

ECONOMIC GROWTH AND EXCHANGE RATE DYNAMICS IN NIGERIA

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Abstract

This paper presents empirical test results on the effect of exchange rate on economic growth in Nigeria with emphasis on asymmetric relationship among the variables (Gross Domestic Product, Exchange Rate and Inflation Rate) using data from 1981 to 2020. Applying the Non Linear Autoregressive Distributed Lag Model (NARDL) approach to examine asymmetric relationships among variables. The study found that, in the long-run, economic growth is positively affected by positive shocks to exchange rate. Meanwhile, both negative and positive shock to inflation rate was found to have adverse non-contemporaneous effect on growth in the long-run. Since both positive and negative changes affect economic growth adversely, it is recommended that the Nigeria Inflation component is reviewed to identify the key drivers and the policy to optimize the relationship between economic growth and inflation rate. In addition, fiscal, monetary and general trade policies must align with the exchange rate policies for desired output growth. Therefore, the monetary authority should implement policies that will boost Nigeria production base to maximize the benefits from foreign exchange inflows.

Keywords: Economic Growth, Exchange Rate, Inflation Rate, Gross Domestic product

Introduction

Since the adoption of the Structural Adjustment Programme in 1986, exchange rate dynamics has remained a key subject of deliberations. The increasing demand for foreign exchange and the consequential inability of the exchange control scheme to arrive a stable and accurate exchange rate led to a paradigm shift to a floating exchange rate system in Nigeria (Sanusi, 2004). The incorporation of the floating exchange rates system into the Nigerian financial system plus the fallouts of the Bretton-Woods system in 1970s provoked series of high volatility in the exchange rate with a corresponding influence on dynamics of macroeconomic indicators such as GDP growth, employment and wage rate dynamics, changes in aggregates investment inflationary pressure, etc. Exchange rate is the price of one unit of the foreign currency in terms of domestic currency. In its simplest form, exchange rate can be expressed as the rate at which a particular currency is given up for another. While economic growth can

be seen as a rise in the production capacity of a country overtime.

It is worth noting that Nigeria implemented fixed exchange rates policy from 1960 till the eventual fall of the Bretton Woods monetary system in the wake of 1970s (The world Bank Report, 2010). However, there was a policy shift from fixed exchange rate to a pegged plan from 1970 to mid-1980. In addition, the introduction of the Structural Adjustment Programme (SAP) in Nigeria in 1986 occasioned exchange rate policies reversals to a number of floating systems that were previously managed (Sanusi, 2004).

However, in recent times, Nigeria's rising spate of poverty, unstable growth and increasing rate of unemployment have been provoked by series of policy failures, poor technical expertise, weak manufacturing sector, neglect of the Agricultural sector and over-dependence of crude oil for foreign exchange earnings. The volatility in the global oil market and the inability of the country to produce the required volume of

exports to douse the foreign currency demand tension, remain a key challenge in the realization of internal and external sector stability objectives.

Having implemented a number of financial sector reforms such as the adoption of different types of exchange rate policies for decades and the adoption of the recent Dutch Auction System (DAS), exchange rate in Nigeria is yet to gain both internal and external balance. For instance, statistical report from the Central Bank of Nigeria (CBN, 2019) revealed that between 1981 and 1985, the Naira was relatively stable against the US dollar and a number of foreign currencies like the Pound Sterling, Franc etc. Specifically, about ₦0.61 and ₦0.89 was exchanged for 1 USD as of 1981 and 1985 respectively. In 1989, major deterioration in the domestic currency set in when the rate of exchange rose to about ₦7.39. The situation has remained on a worsening note to the extent that, about ₦133.15 and ₦192.44 was traded for 1 USD in 2004 and 2015 respectively. The situation became highly horrendous that the figure further rose to about ₦305.1 in 2017 (CBN, 2019).

Unfortunately, the Nigeria financial system has remained highly volatile, notwithstanding the series of reform efforts to stabilize the system. In the early phase of 2019, it was anticipated that the Foreign Exchange (FOREX) market would remain largely stable. Nevertheless, the precariousness in the global oil market was adduced the principal cause of the exchange rate depreciation of about ₦390 to ₦415 per US\$ recorded at the end of year 2019 (Nigeria Economic Outlook, 2019). The Central Bank of Nigeria (CBN), in its efforts to maintain its policy of exchange rate stability, raised the amount of dollar injections into the foreign exchange market to \$40 billion in

2018. This figure represents about 87 percent increase in the volume of dollars that was released by the monetary authority with a view to stabilizing the Nigerian financial system.

