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EXCHANGE RATE REGIMES AND MACROECONOMIC PERFORMANCE IN NIGERIA

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Abstract

Utilizing historical dataset spanning the period 1970 and 2020, we explored the ARDL modeling techniques to determine whether the dynamics of the impact of exchange rate regimes on economic performance varies for different indicators of macroeconomic conditions. We found that compared to floating exchange rate regime, both fixed and intermediate exchange rate regimes have the potential of causing declining inflation (INFL). However, there was little or no significant relationship between exchange rate regimes and output growth (YG), while our finding of negative impact of exchange rate regimes on interest rate appears to be statistically viable mainly when the exchange rate management was under fixed regime. Compared to the internal indicators of macroeconomic conditions, we found the relative impacts of fixed and intermediate regimes on economic performance to be significantly more pronounced when the measure for economic performance was trade balance (TB), which in the context of this study capture the external indicator of macroeconomic condition.

Keywords: Exchange rate regimes; Economic performance; ARDL; macroeconomic conditions; Nigeria

INTRODUCTION

Beyond its conventional role as relative prices upon which the competitiveness of a country's exchange power vis-à-vis the foreign currencies is usually reflected, the phenomenon 'exchange rate' also serve as an anchor which supports sustainable internal and external macroeconomic balances over the medium-term to long-term. Consequently, there has been increasing efforts to understand not only the dynamics of exchange rate managements and but also its macroeconomic implications. Thus, the quest for an effective exchange rate management both on the part of policymakers and the academics has been the essence of empirical literature on the impact of exchange rate regime on economic performance.

Nigeria has implemented various exchange rate regimes over time. For instance, According to Essien, Uyaebo and Omotosho (2017), various exchange rate policies have been implemented in Nigeria ranging from a fixed exchange rate regime prior to 1985 to various forms of floating systems, following the liberalization of the foreign exchange market in 1986. Towards the end of 1985, the government allowed the exchange rate to be determined by market forces in consonance with the tenets of the Structural Adjustment Programme (SAP). Nigeria's exchange rate regime since SAP could be strictly referred to as a managed float system. The Second-tier Foreign Exchange Market (SFEM) was introduced in September 1986 as a market-driven mechanism for foreign exchange allocation, while the first and the second-

tier markets were merged into an enlarged foreign exchange market in July 1987. Other policies that have been implemented prior to 2000 include the Autonomous Foreign Exchange Market (AFEM), introduced in 1995 and the Inter-bank Foreign Exchange Market (IFEM), which was introduced on October 25, 1999.

The Retail Dutch Auction System (RDAS) was reintroduced in July 2002 while the Wholesale Dutch Auction System (WDAS) was introduced on the 20th of February 2006 to further liberalize the foreign exchange market, reduce the dependence of authorized dealers on CBN for foreign exchange and achieve convergence in exchange rates. in November 2013, IFEM was reintroduced while the CBN continued to intervene in the market. In 2014 the rate was adjusted to partially agree with interbank rate in order to constrain the activities of speculators. The exchange rate was more or less fixed in 2015 with the commencement of order-based twoway quote system. During this period, a lot of demand could not be met by the market and such demands were channeled to the parallel market, leading to a widening arbitrage premium. In June 2016, the CBN embraced a more flexible exchange rate regime in order to enhance efficiency and facilitate a liquid and transparent foreign exchange market (Essien, Uyaebo and Omotosho, 2017). Currently, Nigeria operates a system of multiple exchange rates in a bid to control demand for dollars. It uses this to supply cheap foreign exchange to government departments and select companies, including fuel importers.

Despite these various regimes being implemented, there seems to be no consensus on which regime led to a better economic performance in the economy. Nevertheless, not only did we find that the nexus between economic performance and exchange rate regime was grossly unexplored in the context of the Nigerian economy, but several extant studies on the subject matter has also continued to focus mainly on the internal indicators of economic condition for instance the gross domestic product (GDP) growth, while the macroeconomic implications of exchange rate regimes are not only internal but also external. Additionally, the dynamics of the nexus between exchange rate regimes and economic performance may also be sensitive to the choice of the indicator of economic performance that is under consideration.

Given the above, coupled with the fact that both the theoretical and empirical efforts in the literature towards resolving the question of whether or not there exists a link between a country's economic performance and exchange rate regimes has continued to produce mixed results, it germane for a study like this to done using Nigeria. The study was also motivated to revisit the nexus between exchange regimes and economic performance, particularly from the perspectives of whether the internal indicators of the macroeconomic condition respond differently to exchange rate regimes compared to the response of internal indicators of macroeconomic condition to exchange rate regimes in Nigeria. The choice of Nigeria, rests on

the assertion that close-up evaluation of individual country is likely to provide a much keener guide as to the dynamics and ultimate outcome of policy choice on exchange rate management. More so, macroeconomic performance in Nigeria has been acknowledged as abysmal despite the effort of the government in using the exchange rate as a stabilization effort for the economy.

This study thus, investigated whether the viability or otherwise of exchange rate regimes for explaining economic performance in Nigeria varies for internal compared to external indicators of macroeconomic conditions. This is particularly necessary to avoid running into exchange rate policy erroneous that might result from the generalization of the dynamics of the impact of exchange rate regimes on different indicators of macroeconomic.

LITERATURE REVIEW

The existing literature on exchange rate regimes and economic performance can be broadly categorized into two strands of studies namely, multi-country-based studies and country specific based studies. Working with a panel of 60 industrialized and developing countries, Bailliu et al. (2003) examine the impact of exchange rate regime on growth by means of dynamic GMM estimation. Finding from the study on the one hand suggests there is a positive link between fixed regime and growth. Also deduced from the study is the fact that an intermediate regime without an anchor is negatively associated with growth, while all other regime types were reported to have exhibited no discernible impact on growth. For Husain et al. (2005), they estimate (with and without fixed country effects) exchange rate regime durability and performance across a large panel of advanced, emerging and developing economies. They find that in developing countries more flexible regimes are associated with high inflation but do not lead to gains in output growth while fixed or near fixed regimes deliver lower inflation without sacrificing growth.

