Journal homepage: https://resources.jaze.com.ng/index.php/jaze/login

Article: https://bit.ly/JazeIssue4(5) Journal of Arid Zone Economy 4(5): (2024) 155 – 167 ISSN: 2992–4952



The role of money supply and trade on economic growth under different interest and exchange rates regimes: Empirical evidence from Nigeria

Kunle Bankole Osinusi¹, Kehinde Kabir Agbatogun¹ and Abayomi Samuel Taiwo¹

¹Department of Economics, College of Social and Management Sciences, Tai Solarin University of Education, Ogun State, Nigeria.

| Keywords: Growth Money Supply Threshold Regression Trade | Abstract The literature has documented several works on the achievement and sustenance of economic growth. However, none has investigated the role of money and trade on economic growth with respect to regimes of interest and exchange rates. This was investigated in this paper using time series data to establish the one-to-one relationship between money supply, trade, and economic growth in Nigeria at different regimes of interest and exchange rates using threshold regression model. The results show (i) a mixed significant one-to-one relationship between money supply and economic growth at different regimes of interest, (ii) a consistent positive insignificant one-to-one relationship between trade |
|--|---|
| JEL Classification: E52, E31, F41, F43 Corresponding author Kunle Bankole Osinusi | and economic growth at various exchange rate regimes, (iii) a non-linear significant relationship between money supply and economic growth, (iv) a linear insignificant relationship between trade and economic growth in Nigeria. The results authenticate the significance of money in achieving growth and provide new insight that exchange rate matters for trade to accelerate growth. The originality and significance of the study lies in the |
| osinusikb@tasued.edu.ng Tel: +2348034742233 | establishment of one-to-one impact and the nature of linear association among money, trade, and economic growth with practical implications. |

1. Introduction

Every economy strives to achieve economic growth, and no doubt has remained a popular concept of discussion among economic scholars, researchers, and analysts amongst others. This is a result of its significance in measuring the performance, and state of health of nations, which has resulted in various shreds of empirical evidence and interpretations (Asemeh & Gang, 2018). The concept of economic growth has gained attention more in developing economies than in developed nations since the major problem of the former is development, which can be achieved with sustained growth. This has thus necessitated all macroeconomic policy instruments of developing countries to be targeted towards growth (Lawal et al., 2022). However, at the global scale, the question of what matters for economic growth remains difficult to answer given the diverse factors that spur and retard it within an economy or region. Chughtai et al. (2015) identified poor monetary policy formulation, implementation, and management, rising foreign debt, fluctuations of exchange rate, increasing interest rate, high consumption with relatively low investment, and trade to be the major setbacks of achieving and sustaining economic growth, especially in developing countries.

On one hand, money supply serves as a basic macroeconomic requirement for a country's economic growth as it assures smooth and operative working in sectors of the economy (public and private) by providing liquidity (Omodero, 2019). Investment is known to be an economic growth accelerator and through money supply, businesses in the private sector of the economy can access credit to initiate business or expand existing businesses though at a price of "interest rate". Accessibility of credit thus guarantees increased productivity and desired economic growth. However, the central banks of countries use monetary policy to influence the availability and cost of credit; primarily to stabilize prices, maintain economic stability, and promote economic growth (Prasert et al., 2015; CBN, 2017). The tendency of increasing money supply to influence prices has then necessitated monetary authorities, especially in developing economies to develop strategies for ensuring price stability and sustainable economic growth by putting monetary policy instruments in place (Njimanted et al., 2016).

Furthermore, in the economic growth analysis of open economies, growth measurement requires the consideration of trade components as all nations of the world are linked together directly or indirectly via assets and good markets. This link is made possible through foreign exchange (Owolabi & Adegbite, 2014). Exports and imports give rise to trade balance analysis which relates directly to the exchange rate and the level of trade openness. Thus, influencing trade surplus or deficit in an economy (Adeyemi et al., 2020). For an economy to maintain or achieve the desired growth in output, such an economy must ensure it encourages foreign trade which has a direct function with the exchange rate. As such, the exchange rate becomes important in understanding economic growth in relation to trade aside from being a significant macroeconomic variable. The rate of exchange has a traditional view in the economic literature that it changes, and economic growth are positively related (Karahan, 2020). It is believed that the depreciation of a home currency following an increase in the exchange rate will influence the relative prices of both domestic and foreign goods. On the part of export, it will promote export while on the other hand decrease imports as import prices will be high relative to domestic prices compelling consumers to choose domestic products (ceteris paribus) directly and thereby promoting economic growth through increased productivity. In other words, the depreciation of the local currency both converts the demands of foreigners into the country and directs the demands of the indigenous to the local products. As a result, an increase in exchange rates supports the economic growth of the home country by encouraging net exports.