Essentially, Nigeria's huge labour base, large market, strategic geographical setting and prospects ought to make the country a major hub for industrial development in Africa. Nevertheless, factors like weak policies, poor forecasting, corruption, lack of appropriate monitoring design and quite a lot of other factors weaken the efficient utilization of these enormous opportunities in the country. This therefore provokes the need to carefully examine the linkage between exchange rate and economic growth and the dominant factors that could be accountable for the unwarranted deterioration in some of the country's key development indices, despite the series of policy efforts by policy makers, in addition to Nigeria's huge human and non-human resources base. Fundamentally, the paper craves to resolve the accompanying inquiries:

- Does Gross Domestic Product have effect on Exchange Rate in Nigeria?
- Does Gross Domestic Product have effect on Inflation Rate in Nigeria?

The findings show that exchange rate variation has significant influence on the growth rate of the Nigeria economy even though the influence is not potent in the short run. However, in the long run, the resultant effect of depreciation in Naira exchange rate against the US dollar (\$) on Nigeria economic growth is positive. In addition, inflation rate to a large extent was found contributing adversely to Nigerian economic growth.

This paper has contributed to the exchange rate theory and economic growth

by shedding more light on the appreciativeness of the international currency market. Also, the practitioners and policymakers have deeper understanding on how exchange rate and inflation rate affect economic growth especially in Nigeria.

This paper is structured as follows: the second section review literature. Third section discusses the data and methodology. Fourth section presents the empirical results and fifth section provides conclusion.

Literature Review

In bid to understand the linkage between exchange rate and economic growth, quite a number a number of theoretical explications have been presented. On exchange rate determination, several theories have been put forward the list include but not limited to the traditional flow model, the portfolio balance theory, monetarist theory. The most prominent economic growth theories are the classical model, the Neo-classical growth Model and the structural-change theory.

While the traditional flow model explicates that forces of demand and supply determined the rate of foreign exchange in any given economy. The portfolio balance theory hypothesizes that an ideal exchange rate is the outcome of the exchange between cash and financial securities (assets) in the home economy as well as the exchange of domestic financial asset with foreign ones (CBN, 1998). According to Macdonald and Taylor (1992), the interaction of the demand and supply in the markets for a pool of financial products and services (assets) dictate an exchange rate especially in the short-run. The monetarist theory however leverage on the weakness of portfolio theory which undermines the importance of money as a unit of exchange. The theory emphasizes the relevance of

money as a unit of exchange and therefore presents exchange rate as fallout of real change in money stock, consumer price as well as changes in domestic output between a domestic economy and its overseas trading counterpart (Frankel, 1978).

The classical theory of growth put forward by the classical school was an amalgamation of the contributions of various scholars who existed between eighteenth and nineteenth century. These classicists include Adam Smith, David Ricardo, John Stuart Mill and Thomas Robert Malthus. The classical economists believe in the notion of laissez-faire, that is, the incidence of free market in a perfectly competitive economy which is free from any government meddling (Smith, 1776 and Malthus, 1978). However, the general view of the neo-classical theory of economic growth is that, economic growth is determined by certain factors, such as capital stock, supply of labour, and technological progress over time (Harrod, 1948).

This structural-change theory on the other hand focuses on policies directed towards changing economic activities of emerging nations from mere subsistence agriculture to a "more sophisticated and scientifically innovative manufacturing and service economy." The theory of structural change exists in two forms and they include; the Lewis' two-sector surplus model, with its views of agrarian societies as consisting of large amounts of surplus labour which can be used to boost the expansion of urbanized industries, and the Hollis Chenery's arrays of development approach, which holds that different countries become wealthy via different paths.

In establishing the dynamic linkage between these two macroeconomic fundamentals, various methodologies have

been used by previous studies. Some of these methods include Auto-Regressive Distributed Lag (ARDL) approach (Mwinlaaru and Ofori, 2017 and Trust and Eftychia, 2018), Chow Test Procedure (Eze and Okpala, 2014), Correlation Analysis (Khandare, 2017; Elijah, 2018) as well as Error Correction Modelling approach (Fapetu and Oloyede, 2014; Ismaila, 2016 and Ovenseri-Ogbomo and Asekome, 2018). Other methodologies include Generalized Method of Moments (Akpan and Atan, 2011 and Ping, 2011) Generalized Autoregressive Conditional Heteroskedasticity (Kevin and Fausto, 2004; Okoye, Okorie, Okoh, Olokoyo, and EzeJ, 2019), Granger Causality Test (Suna, 2013 and Oyinbo and Rekwot).