In another development, Miles (2006) replicates the LYS growth regressions with a panel of annual data across a developing countries' subset of the LYS original sample. Finding from the study indicate that once a measure of domestic distortions is added to the model, exchange rate regimes exert no independent impact on the output growth of developing countries. In their examination of the impact of exchange rate regimes on inflation and growth in developing countries, Bleaney and Francisco (2007) considered the official (IMF) and four alternative de facto exchange rate regime classifications. With the exception of estimates obtained from the Reinhart & Rogoff (2004) regime classification, which produce quite unfavorable outcomes for flexible regimes (higher inflation and lower growth), the study generally suggests that floats have very similar growth rates to 'soft' (easily adjustable) pegs while 'hard' pegs (currency unions and currency boards) have slower growth than other

regimes. Raji (2013) used panel GMM to study the impact of exchange rate misalignment on economic performance in the WAMZ. The outcome of the study revealed that the WAMZ is exposed to asymmetrical correlation between real exchange rate misalignment and economic performance.

Ihnatov and Căpraru, (2012) study was on Exchange Rate Regimes and Economic Growth in Central and Eastern European Countries. Their study used data from 1999 to 2010 for 16 countries from the Central and Eastern Europe (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Serbia, Slovakia, and Slovenia), where the exchange rate arrangement choice is a key point in the years before Euro adoption. They used OLS and GMM methods to estimate a growth model with dummy variables that isolate the effect of exchange rate regimes on economic growth. In their findings, they got statistically significant coefficients for the regime dummy variables, independently of the estimation method. Their findings suggest superior effect on economic growth of the floating and intermediate regimes comparing to the fixed arrangements. Although the exchange rate stability is commonly viewed as stimulation for economic growth, it seems that it doesn't support growth if it was obtained by massive interventions of the monetary authorities to support the exchange rate level. They acknowledged that their result does not explain why a major part of the selected countries adopted hard pegs, although the flexible regimes apparently stimulate growth. It is possible that currency boards are not suitable for long periods of time, but just for a quick economic.

Jakob, (2015) investigated the Impact of Exchange Rate Regimes on Economic Growth. His analysis was to investigate if there is correlation between exchange rate regimes and GDP growth. The study used data for across 74 countries (36 developed and 38 developing countries) for the year of 2012. He classified exchange rates into two major groups, fixed and flexible regimes. Conventional pegs, currency boards, and pegs with no separate legal tender are classified into fixed regimes; while stabilized arrangements, crawling pegs, craw-like arrangements, managed float, and free floating are classified into flexible regimes. The control variables used in this study include inflation rate, gross capital formation (%GDP), index of government spending, and index of human capital per person. The study found that there is indeed a significantly positive correlation between fixed regimes and economic growth, by using inflation rate and gross capital formation as a percentage of GDP as the control variables. He further explained that one assumption that can be made to explain this relationship is due to the stability factor that a fixed regime has to offer. The more stable the currency is, the more confident the investors and the traders are in conducting business in the country. Therefore, the higher economic output that can be produced.

Ashour, and Yong (2018) examined the relationship between exchange rate regimes and economic growth. Their study focused on the economic growth of 16 developing countries during the period 1974 to 2006. Using fixed effects and pooled regression for these developing countries their results indicated that as compared to flexible exchange regime, growth rate was higher by 1.2% when fixed exchange regime was adopted; and a growth rate of 0.64% was achieved under the intermediate regime when compared with the flexible regime. A positive impact has been identified in exchange rate regimes upon economic growth of the developing countries. Countries following the flexible exchange rates are facing scarcity for the existence of advanced financial systems, which deprives them of enjoying the benefits of flexible regime. Using the Bayesian model of averaging (BMA) technique to investigates the relevance of exchange rate regime in restraining current account imbalance in Sub-Saharan African nations, Gnimassoun (2015) shows that flexible exchange rate regimes are more effective in preventing disequilibria. In a related development, Nathaniel et al. (2019) investigated the impact of exchange rate regimes on economic integration in the ECOWAS using econometric technique of panel fixed effect model. The study found that exchange rate regimes have the potential to deepening economic integration in the ECOWAS.

Ha and Hoang (2020) explored Exchange Rate Regime and Economic Growth in Asia: Convergence or Divergence. This study used the GMM (Generalized Method of Moments) technique on unbalanced panel data to analyze the effect of the exchange rate regime on economic growth in Asian countries from 1994 to 2016 while the exchange rate database constructed by Reinhart and Rogoff was used. Empirical results suggest that a fixed exchange rate regime (weak flexibility) will affect economic growth in the same direction. As such, results from the study will serve as quantitative evidence for countries in the Asian region to consider when selecting a suitable policy and an exchange rate regime to attain high economic growth. Matthew (2020) study look at the relationship between economic growth and exchange rate regimes among countries of lower income, lower middle income, upper middle income, and high-income countries. A cross section pooled time series data was used for a sample of 42 countries over the period of 2000 to 2018. Some of the variables used for the study included political stability, change in terms of trade, population growth, investment/GDP, and exchange rate regime classification because they are all determinants of the robustness of a country's economic growth. This paper used the pooled OLS model, fixed effects model, and random effects model as estimation strategy. The findings included that changing from an intermediate regime to a floating regime is negatively correlated with economic growth while utilizing fixed and floating regimes are positively correlated with growth. Changing regime types in general is also negatively correlated with growth.