Antithetical to the view of the traditionalist, structuralist economists believe that a country's devaluation policy will pose a negative impact on its growth (especially in developing countries). Their argument was since most developing countries are not selfdependent on their production inputs. A large percentage of their input in production processes are produced through imports. In this regard, changes in the exchange rate, being a major determinant of foreign trade, will have far-reaching economic effects on domestic production. Exchange rate fluctuation and volatility risks have been experienced by most countries around the world after the exit of the Bretton Wood system of fixed exchange rate regime in the 70s. The continuous increase in fluctuation of exchange rates over the years has

then been a source of concern. This development affected the economies of most developing countries especially those with a mono-product based economy like Nigeria.

Owing to the significance of interest and exchange rates to money supply and trade respectively, the yet unanswered question is how do interest and exchange rates influence the impact of money supply and trade on economic growth? For example, the Nigeria currency (Naira) has been managed with different exchange rate regime and policies, especially in the post structural adjustment programme implementation in the late 1980's. The regime has majorly spanned across fixed and flexible with several policies such as devaluation in 1973, weighted basket of currency in 1978, adoption of second-tier foreign exchange market in 1986, introduction of autonomous foreign exchange market in 1995, introduction of wholesale Dutch auction system in 2006, interbank foreign exchange market in 2016, and the most recent unified exchange rate of 2023. However, all these policies failed to strengthen the naira; the currency has continued to lose its value by standing at over $\mathbb{H}1.500/\$1$ at both official and parallel market as of Q3 of 2024. Similarly, several interest rate policies have been implemented with the central bank monetary policy rate (MPR). The most recent MPR of the country is 27.50% which marked the sixth consecutive increase in the 2024 fiscal year.

However, from the literature, existing empirical evidence of Owolabi and Adegbite (2014); Obi et al. (2016); George et al. (2018); Abdul et al. (2018); Hussain and Zafar (2018); Awadzie et al. (2024); Ufoeze et al. (2018); Omodero (2019); Ehikioya (2019); Onakoya et al. (2019); Ingabire et al. (2020), Diemante et al. (2020); Nam and Ryu (2024); and Anthony-Orji et al. (2023) showed that the combined effect of monetary and trade variables has not been adequately dealt with. In addition, the empirical evidence in the work of Etale and Ochuba (2019) and Onakoya et al. (2019) on trade, monetary variables, and economic growth are improved in this study.

Given the above background, this study, therefore, tests the relationship between trade and economic growth as well as the relationship between money and economic growth with focus on the examination of potential possibilities. The first likely possibility is whether there is any external variable that plays a significant role aside from the one-to-one relation of trade and economic growth, as well as money and economic growth. The second is does linearity exist between these variables? The study is motivated by increased exchange rate in the Naira and continuous raise in the interest rate based on their significance relatedness to trade and money supply. The rest of this paper is structured into literature review – theoretical and empirical discussions; methodology - data description, model specification, and estimation technique; empirical results presentation and discussion: and conclusion.

2. Literature review

are theoretical There arguments and explanations on the effect of monetary variables and trade on economic growth in the literature. To start with, the monetary theoretical argument pioneered by Friedman emphasized that the money supply is a key macroeconomic component that impacts the economic growth of a nation. The theory states that changes in the money supply are the most essential determining factor of the rate of economic growth and the behavior of business progression (Kenton, 2018). The monetarism hypothesis implies that as the money supply rises, people demand more, factories produce more, and fresh employment opportunities emerge (Kimberly, 2018). The promoters of this theory have contended that money has a substantial effect on price level in an economy in the long run while in the short run, it influences employment and output (Ahuja, 2011). The monetarists considered that the size of the money supply is more significant than any other factor affecting the economy. They also advocated that monetary policies are more effective than fiscal policies. Their support for monetary policy is based on the fact that they appreciate the role of the central banks of countries in determining the money supply in an economy thereby making them more influential than the government (Kimberly, 2018). According to Khabo (2002), there is a direct link between the monetary sector and the real economic sector. The implication is that the central banks of nations can exert so much influence on the economic growth rate since the monetary variables and policy tools including money supply are under their control. Therefore, if a nation's money supply increases, economic activities will also increase and vice versa. Another strand of argument is the connection between trade and economic growth. Furthermore, the H-O trade theory emphasized that a country should focus on the exportation of goods in which it has abundance of factors of production to make her efficient and produce plentifully while on the other hand, it intensifies on the importation of goods that cannot be produce efficiently. Summarily, the H-O theory takes the position that excessive materials should be exported while proportionate resources are imported; the interplay of export and import (trade balance) thus consequently affect the performance of economies. These theoretical submissions form the basis of this study empirical analysis.