With regards to the relationship between exchange rate and economic growth, empirical findings appear to be mixed among studies. While quite a lot of the studies found a significant cause and effect relationship between economic growth and exchange rate with direction of causality flowing from exchange rate to growth, others found insignificant relationship between the two.

Ayodele (2014) empirically evaluated the impact of exchange rate on the Nigerian economy between 2000 and 2012, the study found exchange rate to be exerting positive effect on GDP. In a similar version, Abdulkadir, Isaiah, Babatunde, Olutope and Abiola (2015) considered similar study using data spanning between 2000 and 2014. The study found real exchange rate having negative impact on economic growth. Adelowokan, Adesoye and Balogun (2015). Likewise modelled the relationship between exchange rate volatility and investment and economic growth using Nigeria data from 1986 to 2014, the study found exchange rate having negative relationship with investment and growth.

On the other hand, Anthony, Jonathan, Chiamaka and Onyinye (2018) further examined another side of the coin with respect to exchange rate movements and the manufacturing sector in Nigeria for the period 1981 to 2016. The variables employed in the study include manufacturing GDP, exchange rate, government capital expenditure, foreign direct investment, credit to private sector and value of import. It was however revealed that exchange rate, government capital expenditure, imports and foreign direct investment have positive relationship with manufacturing GDP, while private sector credit was negatively linked with manufacturing GDP in the country.

In the same vein, Ogunmuyiwa and Adelowokan (2018) measured the impact of exchange rate on industrial output in Nigeria from 1986 to 2016, using industrial output and exchange rate. The result showed that exchange rate has a significant positive effect on industrial output in Nigeria. Ping (2011) conducted similar study for 29 Chinese provinces for the period, 1987 to 2008, and found that real exchange rate depreciation exerts an expansionary effect on per capital real GDP and level of employment.

Quite a number of studies also found an insignificant relationship between the two phenomena. Qaiser, Irfan, Muhammad and Saif-ud-Din (2013) adopted an econometric approach in the assessment the linkages between exchange rate and economic growth in Pakistan in the period 1976 to 2010, using real gross domestic product, investment, export, import, domestic saving, foreign direct investment, real exchange rate and indirect taxes. The major findings of the study revealed that exchange rate has an insignificant positive relationship with economic growth in the

country. Khandare (2017) empirically assessing the exchange rate and economic growth nexus for the Indian economy using data from 1987 to 2014 found that both exchange rate and interest rate exert statistically insignificant negative effect on Indian economy.

Therefore, in order to shed more light to the market players and policy-makers on these two macroeconomic variables-exchange rate and inflation rate, affect economic growth in Nigeria, this paper use more recent dataset and methodology as new empirical evidence can be deduced as presented by this study.

Data and Methodology

This study employed yearly data of Real Gross Domestic Product (RGDP), Real Exchange Rate (REXR) and Real Inflation Rate (RINF), sourced from World Bank Data Atlas

for the period, 1981 to 2020, providing 40 yearly observations. Among the recent studies that use Auto-Regressive Distributed Lag (ARDL) approach for their estimation and analysis include; (Mwinlaaru and Ofori, 2017 and Trust and Eftychia, 2018). Therefore, this study adopts ARDL approach for its estimation.

To confirm the trends and dynamics of each of the series over the periods considered, Figure 1 presents the real level of economic activities, that is, Real Gross Domestic Product (RGDP), Real Exchange Rate (REXR) and Real Inflation Rate (RINF), for the period, 1985 to 2020. While Figure 2 presents the series for the Real Gross Domestic Product (RGDP) and Real Exchange Rate (REXR); and Real Gross Domestic Product (RGDP) and Real Inflation Rate (RINF) respectively.