While acknowledging there has been equally an increasing effort to understand the nexus from the perspective of country-specific, notable among the previous studies in the context of the Nigerian economy are Adeoye and Atanda (2010); Omojimite and Akpokodje (2010); Mahmood and Ali (2011); Dada and Oyeranti (2012); Adesoye (2012), it is instructive that there has been little or no concrete effort in the literature to determine whether the exchange rate regimes impact the internal economic activities differently compared to the external economic activities.

In all, both the theoretical and empirical efforts in the literature towards resolving the question of whether or not there exists a link between a country's economic performance and exchange rate regimes has continued to produce mixed results. Taken cognizant of this concern, this present study herein hypothesized that the impacts of exchange rate regimes on economic performance varies for different indicators of macroeconomic conditions, particularly from the perspectives of internal and external macroeconomic indicators.

METHODOLOGY

The model

The objective of this study is to examine the effects of exchange rate regimes on macroeconomic performance both from internal and external measures of economic activities in the context of the Nigerian economy. In view of this, four different models, namely, output growth (YG) model, inflation rate (INFL) model, interest rate (INTR) model all were used as measures of internal economic condition while trade balance (TB) model was used to capture the external perspective of the economy.

Output Growth Model

Sustaining the standard practice in the literature, we commence our model specification with the conventional growth regression which expressed real per capita GDP growth as a function of physical capital (PK), human capital (HK), government spending (GC), inflation rate (INFL), exchange rate (EXR) and trade openness (TOP).

$$YG = f(PK, HK, GC, INFL, EXR, TOP) \quad (1)$$

The equation of estimation parameters associated with the above specified growth model is as represented below.

$$YG = A*(PK)^{\beta_1} *(HK)^{\beta_2} *(GC)^{\beta_3} *(INFL)^{\beta_4} *(EXR)^{\beta_5} *(TOP)^{\beta_6} \quad (2)$$

The growth model in equation (2) is similar to the one expanded by Levy-Yeyati and Sturzenegger (2001) and Garofalo (2005) to include the indicator of exchange rate regime as below.

$$YG = A*(PK)^{\beta_1}*(HK)^{\beta_2}*(GC)^{\beta_3}*(INFL)^{\beta_4}*(EXR)^{\beta_5}*(TOP)^{\beta_6}*(RGM)^{\beta_7} \quad (3)$$

Equation (3) is our extended growth model which now include indicator for exchange rate regime (i.e., RGM). We further rewrite equation (3) ina natural logarithm as follows:

$$\log YG_t = \beta_0 + \beta_1 \log PK_t + \beta_2 \log HK_t + \beta_3 \log GC_t + \beta_4 INFL_t + \beta_5 \log EXR_t + \beta_6 \log TOP_t + \beta_7 RGM_t + \varepsilon_t \quad (4)$$

Where, YG representing output growth is measured as log of real GDP per capita, PK denoting physical capital is measured as log of gross fixed capital formation while human capital (HK) is measured as the ration of secondary school enrolment to the gross total of school enrolment. The term GC is government consumption measured as log of total government consumption expenditure, inflation (INFL) is measured as log of consumer price index while the sum of export and import as a ratio of GDP is the proxy for trade openness (TOP). We expect output growth to respond positively to all the variables expect inflation and exchange rate (i.e., $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \ \beta_5 < 0$ and $0 < \beta_6 > 0$).

Inflation Model

Here, we follow the Batini and Haldane (1999) to utilize a reduced-form Phillips curve inflation model which is derived from a combination of mark-ups, wage-contracting and consumption price index equations. The mark-up and wage contracting equations are used to represent the supply side of the model based on the staggered contract theory (Fuhrer and Moore, 1995; Buiter and Jewitt, 1981) while domestic and foreign goods prices are combined into a consumption price index. This combination yields an aggregate supply (Phillips's curve) or price-setting equation which characterizes the dynamic response of inflation to the output gap. The final specification is an open economy aggregate supply equation that depicts inflation as a function of its own lagged values (backward-looking inflation), output gap (representing current mark-up of firms' prices over marginal costs) and real exchange rate changes (reflecting the price effects of exchange rate changes on imported goods). This is represented by equation (5).

$$INFL = \beta_0 * INFL_{t-1}^{\beta_1} * YG^{\beta_2} * EXR^{\beta_3} * e^{\mu} \quad (5)$$

Again, equation (5) is further extended to capture the impact of exchange rate regime on economic performance via the inflation rate channel.

$$INFL = \beta_0 * INFL_{t-1}^{\beta_1} * YG^{\beta_2} * EXR^{\beta_3} * RGM^{\beta_4} * e^{\mu} \quad (6)$$

The natural logarithm variant of the extended inflation model in equation (6) is as given below.

$$\log INFL_t = \beta_0 + \beta_1 \log INFL_{t-1} + \beta_2 \log YG_t + \beta_3 \log EXR_t + \beta_4 \log RGM_t + \varepsilon_t \quad (7)$$

The inclusion of the lagged value of inflation represents the short-run trade-off between inflation and the output gap with coefficient $1 \le \beta_1 \le 0$ since β_1 is expected to decline from 1 with the relative importance of backward-looking expectations. In other words, when it is close to 0, inflation responds to its past values and therefore, may take some periods for the accumulated effect of monetary policy to affect inflation. The closer it is to 1, the more will a small, but persistent increase in interest rates have a huge and instant impact on current inflation. The equation also recognizes that interest rate affects inflation via the current and past outputs. The coefficient β_2 on output gap is expected to decline in a situation when adaptive expectations are more important. This is because the output gap also operates via its expected price movements (Berg et al., 2006). The inclusion exchange rate changes originate from the afore-mentioned mark-up, wage-contract and consumption price index equations. Thus, the coefficient on exchange rate is expected to be positive but depending on the relatively openness of the economy.