On empirical shred, Salih (2012)ascertained the relationship among financial development, international trade, and economic growth in Sub-Saharan Africa (SSA) using the autoregressive distributed lag (ARDL). The empirical result validates finance-led and import-led growth hypotheses in SSA economies. Similarly, Asfaw (2014) examined the connection between SSA trade policy and economic growth of the region using the generalized least square (GLS) on data gathered across 48 countries. The study revealed that openness of trade stimulates not only economic growth in SSA but also spurs investment. Also, Chang and Mendy (2014) provide an answer to the question of what is the empirical relationship between economic growth and openness in Africa? using panel regression on the data of 36 African countries. Their finding illustrates that trade and

investment are positively related to economic growth in a significant manner. Menyah et al. (2013) investigated the relationship among financial development, trade openness, and economic growth in Africa. The results showed that recent financial development and trade liberalization policies across the selected countries do not have a significant impact on growth, thus limiting the study support for the finance-led growth and trade-led growth hypothesis. Anyanwu (2014) drew from China's experience to study the factors influencing economic growth in Africa. The study found that Africa's trade openness is almost twice of China, but China benefits more than Africa.

Furthermore, Zahonogo (2017) assessed how developing countries react to trade openness using SSA as a case study. The generalized method of moments (GMM) was employed to estimate generated data across 42 SSA countries and it was found that a nonlinear relationship exists between trade openness and economic growth in SSA. Thus, the study suggested more effective trade openness policies and frameworks for the SSA countries. In the same vein, Sakyi et al. (2017) used the GMM to assess the effects of trade and its facilitation on Africa's economic growth. The estimation results informed that trade through trade facilitation (measured with trade, export, and import-related costs) affects economic growth in Africa. The same methodology was adopted by Olaniyi et al. (2018) to study the relative effect of both monetary and fiscal policy on Africa's development. Their examination revealed money supply is significant and positively related to development while interest rates have significant negative effect. а Conclusively, their study reported that trade openness is accelerating the development of the African continent. With an improved methodology, fiscal and monetary policy effects were examined on the economic growth of 47 SSA countries by Ubi-Abai and Daniel (2018) using GMM and Dumitrescu-Herlin causality. The study found that both fiscal and monetary policy has affected economic growth

in the African sub-region over the years, but the impact of fiscal policy is much greater.

Owolabi and Adegbite (2014) examined the relationship among money supply, foreign exchange regimes, and economic growth with multiple regression. The variables were found to have significant effects on the Nigeria economic growth while the analysis further established that money supply and foreign exchange rate have a positive relationship with Nigeria economic growth in the analysis period. Similarly, Obi et al. (2016) assessed the impact of Nigeria exchange rate regimes on its economic growth. The assessment was made with GMM, and the result showed that Nigeria's economic growth spurred during the deregulated exchange rate regime which is against the fixed regime. Finally, the study submitted that the fixed exchange rate constraints Nigeria economic performance as it depicts an inverse relationship with economic growth during the whole period and the regime of the fixed exchange rate. Ufoeze et al. (2018) analyzed the effect of foreign exchange rate fluctuations on economic growth in Nigeria. The study employed ordinary least square (OLS) multiple regression on data from 1970 to 2012. The results revealed exchange rate has a positive significant effect on Nigeria's economic growth during the fixed exchange rate regime and a negative effect during the floating era. The result further showed that money supply in Nigeria during the period harms economic growth. Ehikioya (2019) empirically investigated the impact of exchange rate volatility on the economic growth of Nigeria using two methodologies, the GARCH model and the system GMM. The results revealed exchange rate volatility persists throughout the period of study with a negative significant effect on the growth of Nigeria economy. In addition, the result positive but presented а insignificant relationship among money supply, trade openness, and government expenditure.