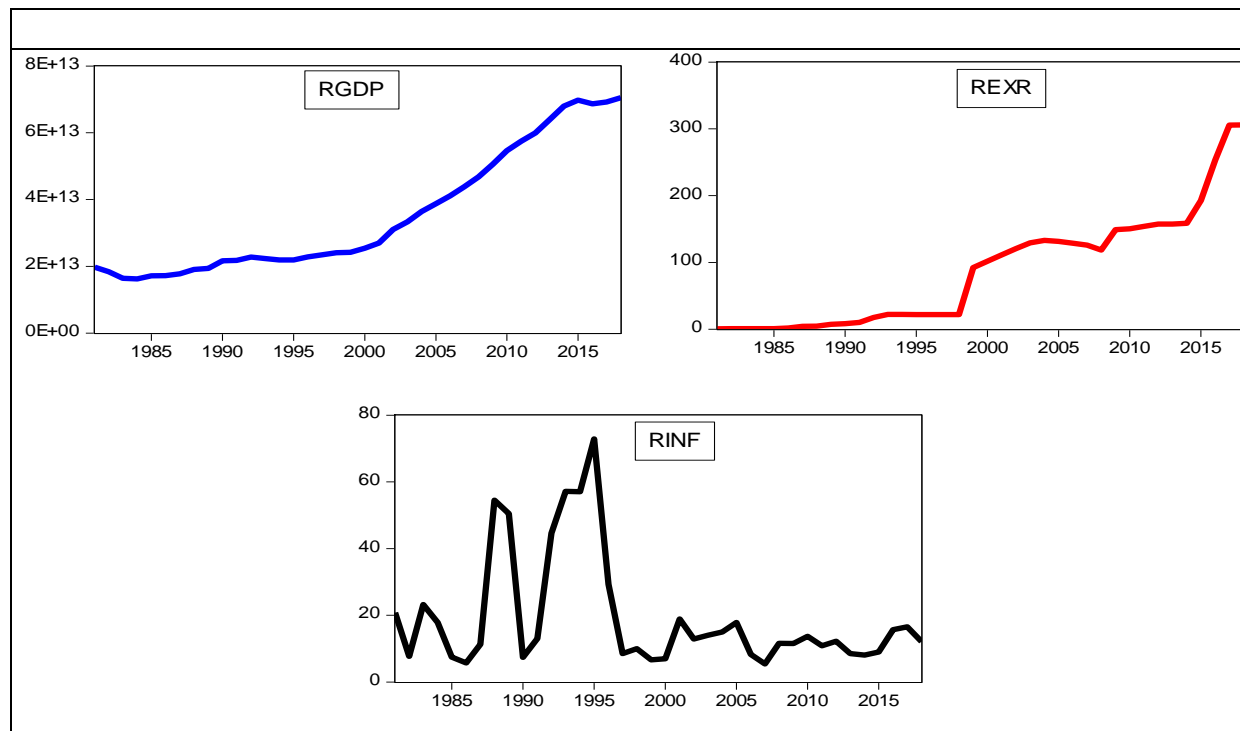


Figure 1: Trends and dynamics of the Variables, RGDP, REXR and RINF for the period, 1985 to 2020.