Interest Rate Model

The interest rate model in the context of this study rests on the assumption that the monetary policy instrument is based on short-term nominal interest rate (MPR in the case of Nigeria), and that the Central Bank sets this instrument in order to achieve a target level for inflation. It may also react to deviations of output from equilibrium. Therefore, interest rate is a function of output gap, exchange rate, inflation and monetary policy rate. In addition to the inclusion of exchange rate which is motivated on the ground that we are not sure whether uncovered interest parity holds in the case of Nigeria, we also control for changes in exchange rate regime on the assumption that fluctuations in exchange rate which usually necessitate change in exchange rate regime matters to policy makers.

$$INTR = f(YG, INFL, EXR, MPR, RGM) \quad (8)$$

Where, INTR is the nominal interest rate, MPR is monetary policy rate while other variables remain as earlier defined.

The estimable and econometric representation of the above interest rate function in a logarithm form is as follows.

$$\log INTR_t = \beta_0 + \beta_1 \log YG_t + \beta_2 \log INFL_t + \beta_3 \log EXR_t + \beta_4 \log MPR_t + \beta_5 \log RGM_t + \varepsilon_t \quad (9)$$

Theoretically, the higher the interest rate the lower the expected investment and thus output thus we expect inverse relationship between interest rate and output gap such that, $\beta_1 < 0.$ Similarly, the higher the interest rate the higher the inflation, hence $\beta_2 < 0.$ However, an increase in interest rate relative to abroad will lead to exchange rate appreciation for instance $\beta_3 > 0.$ Finally, monetary policy rate serves as one of the policy instruments used by the CBN to control the level of interest rate and there exists a positive relationship between the two variables ($\beta_4 > 0$).

Trade Balance Model

The rationale here is to further explore the potential of exchange rate regime for explaining economic performance from the perspective of the external activity of the economy, particularly from the balance of trade channel. The Nigerian foreign trade can be categorized by its trade deficit, and that is because the country's export consists mainly primary goods and raw materials while the country's import on the other hand consists of capital goods, industrial goods, luxury items, etc. To this end, balance of trade is usually measured as exports less imports of visible goods. Thus, the nexus between trade balance and exchange rate is usually anchored on the assumption that neither imports nor exports are perfect substitute for domestic goods. More so, the economy consists of two goods; home and foreign goods and part of home goods is exported, and part of foreign goods is also demanded by domestic consumers. Consequently, the trade balance (TB) can be expressed as a function of foreign income (FY), domestic income, (DY), exchange rate (EXR), and trade openness (TOP). Thus, the functional representation of the trade balance model is given as follows:

$$TB = f(FY, DY, EXR, TOP) \quad (10)$$

The estimable and econometric representation of the above functional relational is further represented in natural logarithm form as below.

$$\log TB_t = \beta_0 + \beta_1 \log FY_t + \beta_2 \log DY_t + \beta_3 \log EXR_t + \beta_4 \log TOP_t + \varepsilon_t \quad (11)$$

To capture the extent to which exchange rate regime matters for trade balance, equation (11) is further modified and extended as below.

$$\log TB_t = \beta_0 + \beta_1 \log FY_t + \beta_2 \log DY_t + \beta_3 \log EXR_t + \beta_4 \log TOP_t + \beta_5 RGM_t + \varepsilon_t \quad (12)$$

Data Source and Description

Variables considered for empirical analyses in the context of this study are selected based on their theoretical importance, performance measures of the economy, and their uses and findings in the previous empirical literature. Essentially, all the data used for this study are annual time series covering the period between 1970 and 2020 and totaling 50 as the number of observations. The data was obtained from secondary sources including Central Bank of Nigeria (CBN) online databases, CBN annual statistical bulletin, and World Development Indicators (WDI) online database. The key variables of interest include output growth (YG) measured as log of real GDP per capita, inflation (INFL) measured as log of consumer price index, interest rates (INTR) measures as log of prime lending rates, and trade balance (TB) measured as log of exports less log of imports of visible goods. In additional exchange rates (EXR) measured as the log of the country's national currency (Naira) relative to dollar which was captured in each of the model, we also control for other variables depending on the model under consideration.

From the growth model, physical capital (PK) was measured using log of gross fixed capital formation. For human capital (HK), it was measured using secondary school enrolment as a ratio of total school enrolment while labor force (LAB) model was measured as log of total labor force. Other determinants of output growth considered are government consumption (GC) measured as log of total government final consumption expenditure, trade openness (TOP) measured as the sum of export and import as a ratio of GDP, while inflation as determinant of growth remains as earlier defined. Other variables under consideration are monetary policy rate (MPR) in the interest rate model, domestic income (DY) and foreign income (FY) in the trade balance model. The former was measured as log of the Nigeria's real GDP while the latter was measured as log of world real GDP less log of Nigeria's real GDP.

Regarding the exchange rate regimes variables, there are at least eight categories of foreign exchange regimes irrespective of the regimes classification scheme that is under consideration, ranging from currency union at one corner to free floating at second corner: pegged (hard pegs, conventional pegs, horizontal bands), intermediate regimes (crawling pegs, crawling bands, target zones), and floating arrangements (free floats, managed floats). Consequently, the dummies for exchange rate regimes in the context of this study were classified into three major groups namely, pegged/fixed regime (FIX), intermediated regime (INTER) and floating/flexible regime (FLEX) using IMF's de jure and de facto complementary approach to exchange rate regime classification. Overall, the dummies take the value of one if a specific exchange rate regime prevailed in a given period, and zero if otherwise. Saying it differently, for both the statistical and non-statistical approach to exchange rate regime classification, we create dummies for pegged/fixed, intermediate (INTER), and floating/flexible

(FLEX) exchange rate regimes, and but the later (i.e., FLEX) was reflected as default benchmark. The essence is to avoid running into the problem of dummy trap and to also understand the extent to which economic performance have been responding differently to difference groups of exchange rate regime.