Inam and Ime (2017) used annual data spanning 1970 to 2012 to study the impact of monetary policy on Nigeria's economic growth to analyze the relationship and direction of causality. The OLS technique and granger causality test was employed, and the result revealed an insignificant positive relationship between money supply and economic growth while it further showed no evidence of causality between money supply and economic growth in Nigeria. Omodero (2019) made a comparative study of Ghana and Nigeria in the investigation of the effect of money supply on economic growth. The study data ranged from 2009 to 2018, and the OLS regression technique was used for data analysis. The result revealed broad money has a negative insignificant influence on the Nigeria economic growth and a positive significant influence on Ghana economic growth. Furthermore, narrow money supply exerts a positive insignificant influence on economic growth in Nigeria and a negative significant influence on Ghana economic growth. George et al. (2018) investigated the relationship between money supply and some key macroeconomic variables in Nigeria. The scope of the study covered from 1985 to 2016 with the OLS methodological approach. The result revealed that the narrow money supply does not have any significant impact on inflation and real GDP.

Onakoya et al. (2019) examined the asymmetric cointegration relationship among exchange rate, trade balance, and economic growth in the country with momentum threshold autoregressive and the threshold autoregressive (TAR) models. The result of the TAR model revealed evidence of cointegration among the variables and it also established an asymmetric adjustment disequilibrium process. Furthermore, the study result showed that the three variables respond to disequilibrium. The work of Etale and Ochuba (2019) modeled exchange rate volatility, trade, and economic growth in Nigeria using the multiple OLS approach and concluded that exchange rate had a positive significant effect on economic growth. The study also reported that trade balance has a positive but insignificant effect on economic growth while inflation had a negative insignificant effect on GDP.

From the literature, it is evident that the relationship among trade, monetary policy variables, and economic growth needs attention based on the influence of interest and exchange rate on money supply and trade respectively. In this regard, this study aside from its theoretical justification provides empirical contribution by analyzing the impact of money supply and trade on economic growth with respect to interest and exchange rate regimes.

3. Methodology

3.1 Model Specification

In lieu of the target of this study, the prominent St. Louis equation of modeling macroeconomic policy instruments is adopted and modified. The equation is given as (see Anderson & Jordan, 1998; Carlson, 1978):

$$Y_t = \alpha + \beta(L)\Delta M_t + \gamma(L)\Delta(R_t - E_t) + \delta(L)\Delta Z_t$$
 1

where ΔY is the change in nominal GDP; ΔM is the change in money aggregate, $\Delta(R - E)$ is the change in full employment government surplus (revenue (R) minus expenditure (E)), ΔZ is the change in remaining variables that affect output, and L is a lag operator. However, Schmidt and Waud (1973) argued that the specification of St. Louis in equation 1 that is constrained by Almon lag may lead to a biased and inconsistent estimation as well as invalid tests. Thus, they re-write the equation as:

$$Y_t = \alpha + \beta M_t + \gamma (R_t - E_t) + Z_t$$
 2

The equation presented by Schmidt and Waud (1973) is then modified as given below to achieve the objective of this study as:

$$GDP_t = \beta_0 + \beta_1(MS_t) + \beta_2(RIR_t) + \mu_t \qquad 3$$

$$GDP_t = \beta_0 + \beta_1(TOP_t) + \beta_2(REER_t) + \mu_t \qquad 4$$

where GDP_t = gross domestic product; MS_t = money supply; TOP_t = trade openness; RIR_t = real interest rate; $REER_t$ = real effective exchange rate; and μ_t = error term. Equation 3 measures the relationship of money with economic growth while equation 4 checks the association between trade and economic growth. Furthermore, as captured in the study background, we considered RIR and REER as important factors to money supply and trade as being significant drivers of economic growth in the equations 3 & 4 respectively. This thus justifies their inclusion as control variables in our model.

3.2 Data Description

Quantitative analysis is employed; thus, the need for the use of secondary data. The annual time series dataset used was sourced from the bulletin of the Central Bank of Nigeria and the World Bank database from 1985 to 2020; all are publicly available at www.cbn.gov.ng and www.data.worldbank.org. These years were chosen to capture the significant trade and monetary policies that have been adopted and the Nigerian government operated by following the collapse of the Bretton Woods system in the 1970s which accompanied the adoption of various exchange rate regimes. This period was also chosen because of the country's adoption of the structural adjustment programme which is a monetary policy of the World Bank and International Monetary Fund, as well as the signing of various trade agreements to facilitate trade openness in the country. As specified in the study model, economic growth is measured with gross domestic product (GDP) growth rate; money with broad money supply (M2), and trade is measured with trade openness. We followed the conventional method of estimating trade openness by dividing the sum of export (X) and import (M) values by the GDP. That is:

