RER model was used to investigate the fundamental variables affecting the equilibrium real exchange rate in Nigeria and to analyse the level of exchange rate misalignment. The impact of exchange rate misalignment on economic performance was then analysed using the Growth Model.

Findings from the study showed that over time, there has been mismatch between the Naira Exchange Rate and the identified macroeconomic fundamentals, leading to either extreme overvaluation or undervaluation, with an average misalignment of 0.67% over the period of study. Specifically, there was evidence that the Naira Exchange Rate Misalignment has been detrimental to economic growth, implying that policy makers must focus on measures that will ensure that the Naira Exchange Rate remains, as much as possible, within its equilibrium path to ensure that the country achieves its objectives of external balance and economic growth. Such measures include continued implementation of market-based exchange rate system to ensure sustainable equilibrium. In addition, measures to increase productivity, operating an open economy to promote exports and maintaining a positive real interest rate in the domestic economy to attract foreign capital inflows will impact positively and strengthen the Naira real exchange rate.

6.0 References

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