Estimation Technique and Procedures

To capture the dynamics of the impact of exchange rate regime on economic performance particularly, the Auto-regressive Distributed Lag (ARDL) modeling procedure, which allow us to account for both the short run and long run dynamics of the nexus is considered the most appropriate in this study. The preference for ARDL compared to other alternative methods in the literature hinge on the flexibility of its application regardless of whether the variables are stationary or become stationary through the first difference. Also, and according to Pesaran, Shin and Smith (2001), the selection of the optimum ARDL model involves automatic correction of the residual serial correlation and of the endogeneity problem. Thus, the ARDL representation of the nexus between economic performance and exchange rate regime is as given below.

$$\Delta \ln Z_t = \varphi + \alpha_1 \ln Z_{t-1} + \alpha_2 \ln X_{t-1} + \alpha_3 \ln EXR_{t-1} + \sum_{j=1}^{p} \beta_{1j} \Delta \ln Z_{t-j} + \sum_{i=0}^{q1} \beta_{2i} \Delta \ln X_{t-i} + \sum_{i=0}^{q2} \beta_{3i} \Delta \ln EXR_{t-i} + \sum_{n=1}^{k} \lambda_n D_{nt} + \varepsilon_t \quad (13)$$

Where, Z denotes various indicators of economic performance to be captured singly via internal measures of economic activities such as output growth (YG), inflation rate (INFL), interest rate (INTR) and a measure of external economic condition namely, trade balance (TB). The term X is a set of exogenous variables depending on which of the models is under consideration or which indicator of economic performance is being considered. EXR represent exchange rate with US dollar the reference currency while D is a matrix representing dummy variable for exchange rate regime type to be captured as fixed regressor(s).

The long run parameters for the intercept and slope coefficients are computed as: $-\frac{\varphi}{\alpha_1}$, $-\frac{\alpha_2}{\alpha_1}$ and $-\frac{\alpha_3}{\alpha_1}$. However, since in the long run it is assumed that $\Delta Z_{t-j} = 0$ and $\Delta(X, EXR)_{t-i} = 0,$ respectively, then the short run estimates are obtained as β_{1j}, β_{2i} and β_{3i}. Since the variables in first differences can accommodate more than one lag, determining the optimal lag combination for the ARDL becomes necessary. The optimal lag length was selected using Schwartz Information Criterion (SIC). The lag combination with the least value of the

chosen criterion among the competing lag orders is considered the optimal lag. Consequently, the preferred ARDL model is used to test for long run relationship in the model. This approach of testing for cointegration as earlier described is referred to as bounds testing as it involves the upper and lower bounds. The test follows a F distribution such that, if the calculated F-statistic is greater than the upper bound, there is cointegration; if it is less than the lower bound, there is no cointegration and if it lies in between the two bounds, then, the test is considered inconclusive.

Equation (13) can be re-specified to include an error correction term as follows:

$$\Delta \ln Z_t = \varphi + \delta ECT_{t-1} + \sum_{j=1}^{p} \beta_{1j} \Delta \ln Z_{t-j} + \sum_{i=0}^{q1} \beta_{2i} \Delta \ln X_{t-i} + \sum_{i=0}^{q2} \beta_{3i} \Delta \ln EXR_{t-i} + \sum_{n=1}^{k} \lambda_n D_{nt} + \varepsilon_t \quad (14)$$

Equation (14) is the error correction variant of the ARDL specification in equation (27), where the ECT_{t-1} is the error correction term while the coefficient δ represent the speed of adjustment to equilibrium level. If the value of the coefficient is in the (-1, 0) range, then the error correction mechanism is stable and ECT helps to adjust the long-run relationship due to the impact of a specific exogenous shock. In the case of positive ξ coefficient, then the ECT model leads to the model deviation from the long-run equilibrium so that a certain shock will no longer be neutralized. If those ratios are closer to 0, then the exogenous shock adjustment is performed at low speed, while the closeness to -1 corresponds to a high shock adjustment in one period taken into account (for example, one year in the case of annual data, a quarter for quarterly data etc.). It is instructive that the term D in both equations (13 and 14) which is a matrix of dummy variables for fixed (FIX), intermediate (INTER) and flexible (FLEX) exchange rate regime types will be capture as fixed regressors with the latter (i.e., FLEX) suppressed from the estimation to avoid perfect collinearity problem and instead expressed as the reference dummy.

RESULTS AND DISCUSSION

Preliminary Results

Table 1 contains the summary statistics of the variables. A cursory look at the table shows that average output growth in Nigeria measured as real GDP was 220.8 US billion dollars for the period between 1970 and 2020. With respect to other indicators of economic performance under consideration, the mean statistic puts the average interest rate in Nigeria at 15% between the period 1970 and 2020. Equally, an important observation from the summary

statistics is the fact that the mean value for trade balance (TB) is positive, which is an indication that the country has been maintaining a trade surplus on average over period between 1970 and 2020.