$$TOP = \frac{X + M}{GDP}$$
 5

3.3 Estimation

The estimation is divided into two parts; the first is the preliminary analysis which is necessary for all time-series data. This analysis includes descriptive statistics to ascertain the statistical properties of the variables employed as well as the unit root test using the Augmented Dickey-Fuller (ADF) test to confirm the stationarity of the data series. The second is the primary analysis to achieve the study objective and this was done using threshold regression. This methodology was chosen to extend methodological knowledge in the examination of the relationship between trade, monetary policy, and economic growth in Nigeria as against the conventional methods of OLS and GMM that are used by most previous studies. Similarly, this method was chosen to detect the one-to-one and non-linear relationship among the specified models. As proven from theory and empirical studies, real interest rate and real effective exchange rate influence money supply and trade openness respectively. Thus, with this methodology, we detect the relationship between money supply and economic growth at the different thresholds of real interest rate; similarly, we ascertain the relationship between trade openness and economic growth at the different thresholds of the real effective exchange rate. The threshold empirical model (1999) was given as:

$$y_t = \theta_1 x_t + e_t \text{ for } q_t \le \gamma \qquad 6$$

$$y_t = \theta_2 x_t + e_t \text{ for } q_t > \gamma$$
7

Where y_t and q_t are the observation of the dependent variable and the threshold variable respectively, and x_t are the independent variables. The threshold variable q_t may be an element of x_t and it is used to split up the sample into two groups which are called "regimes". The random variable e_t is a regression error. Equations 6 and 7 in a single equation form transformation with the introduction of a dummy variable become:

$$d_t = I\left(q_t \le \gamma\right) \tag{8}$$

where I (.) denotes the indicator function and setting the variable $x_t(\gamma) = x_t(\gamma) d_t(\gamma)$, equations (6) and (7) equals:

$$y_t = \theta' x_t + \delta n' x_t \gamma + e_t \qquad 9$$

where $\theta = \theta_1$ and $\delta = \theta_1 - \theta_2$. Equation (9) allows all regression parameters to differ between the two regimes. The null hypothesis of linearity against a threshold specification can be expressed as $\theta_1 - \theta_2$.

Following Hansen (2000), equations 3 and 4 are estimated with RIR and REER as their threshold variables respectively:

$$GDP_t = \beta_{10} + \beta_{11}MS_t + \beta_{12}RIR_t + e_t \quad RIR_t$$
$$\leq \gamma \qquad \qquad 10$$

$$GDP_t = \beta_{20} + \beta_{21}MS_t + \beta_{22}RIR_t + e_t RIR_t$$

> γ 11

$$GDP_t = \beta_{30} + \beta_{31}TOP_t + \beta_{32}REER_t + e_t$$
$$REER_t \le \gamma$$
12

$$GDP_t = \beta_{40} + \beta_{41}TOP_t + \beta_{42}REER_t + e_t$$
$$REER_t > \gamma$$
 13

4. Empirical Results and Discussion

The preliminary analysis of the study is presented in Table 1. Panel A of the table presents the descriptive statistics which show that the mean, median, maximum, and minimum values of each variable are positive except GDP, MS, and RIR which have negative minimum values. The difference in the mean and median of all variable datasets shows asymmetric and skewness properties. The difference in the maximum and minimum values shows the variability of the data series over the years with the standard deviations showing wide dispersions from their mean values. In addition, all the variables are positively skewed except TOP and RIR; this is further confirmed by the greater values of their median over the mean. GDP, MS, and TOP are platykurtic while REER and RIR are leptokurtic. The Jarque-Bera statistic which

measures normality of series informs that the null hypothesis of normal distribution will be rejected for REER and RIR while the alternate will be rejected for GDP, MS, and TOP. The pvalue of GDP, MS, and TOP (>0.05) implies the series are normally distributed and these results are complemented by greater mean values over the standard deviation in GDP, MS, and TOP series. Furthermore, panel B from the table presents the result from the confirmation of unit root properties of each employed variable. This test was carried out using the Augmented Dickey-Fuller (ADF) and Phillip-Peron (PP) tests approach. The results from both tests show that all the data series are stationary. Categorically, MS, REER, and RIR are stationary at level, that is, I(0) while GDP and TOP are stationary after the first difference, that is, I(1). Conclusively, the unit root results show the suitability of the data series for empirical analysis and give assurance of producing unbiased results.