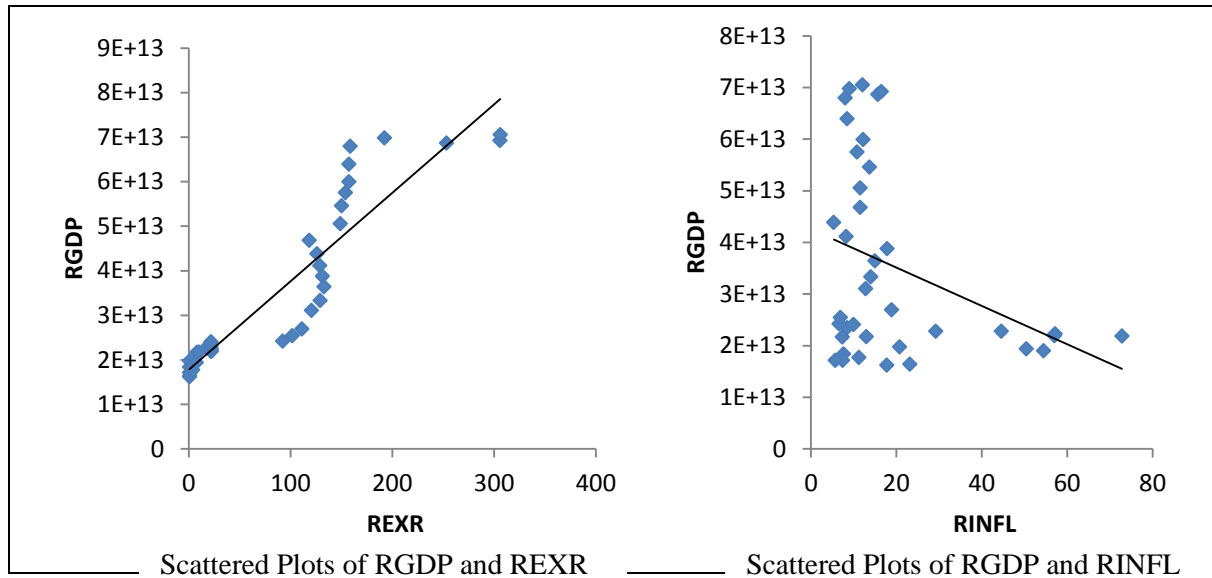


Figure 2: The series for the RGDP and REXR; and RGDP and RINF for the period, 1985 to 2020.

The trends and dynamics of each of the series over the periods were considered. As shown in Figure 1, the real level of economic activities has been on the rise in the Nigerian economy as RGDP series was on a consistent rise over the period considered. Although, the series began in the early 1980’s on a negative trend in a period corresponding with Oil glut regime in the country, and it began to rise consistently afterward rising to about ₦75 trillion. From the graphical illustration of the RGDP series, two regimes can be identified; a regime when the economy was growing at a decreasing rate, and the regime with increasing economic growth rate. Prior to year 2000, the economic growth rate was marginal, with average growth in that period being about 1.3%. However, since the presidential system of government was reinstated, the economic growth has been a bit stable averaging about 5.8% between that time and 2018.

Likewise, the trend in exchange rate across the periods, the graph depicts that the naira-dollar exchange rate was consistently on the rise throughout the

periods considered. The jumps in the naira-dollar exchange rate in late 1980s, 1991 through 1993, 1999 and some years after was as a result of foreign exchange policies adopted by the monetary authorities in response to certain macroeconomic forces. The unusual inflation rates in Nigeria in this period was believed to be as a result of adverse effect of some of the monetary and foreign exchange policies put in place by the Nigerian monetary authority. Although, for the early part of the new century, the inflation rate was double digit, but then, it was below 20%.

Model specification

Augmented Dickey-Fuller (ADF) tests was employed to explore the stationarity of the time series data.

ADF test is achieved with the following regression:

$$\Delta Y_t = \beta_1 + \beta_2 + \gamma Y_{t-1} + \delta_i \sum_{i=1}^n \Delta Y_{t-1} + \varepsilon_t \dots\dots\dots(1)$$

The difference operator is represented by Δ ; while the coefficients to be estimated are represented by β , γ and δ ; the variable whose time series properties

are analyzed is represented by Y and error term at time t is represented by ε_t

The theoretical context of this study is established on the modified finance-growth model earlier adopted in the studies of Levine et al. (2000), Beck et al. (2000), Aghion et al. (2009), Kizito and Hooi (2019) as the baseline model for achieving the objectives of this study. Essentially, the underlying structure of the finance-growth model is presented as follows;

$$Y_t = \beta_0 + \phi FD_t + \psi Z_t + \xi_t \dots \dots \dots (2)$$

Where,

Y represents output growth (GDP), FD denotes financial development (proxy by any finance related variable such as interest rate), Z is a set of other independent variables having bearing with GDP, β_0 is the intercept in the model, ϕ and ψ are the impacts measuring parameters, t depicts time and ε_t is the error term. The modified financed-growth model estimated is specified as;

$$GDP_t = \beta_0 + \alpha REXR_t + \gamma RINF_t + \xi_t \dots \dots \dots (3)$$

Where,

RGDP implies Real Gross Domestic Products (dependent variable);
 REXR stands for the Real Exchange Rate (independent variable);

INFL denotes Inflation Rate (independent variable);

Subscript ' t ' indicates time period;

θ_0 is the intercept;

α_i , γ_i , and are the coefficients of the respective variables;

ξ_t is the error term;

In order for the dynamism among the variables to be fully captured, Equation (3) above is re-specified to a more dynamic Nonlinear Autoregressive Distributed Lag Model as;

$$\Delta y_t = \rho y_{t-1} + \theta^+ x_{t-1}^+ + \theta^- x_{t-1}^- + \sum_{j=1}^{p-1} \gamma_j \Delta y_{t-j} + \sum_{j=0}^{q-1} (\varphi_j^+ \Delta x_{t-j}^+ + \varphi_j^- \Delta x_{t-j}^-) + \xi_t \dots (4)$$

From the above specification, ξ_t is the nonlinear error correction factor, where $\theta^+ \theta^-$ and $\varphi_j^+ \varphi_j^-$ are asymmetric long-run and short-run coefficients.