Table 1: Descriptive/Summary Statistics

	Mean	Max.	Min.	*Std. Dev.*	N-Std. Dev.	Skewness	Kurtosis	J-B
YG	220.79	487.47	94.69	127.72	0.58	0.99	2.42	9.12(0.01)
INFL	52.81	294.88	0.10	76.74	1.45	1.65	4.85	30.28(0.00)
INTR	15.32	31.65	6.00	6.10	0.40	0.12	2.48	0.69(0.71)
TB	1.04	3.19	-1.17	1.20	1.16	0.27	2.01	2.71(0.26)
EXR	78.25	307.76	0.55	95.57	1.22	1.09	3.20	10.17(0.01)
PK	51.66	85.79	11.89	16.41	0.32	-0.76	3.55	5.57(0.06)
HK	26.54	56.21	4.43	12.60	0.47	-0.08	2.60	0.39(0.82)
GC	9.41	33.44	1.09	11.94	1.27	1.01	2.24	9.93(0.01)
TOP	33.32	53.28	9.14	11.91	0.36	-0.46	2.33	2.78(0.25)
FY	46481	86338	19117	19739	0.42	0.44	1.99	3.83(0.15)
MPR	11.72	26.00	6.00	4.54	0.39	0.53	3.36	2.67(0.26)

Note: The terms Min in the table denotes Minimum statistic, Max means Maximum, Std. Dev. denotes standard deviation while N-Std. Dev. is the normalized variant of the standard deviation statistic computed as: standard deviation/mean.
The values in parenthesis are probability values associated with
the reported Jaque-Bera (JB) statistics.

As a precondition for most time series analyses, this study also conducts unit root tests on all the variables under consideration and the essence is to determine the stationary status of the series and in turn the suitability of the chosen estimation techniques. For robustness and consistency purposes, this present study considered both the basic Augmented Dickey-Fuller (ADF) test and its extended variant for instance Dickey-Fuller GLS test. Starting with the ADF results, the null hypothesis of unit root tends to hold for a number the variables with TB, PK and TOP the few notable exceptions, particularly when the ADF test was performed with the model with constant only. Same as the ADF results, the unit root test results obtained from DF-GLS test also revealed the integration properties of series to hover between I(0) and I(1). This by implications further re-enforces our preference for ARDL technique as the most appropriate to accommodate the mixed order of integration exhibited by the series.

Table 2(a): ADF Unit Root Test Results

Variable	Model with Constant			Model with Constant & Trend		
	Level	First Difference	I(d)	Level	First Difference	I(d)
YG	0.600	-2.297***	I(1)	1.429	-2.486***	I(1)
INFL	-1.384	-4.099***	I(1)	-1.519	-4.272***	I(1)
INTR	-1.621	-6.682***	I(1)	-0.927	-6.881***	I(1)
TB	-2.612*	-	I(0)	-2.575	-7.322***	I(1)
EXR	-0.363	-5.618***	I(1)	-1.444	-5.555*	I(1)
PK	-3.302**	-	I(0)	-6.005***	-	I(0)
HK	-1.788	-2.772*	I(1)	-2.547	-5.966**	I(1)
GC	-0.231	-7.227**	I(1)	-1.778	-7.230**	I(1)
TOP	-2.866*	-	I(0)	-2.827	-7.871**	I(1)
FY	-1.761	-5.354**	I(1)	-4.494*	-	I(0)
MPR	-2.111	-8.634***	I(1)	-2.198	-8.591***	I(1)

Table 2(b): DF-GLS Unit Root Test Results

YG	1.294	-2.072***	I(1)	-1.377	-2.695	I(1)
INFL	0.420	-4.146***	I(1)	-1.701	-4.343***	I(1)
INTR	-0.906	-6.685***	I(1)	-1.086	-6.952***	I(1)
TB	-2.496**	-	I(0)	-2.579	-7.445***	I(1)
EXR	0.374	-5.427***	I(1)	-1.314	-5.616***	I(1)
PK	-0.4661	-2.769***	I(1)	-1.789	-3.321**	I(1)
HK	-0.807	-2.818***	I(1)	-2.900*	-	I(0)
GC	0.252	-7.282***	I(1)	-1.625	-7.385***	I(1)
TOP	-2.413**	-	I(0)	-2.777	-7.937***	I(1)
FY	0.868	-4.867***	I(1)	-2.711	-5.506***	I(1)
MPR	-1.493	-8.707***	I(1)	-2.180	-8.752***	I(1)

Note: The exogenous lags are selected based on Schwarz info criteria while ****, **, * imply that the series is stationary at 1%, 5% and 10% respectively. The null hypothesis is that an observable time series is not stationary (i.e., has unit root).

Regression Results

The focal point of this study is to test whether the impact of exchange rate regimes on economic performance varies for different indicators of economic performance, namely, inflation (INFL), output growth (YG), interest rate (INTR) and trade balance (TB). Starting with the Bound cointegration testing results, the null hypothesis of no cointegration was significantly rejected at

1% both in Tables 3 and 4, where economic performance is represented as inflation and output growth, respectively. However, when the economic performance was measured as interest rate and trade balance in Tables 5 and 6, the null hypothesis of no cointegration was rejected at 10% and 5% levels of significance, respectively. Conforming to the bound cointegration testing results was the coefficients on the error correction term (ECT) reported in each of the tables. For instance, irrespective of whether the economic performance was represented as INFL, YG, INTR or TB, the coefficients on the ECT are correctly signed and statistically significant at 1% level of significance.

Table 3: ARDL Estimates on the Impact of Exchange Rate Regimes on Inflation

	Dependent variable: Inflation (INFL)		
Long Run Equation	**Coefficient**	**Standard Error**	**T-statistic**
YG	-0.4353	1.0207	-0.4265
EXR	0.0960***	0.1903	5.0457
Short Run Equation			
Constant	0.3181	0.3474	0.9158
$\Delta INFL_{t-1}$	-0.0779**	0.0352	-2.2166
ΔYG	-0.0339	0.0713	-0.0475
ΔEXR	0.0748**	0.0339	2.2067
ECT_{t-1}	-0.0779***	0.0077	-10.0343
Fixed Regressors			
$Pegged\ /\ Fixed\ (FIX)$	-0.2218***	0.0661	-3.3574
$Intermediate\ (INTER)$	-0.0504*	0.0277	-1.8202
Bound Test Cointegration Results			
Level of Significance	F-statistic	I(0)	I(1)
10%	5.23***	2.63	3.35
5%		3.10	3.87
1%		4.13	5.00
Diagnostic and Post-Estimation Results			
Adjusted R^2:		0.98	
F-statistics:		5955.61 (0.00)	
Autocorrelation test (Q-Statistic):		13.275 (0.021)	
Heteroscedasticity test (ARCH LM)		3.0923 (0.019)	
Normality test (Jaque-Bera):		11.612 (0.003)	

Note: The value in parenthesis represents the probability values for the various post estimation tests performed, while ***, ** and * denote 1%, 5% and 10% level of significance.