| Variables | GDP | MS | ТОР | REER | RIR |
|-------------|-----------|----------|---------|----------|----------|
| Mean | 4.6888 | 23.1045 | 0.3160 | 120.6285 | 2.4606 |
| Median | 4.7569 | 20.4809 | 0.3290 | 99.7824 | 4.5222 |
| Maximum | 14.6044 | 57.7816 | 0.5502 | 482.7308 | 18.1800 |
| Minimum | -1.9200 | -2.0100 | 0.0752 | 49.7498 | -31.4526 |
| Std. Dev. | 3.8980 | 15.8701 | 0.1036 | 82.2060 | 10.0815 |
| Skewness | 0.0378 | 0.4944 | -0.2846 | 2.8299 | -1.1710 |
| Kurtosis | 2.6323 | 2.3513 | 2.9549 | 11.8993 | 5.0558 |
| Jarque-Bera | 1.0581 | 2.0980 | 0.4889 | 166.8482 | 14.1623 |
| Prob. | 0.5892 | 0.3503 | 0.7831 | 0.0000 | 0.0000 |
| Panel B | | | | | |
| Variables | ADF Stat. | PP Stat. | 5% C.V. | Prob. | Decision |
| GDP | -4.9871 | -17.6784 | -3.5578 | 0.0017* | I(1) |
| MS | -3.7749 | -3.7361 | -3.5443 | 0.0301** | I(0) |
| TOP | -5.4482 | -13.5068 | -3.5578 | 0.0005* | I(1) |
| REER | -6.1282 | -5.6205 | -3.5443 | 0.0001* | I(0) |
| RIR | -4.0419 | -3.7632 | -3.5443 | 0.0166** | I(0) |

| Tal | ble 1 | l: P | rel | imi | inary | A | nal | lysi | S |
|-----|-------|------|-----|------|--------|---|------|------|----|
| P | anel | A٠ | De | scri | intive | S | tati | stic | ۰c |

* & ** indicates significant at 1% and 5% levels respectively.

Table 2 presents the results of the one-to-one relationship between broad money supply and economic growth in Nigeria at different threshold levels as specified in Equations 10 and 11. The result shows that at a regime of lower real interest rate, broad money supply, and real interest rate are negatively and positively related to economic growth respectively. In addition, the impact of broad money supply and real interest rate at the lower regime of interest rate is significant at 10 and 5% levels respectively. On the other hand, at the higher regime of real interest rate are positively related to economic growth in Nigeria. Similarly, these impacts are significant at 10 and 5% p-value respectively. The inconsistency in the results of broad money supply at different thresholds of real interest rate show it has a non-linear relationship with economic growth in Nigeria while the results produced by real interest rate at its lower and upper threshold show real interest rate has a linear relationship with Nigeria economic growth. The results further show that at the lower regime of real interest rate, money supply and interest rate significantly decrease and increase economic growth by 9% and 22% respectively while the coefficients at the upper regime of real interest rate show that both money supply and interest rate significantly increase economic growth by 8% and 45% respectively. The adjusted r-squared value indicates about 35% variations in economic growth over the years under consideration are caused by broad money supply and real interest rate in Nigeria, while the f-statistic value of 4.5828 with a probability value less than 1 implies the specified model is significant. In addition, the Durbin-Watson statistic value shows the model does not suffer from serial correlation problems. The model finding of broad money supply having a significant impact on economic growth at both regimes of real interest rate conform to the monetarist theory as well as the submissions of Khabo (2002), Olanivi et al. (2018), Abari and Daniel (2018), Osinusi et al. (2022), Owolabi and

Adegbite (2014) and Ufoeze et al. (2018). Furthermore, Panel B in Table 2 gives the diagnostic tests of the model to have confidence in the results produced as well as confirm and ensure its robustness for policy recommendation. The Jarque-Bera test confirms that the model residuals are normally distributed while the Breusch-Godfrey LM test shows the rejection of the null hypothesis of serial correlation. This result supports the Durbin-Watson test that confirms that the errors are not serially correlated. Finally, the Breusch-Pagan-Godfrey test confirms that the model is homoscedastic. These post-estimation tests are strong confirmations that the results of this model are good and are relevant in terms of policymaking.