Empirical Results and Discussion

The stationary of the data is checked, and Table 1 presents the results of the unit root test. The tests show that the null hypothesis cannot be rejected with level data. However, at first difference, the null hypothesis can be rejected for both RGDP and REXR. For RINF, the result obtained indicates the series to be stationary at level. This confirms that the variables, RGDP and REXR are stationary as $I(1)$ process, while, RINF is stationary as $I(0)$ process.

Table 1. Unit Root Analysis

Augmented Dickey Fuller							ID
	Level			First Difference			
	None	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	
RGDP	2.836	-0.278	-1.507	-2.181***	-3.809***	-3.731***	I(1)
RINF	-1.897*	-2.885*	-3.962*	-2.631***	-3.627***	-4.235***	I(0)
REXR	1.853	-1.989	-1.283	-4.157***	-5.170***	-5.526***	I(1)

*** and * implies significance at 1% and 10% significant level.

Source: Author's Computation

Table 2 presents the summary of descriptive statistics. The findings indicate that all the variables fail the Jarque-Bera (JB) test with the exception of RINF. Meaning that all the variables depart from normality with the exception of RINF. The skewness for all the variables is less than 2.

As shown in table 2, over the period considered, Nigerian real level of economic activities averaged about ₦35.4 Trillion with

actual values ranging from ₦16.2 Trillion to about ₦75 Trillion. Inflation rate on the average was also double-digit being about 19% within time frame considered, the highest recorded within the period was about 73% while the least recorded was approximately 5%. It also cost about ₦88 to purchase a unit of dollar on the average within the periods while the rate ranged from about 0.62 to 306.1.

Table 2: Descriptive Statistics

	Real Gross Domestic Product (N'trillion)	Real Inflation Rate (%)	Real Exchange Rate (N/\$)
Mean	35.4	19.3238	88.5440
Median	24.8	12.5472	97.0177
Maximum	70.5	72.8355	306.0837
Minimum	16.2	5.3822	0.6177
Std. Dev.	18.8	17.2552	87.1376
Skewness	0.7642	1.74226	0.8029
Kurtosis	2.0530	4.8372	2.9743
Jarque-Bera	5.1182	24.5687	4.0845
Probability	0.0774*	0.0005***	0.1297
Observations	40	40	40

Notes: The table presents the summary of descriptive statistics. 1% level is denoted by *** and 10% level is denoted by *, represent the level of statistical significance.

As shown in Table 3, the F-Statistic is reported to be approximately 6.46 higher than the upper bound critical value at 5%. This implies the null hypothesis of no co-

integration is rejected implying that the variables in consideration have a long-run relationship.

Table 3: ARDL Bounds Test

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.4576	10%	2.33	3.25
K	6	5%	2.63	3.62
		2.5%	2.9	3.94
		1%	3.27	4.39

Source: Author's Computation

As shown in Table 4, the short-run impact of exchange rate and other explanatory variables were found to be statistically insignificant, as none of the t-statistics estimated for the negative and

positive short-run coefficients were significant. However, the results revealed that the lagged independent variables significantly affect economic growth. Specifically, it is shown that the immediate

past value of economic growth rate significantly and negatively affect the present growth rate. The result shows that every 1% changes in value in the immediate past economic growth rates inversely affect the subsequent growth rate by about 0.2%. Also, the impact of positive change in exchange rate on economic growth is lagged by one period, and positive, while the effect of negative change in exchange rate on economic growth was found to be statistically insignificant.

In addition, the result shows that positive shock to the one year lagged value of inflation rate inversely affect economic growth rate, while the impact of negative shock to the lagged value is direct. A 1%

positive shock to lagged value of inflation rate decreases economic growth by 0.001%, while a 1% negative shock to lagged values of inflation rate equally decreases economic growth rate by 0.003%, implying that, the impact of negative shocks to inflation rate outweighs that of positive shocks.