In view of the above, which confirms the long run dynamic of the empirical estimates across different indicators of economic performance, the study then proceeded to analyze and discuss the elasticities of the coefficients with focal point on the exchange rate regime and its impact on economic performance. Starting with table 3, the coefficients on the impact of exchange rate regime on inflation was -0.22 for fixed regime compared to floating regime and -0.05 for intermediate regime compared to floating regime. However, the impact was statistically significant at 1% for fixed regime and at 10% for the intermediate regime. In addition to the lagged value of inflation, other determinants of inflation whose coefficient were also reported in the table are level of income (YG) and exchange rate (EXR). But the probable impact of these other factors on inflation appears to be only statistically significant in the case of coefficients on EXR which are 0.096 and 0.075 in the long run and short run, respectively.

However, when the indicator for economic performance was (YG) for instance output growth measured as log of real GDP, coefficients on exchange rate regimes was statistically insignificant for fixed regime compared to floating regime as well as for intermediate regime compared to floating regime. What this portends, is that the potential of exchange rate regime for explaining or enhancing economic growth in Nigeria may depend, among other, on the degree of variability of the regime under consideration. Whereas our finding of positive impact of government consumption (GC) on economic growth tends to confirm the hypothesis that increase in government spending cause a rise in aggregate demand. However, the evidence of negative sign on the coefficient on inflation (INFL) seems to be suggesting that increase in the general price level tends to stifle purchasing power and consequently cause declining aggregate demand and negative economic growth in return. We also found the openness of trade (TOP) as statistically viable for promoting increasing economic growth in Nigeria particularly in the short run.

Table 4: ARDL Estimates on the Impact of Exchange Rate Regimes on Output Growth

Long Run Equation	Dependent variable: Output Growth (YG)		
	Coefficient	**Standard Error**	**T-statistic**
PK	-0.6478	0.7325	-0.8843
HK	0.0118	0.0205	0.5775
GC	0.3526**	0.1629	2.1647
INFL	-0.2744**	0.0037	3.8139
TOP	0.0237	0.0184	1,2937
EXR	0.3785	0.3499	1.0818

Table 4…

Short Run Equation			
Constant	0.4512*	0.2447	1.8439
ΔYG_{t-1}	-0.0741	0.0492	0.1396
ΔPK	-0.0480	0.0354	-1.3573
ΔHK	0.0009	0.0013	0.6875
ΔGC	0.0261	0.0187	1.3970
$\Delta INFL$	-0.0203	0.0191	-1.0650
ΔTOP	0.0017**	0.0008	2.3401
ΔEXR	0.0281	0.0176	1.5959
ECT_{t-1}	-0.0741***	0.011	-6.8532
Fixed Regressors			
Pegged/Fixed (FIX)	0.0087	0.0259	0.3371
Intermediate (INTER)	0.0039	0.0094	0.4173
Bound Test Cointegration Results			
Level of Significance	F-statistic	I(0)	I(1)
10%	4.99***	1.99	2.94
5%		2.27	3.28
1%		2.88	3.99
Diagnostic and Post-Estimation Results			
Adjusted R^2:		0.93	
F-statistics:		695.481(0.000)	
Autocorrelation test (Q-Statistic):		7.043 (0.217)	
Heteroscedasticity test (ARCH LM):		0.806 (0.552)	
Normality test (Jaque-Bera):		0.164 (0.921)	

Note: The value in parenthesis represents the probability values for the various post estimation tests performed, while ***, ** and * denote 1%, 5% and 10% level of significance.

Moving to table 5 where the indicator for economic performance was interest rate (INTR), the coefficients on the impact of exchange rate regime on interest rate was -0.16 for fixed regime compared to floating regime and -0.03 for intermediate regime compared to floating regime. However, the relative impact of these exchange rate regimes on interest rate was only statistically significant at 5% level of significance when the exchange rate management was under fixed regime. Expectedly, the coefficients on monetary policy rate (MPR) a major determinant of market interest rates are positive and significant both in the long run and short

run. For instance, a one % increase in MPR has the potential of increasing INTR by 0.38% in the long run and 0.13% in the short run.

Table 5: ARDL Estimates on the Impact of Exchange Rate Regime on Interest Rate

Long Run Equation	Dependent variable: Interest Rate (INTR)		
	Coefficient	**Standard Error**	**T-statistic**
YG	-0.4053	0.2584	-1.5681
$INFL$	-0.1450	0.1378	-1.0526
MPR	0.3793**	0.0042	3.5535
EXR	0.2970**	0.2442	1.5535
Short Run Equation			
Constant	1.1923	0.7238	1.6477
$\Delta INTR_{t-1}$	-0.3448***	0.1079	-3.1956
$\Delta INFL$	-0.1397	0.1084	-1.2888
ΔMPR	0.1308***	0.0009	4.6630
ΔEXR	0.1024**	0.0446	2.2941
ECT_{t-1}	-0.3448***	0.0744	-4.6365
Fixed Regressors			
$Pegged\ /\ Fixed\ (FIX)$	-0.1620**	0.0736	-2.2013
$Intermediate\ (INTER)$	-0.0306	0.0306	-1.2969
Bound Test Cointegration Results			
Level of Significance	F-statistic	I(0)	I(1)
10%	3.20*	2.20	3.09
5%		2.56	3.49
1%		3.29	4.37
Diagnostic and Post-Estimation Results			
Adjusted R^2:		0.92	
F-statistics:		91.113(0.000)	
Autocorrelation test (Q-Statistic):		9.687(0.085)	
Heteroscedasticity test (ARCH LM)		0.908(0.454)	
Normality test (Jaque-Bera):		3.149(0.207)	

Note: The value in parenthesis represents the probability values for the various post estimation tests performed, while ***, ** and * denote 1%, 5% and 10% level of significance.