| Threshold Variable | e: RIR | | | | | | | |
|----------------------------------|---------------------|-------------------------|------------------|--------------------|-----------------|------------------------|--------------------|--|
| Threshold Value: 4.3103 | | | | | | | | |
| | Regime 1: RI | Regime 1: RIR <= 4.3103 | | | | Regime 2: RIR > 4.3103 | | |
| Variables | Coefficients | | Standard Errors | | Coefficients | | Standard | |
| | | | | | | | Errors | |
| MS | -0.0909 | | 0.0523*** | | 0.0800 | C | 0.0448*** | |
| RIR | 0.2281 | | 0.0918** | | 0.4563 | | 0.1756** | |
| С | 9.0679 | | 1.6146 | | -1.3303 | | 1.8921 | |
| $R^2 = 0.4414$ | Adj. $R^2 = 0.3451$ | | F-stat. = 4.5828 | | Prob. = 0.0033* | | DW = | |
| | - | | | | | | 1.5475 | |
| Panel B: Post Estimation Results | | | | | | | | |
| Histogram Normality Test | | Breusch-Godfrey LM Test | | t Breusch-F | | agan- | | |
| - | | | | | | Godfrey T | 'est | |
| Jarque-Bera ^a P | rob. | F-Stat | t. | ^a Prob. | | F-Stat. | ^a Prob. | |
| 1.5991 0. | 4495 | 1.723 | 2 | 0.1975 | | 0.8519 | 0.5247 | |

| Table 2: Estimates of Threshold Model | | |
|--|------|------|
| Panel A: Threshold Regression Results of Equations | 10 8 | z 11 |

Dependent Variable: GDP

*, ** & *** denotes significant at 1%, 5% & 10% level respectively while a denotes p>10%.

The threshold estimates in Table 3 present the output of the one-to-one relationship between trade and economic growth at a different threshold level of the real effective exchange rate as specified in equations 12 and 13. The result in Panel A of the table shows that trade openness and real effective exchange rate are positively related to economic growth at the lower and upper thresholds of the real

exchange rate. It was revealed that at the lower threshold of the real exchange rate, trade openness is not significantly related to economic growth while the real exchange rate is significant at 5% critical value. Furthermore, the upper threshold estimates show that both trade openness and real exchange rate are not significant at either 1, 5, or 10% critical values. The result implies that at the lower threshold of the real exchange rate, growth of the economy was increased by 13% prevailing rate of exchange rate. For the confirmation of nonlinearity between the variables, the results show there is a linear relationship between trade openness and economic growth. Similarly, the results produced by the real effective exchange rate at different threshold levels confirm the existence of a linear relationship with economic growth in Nigeria. The non-linearity result in trade openness and economic growth differs from the submission of Zahonogo (2017) who found evidence of non-linearity for SSA countries. However, the earlier reports of Chang and Mendy (2014), Sakyi et al. (2017), Bisiriyu et al. (2021), Olaniyi et al. (2018), Osinusi et al. (2022), Ehikioya (2019), and Etale and Ochuba (2019) supported the finding of the study that positive relationship between trade and economic growth. Also, this finding corroborates the theoretical submission of Heckscher-Ohlin.

Further, the insignificance of trade openness on economic growth reported by the study has also been earlier reported by Menyah et al. (2014) and Ehikioya (2019). The model adjusted rsquared implies the independent variables explained about 29 percent variation in economic growth over the period of analysis. Also, the model f-statistic probability value of 0.0084 reveals the model is significant at a 1% critical level. In addition, the post-estimation tests result summary presented in Panel B of Table 3 for reliability shows normality in the distribution of the model's residuals. Also, the test for serial correlation as shown by the probability value of Breusch-Godfrey reveals the errors of the residuals are not serially correlated. Likewise. the test for heteroskedasticity test reveals the model is homoscedastic and all these tests give certainty of the results to produce meaningful policy recommendations.

Table 3: Estimates of Threshold Model

Panel A: Threshold Regression Results of Equations 12 & 13 Dependent Variable: GDP Threshold Variable: REER Threshold Value: 100.5197 Regime 1: REER <= 100.5197