However, in the long-run, only the long-run impact of positive shock to exchange rate is statistically significant. It is revealed that the effect of positive shocks to exchange rate on economic growth is direct, implying that, in the long-run, all other things being equal, a 1% positive shock to exchange rate increases the rate of economic growth by about 0.4.

Table 4: NARDL Estimation Results

Variable	Coefficient	Std. Error	t-Statistic
Error Co-integrating Equation			
C	6.038**	2.823	2.139
@TREND	-0.011	0.008	-1.392
RGDPL(-1)	-0.210**	0.093	-2.267
EXCRL_POS(-1)	0.082***	0.019	4.384
EXCRL_NEG	-0.314	0.351	-0.895
INF_POS(-1)	-0.001*	0.001	-1.972
INF_NEG(-1)	0.003**	0.001	2.281
D(EXCRL_POS)	0.019	0.022	0.845
D(INF_POS)	0.000	0.001	0.184
D(INF_NEG)	-0.001	0.001	-1.425
Level Equation			
EXCRL_POS	0.392**	0.204	1.918
EXCRL_NEG	-1.494	1.535	-0.973
INF_POS	-0.006	0.004	-1.701
INF_NEG	0.013	0.008	1.694
@TREND	-0.052	0.055	-0.946

Source: Author's Computation

As shown in Table 5, the null hypothesis of each of the selected cannot be rejected as the p-value reported for each is greater than 5%, implying that, derived residual series are normally distributed, not

serially correlated and have a time invariant variance. This further implies that, the estimates derived from the empirical analysis are suitable for policy recommendation and forecasts.

Table 5: Diagnostic Tests Results

Tests	Statistic	P-Value
Jarque-Berra	3.384	0.184
Breusch-Godfrey	0.431	0.655
ARCH-LM	0.722	0.402

Source: Author's Computation

Furthermore, since the study emphasized on the asymmetry impact of each of the selected explanatory variables on economic growth, it is important the study ascertains if the effects of each of the variables are indeed asymmetry. Hence, the Wald Test, applied to both the long-run and short-run results. The test hypothesizes that the effect of each of the selected variables is symmetry in both short-run and long-run. The result is presented in Table 6. The null hypothesis of the test could not be rejected

in the short-run for each of the variables as the probability for the test statistics for each of the variables is greater than 5%. However, in the long-run, the result revealed that both inflation rate and interest rate have asymmetry effect on economic growth as the reported p-values are less than 5%, implying that, the null hypothesis of the test for the variables in the long-run can be rejected. The results of this study agree with the studies of Ayodele (2014); Abdulkadir et al, (2015) and Adelowokan et al (2015).

Table 6: Wald Tests

Variables	F-Statistic		Probability		Decision	
	Short Run	Long-Run	Short Run	Long-Run	Short Run	Long-Run
Real Exchange Rate	0.715	1.242	0.407	0.276	No Asymmetry	No Asymmetry
Real Inflation Rate	1.431	13.203	0.244	0.001	No Asymmetry	Asymmetry

Source: Author's Computation

Conclusion

This paper examines the effect of exchange rate on economic growth in Nigeria with emphasis on asymmetric relationship among the variables (Gross Domestic Product, Exchange Rate and Inflation Rate) with yearly data from 1981 to 2020. While the study applied the Non Linear Autoregressive Distributed Lag Model (NARDL), it was found that, economic growth is positively affected by positive shocks to exchange rate in the long-run. Meanwhile, both negative and positive shock to inflation rate was found to have adverse non-contemporaneous effect

on growth in the long-run. It can be deduced that exchange rate variation have significant influence on the growth rate of the Nigerian economy even though the influence is not potent in the short-run, in the long-run, the resultants effect of depreciation in Naira exchange rate to Dollar(\$) on Nigeria economic growth is positive.

Furthermore, inflation rate to a large extent was found to be contributing to Nigerian economic growth adversely. The policy implication of this is that, no policy intervention of these macroeconomic

variables can be implemented to achieve long-term economic results. As a result, both fiscal and monetary authorities should collectively implement policies that will boost Nigeria production base to maximize the gains from foreign exchange flow. The fiscal/monetary and general trade policies must align with the exchange rate policies to get desired output growth. Since both positive and negative changes affect economic growth adversely, it is recommended that the Nigeria Inflation component is reviewed to identify the key drivers and the policy to optimize the relationship between economic growth and inflation rate. Hence, the policymakers must be conscious of the effect of foreign exchange policies on domestic economy in order to have competitive advantage in the global market.

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