In what appears to be confirming our hypothesis that the dynamics of the impact of exchange rate regime on economic performance depends on the indicator of economic performance under consideration. The empirical estimates in table 6 shows that the magnitude of the coefficients on the impact of exchange rate regime on economic performance was relatively higher and significantly more pronounced when the measure for economic performance was trade balance (TB). For instance, the coefficient on for fixed regime was 1.67 and statically significant at 1% level of significance while that of intermediate regime was 1.12 and statistically viable at 1% level of significance. Compared to floating regime, both fixed regime and intermediate regime has the potential of increasing the net trade balance of the country positively by 1.67% and 1.12%, respectively. Same as the lagged value of the TB, the coefficient on domestic income (DY) is negative both in the long run and short run but only statistically significant in the short run with the potential of increasing negative net trade balance by 1.70%.

Table 6: ARDL Estimates on the Impact of Exchange Rate Regime on Trade Balance

	Dependent variable: Trade Balance (TB)		
Long Run Equation	**Coefficient**	**Standard Error**	**T-statistic**
FY	2.2039	4.0463	0.5446
DY	-3.1197*	1.6419	-1.9000
TOP	0.0302	0.0242	1.2455
EXR	0.4406	0.4835	0.9111
Short Run Equation			
Constant	-5.0908	18.8844	-0.2696
ΔTB_{t-1}	-0.5352***	0.1255	-4.2652
ΔFY	1.1794	2.1049	0.5603
ΔDY	-1.6696**	0.7957	-2.0983
ΔTOP	0.0161	0.0123	1.3138
ΔEXR	0.2358	0.2717	0.8679
ECT_{t-1}	-0.5352***	0.1032	-5.1861
Fixed Regressors			
$Pegged / Fixed\,(FIX)$	1.6711***	0.5464	3.0583
$Intermediate\,(INTER)$	1.1206***	0.2675	4.1898

Table 6…

Bound Test Cointegration Results			
Level of Significance	F-statistic	I(0)	I(1)
10%	4.01**	2.20	3.09
5%		2.56	3.49
1%		3.29	4.37
Diagnostic and Post-Estimation Results			
Adjusted R^2		0.60	
F-statistics		11.333(0.000)	
Autocorrelation test (Q-Statistic)		2.658(0.753)	
Heteroscedasticity test (ARCH LM)		0.398(846)	
Normality test (Jaque-Bera)		7.465(0.239)	

Note: The value in parenthesis represents the probability values for the various post estimation tests performed, while ***, ** and * denote 1%, 5% and 10% level of significance.

CONCLUSION AND POLICY RECOMMENDATIONS

Exploring a historical dataset spanning between 1970 and 2020 in the context of the Nigerian economy, this study utilizes the ARDL modeling techniques to determine whether the dynamic of the impact of exchange rate regimes on economic performance varies for internal compared to external indicators of macroeconomic conditions. Confirming this position, we find the direction as well as the significance of the impact of exchange regimes on economic performance distinct for the variant measures of economic performance considered. On the one hand, we find both fixed regime and intermediate regime with the potential of causing declining inflation (INFL) compared to floating exchange rate regime. On the other hand, however, we find no evidence of significant impact of fixed regime and/or intermediate regime on output growth (YG). Also, while our finding of negative impact of exchange rate regime on interest rate suggests that exchange rate management has the potential for causing declining interest rate, it must be pointed out that the significance of this finding was mainly evident when the exchange rate management was under fixed regime. However, not only did we found both the relative impacts of fixed regime and intermediate regime on economic performance to be significant when the measure for economic performance was trade balance (TB), we also find the magnitude of the impacts to be relative higher for trade balance (TB) compared to other measures of economic performance.

It is also important to point out the fact that our findings also find support in a number of the previous studies like Ghosh et al. (2002), Husain et al. (2005) and Yeyaty and Sturzenegger (2001, 2003). Although, Victoria (2019) as well as Ogbomo and Anjoonu (2019) are some of the

previous studies that have also explored the Nigerian dataset and found no evidence significant impact of particularly fixed exchange rate regime on economic growth, our finding that exchange rate regimes has the potential for promoting positive net trade balance found support in Nathaniel et al. (2018), whose finding implies that exchange rate regimes can be explored to deepen economic integration in the ECOWAS.

Based on the findings of this paper, the following recommendations are made: firstly, policy makers saddled with responsibility of the country's exchange rate management should take cognizant of avoiding any possible exchange rate policy erroneous that might result from the generalization of the dynamics of the impact of exchange rate regimes for different indicators of economic performance. Thus, when formulating exchange rate policies, governments should consider the different indicators of economic performance and convergence of macroeconomic policies in Nigeria. Secondly, compared to flexible/floating exchange rate system; fixed and/or intermediate exchange rate regimes should be favored in any policy initiative that geared towards attaining robust economic performance via exchange rate management in Nigeria, especially given the fact that different economic indicators of economic performance are likely to respond differently to changes in exchange rate regimes.

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