| Regime 1: REER <= 100.5197 | | | | Regime 2: REER > 100.5197 | | | | |
|----------------------------------|--|---|---|---|--|---|--|--|
| Coefficients | | Standard Errors | Coefficients | | Standard | l | | |
| | | | | | Errors | | | |
| 4.1235 | | 10.4925 | 4.246 | 8 | 6.6275 | | | |
| 0.1296 | | 0.0553** | 0.014 | 3 | 0.0085 | | | |
| -5.1347 | | 5.7803 | -0.861 | -0.8617 | | | | |
| Adj. $R^2 = 0.2880$ | | F-stat. = 3.8321 | Prob. = 0.0084* | | DW | = | | |
| | | | | | 1.4271 | | | |
| Panel B: Post Estimation Results | | | | | | | | |
| Histogram Normality Test B | | Breusch-Godfrey LM Test | | Breusch-Pag | | ey | | |
| | | | | Test | | | | |
| rob. | F-Stat | . ^a Prob. | | F-Stat. | ^a Prob | | | |
| 3094 | 1.2554 | 4 0.3005 | | 01.1760 | 0.344 | -0 | | |
| | Regime 1: RECoefficients 4.1235 0.1296 -5.1347 Adj. $R^2 = 0.28$ nation Resultsty Testrob.3094 | Regime 1: REEK <: Coefficients 4.1235 0.1296 -5.1347 Adj. $R^2 = 0.2880$ hation Results ty Test Breus Breus rob. F-Stat 3094 1.2554 | Regime 1: REER <= 100.3197 Coefficients Standard Errors 4.1235 10.4925 0.1296 0.0553^{**} -5.1347 5.7803 Adj. R ² = 0.2880 F-stat. = 3.8321 nation Results Breusch-Godfrey LM Tes rob. F-Stat. ^a Prob. 3094 1.2554 0.3005 | Regime 1: REER <= 100.3197 Regime 1: Reer Coefficients Standard Errors Coeff 4.1235 10.4925 4.246 0.1296 0.0553^{**} 0.014 -5.1347 5.7803 -0.861 Adj. R ² = 0.2880 F-stat. = 3.8321 Prob. nation Results try Test Breusch-Godfrey LM Test rob. F-Stat. ^a Prob. 3094 1.2554 0.3005 | Regime 1: REER <= 100.5197 Regime 2: REER > Coefficients Standard Errors Coefficients 4.1235 10.4925 4.2468 0.1296 $0.0553**$ 0.0143 -5.1347 5.7803 -0.8617 Adj. R ² = 0.2880 F-stat. = 3.8321 Prob. = $0.0084*$ nation Results try Test Breusch-Godfrey LM Test Breusch-Pag rob. F-Stat. ^a Prob. F-Stat. 3094 1.2554 0.3005 01.1760 | Regime 1: REER <= 100.3197 Regime 2: REER > 100.3197 Coefficients Standard Errors Coefficients Standard Errors 4.1235 10.4925 4.2468 6.6275 0.1296 0.0553** 0.0143 0.0085 -5.1347 5.7803 -0.8617 2.8004 Adj. $R^2 = 0.2880$ F-stat. = 3.8321 Prob. = 0.0084* DW nation Results ty Test Breusch-Godfrey LM Test Breusch-Pagan-Godfrey rob. F-Stat. ^a Prob. F-Stat. ^a Prob 3094 1.2554 0.3005 01.1760 0.344 | | |

* & ** denotes significant at 1% and 5% level respectively while ^a denotes p>10%.

5. Conclusion

This study provides empirical evidence on the one-to-one and non-linear relationship between money supply, trade, and economic growth in Nigeria at a different threshold level of real interest and exchange rates. The study sample ranges from 1985 to 2020, and we found a mixed significant one-to-one relationship between money supply and economic growth at the different thresholds of real interest rate which confirm non-linearity among the variables. On the other hand, we found a consistent, insignificant positive one-to-one relationship between trade and economic growth at different regimes of the real effective exchange rate. Based on these results, we conclude a non-linear relationship between money supply and economic growth, and a linear relationship between trade and economic growth in Nigeria. The policy implications of our study findings are that real interest rate increases the impact of money supply on economic growth, and that fluctuations in exchange rate mitigate the growth benefit of trade. We thus recommend that monetary policies that are growth enhancers and stabilizers are imperative to further promote the economic growth of Nigeria and to accelerate her development process. Similarly, export trade should further be intensified for openness positive impact to be significant on the Nigerian economy. Finally, we encourage future related research on money, trade, and economic growth in Nigeria to explore the effects of financial deepening and trade tariffs on economic growth. This knowledge gap will provide evidence of how savings mobilization and trade fiscal policy affects economic growth.

References

- Abdul, M., Quratulain, S., Shagufta, B., Khushbakht, I., Romana, S., & Khalid, Z. (2018). The relationship between money supply, price level and economic growth in Pakistan: Keynesian versus monetarist view. *Review of Economic and Business Studies, 11*(2), 49-64.
- Adeyemi, O. J., Oseni, I. O., & Tella, S. A. (2020). Effects of money demand on trade balance in Nigeria. *Acta Universitatis Lodziensis*, 6(351), 23-43.
- Ahuja, H. L. (2011). *Macro-economic theory and policy*. 7th Revised Edition. S. Chand & Company Ltd, New York.
- Andersen, L. C., & Jordan, J. L. (1968).
 Monetary and fiscal actions: A test of their relative importance in economic stabilization. *St. Louis Federal Reserve*

Bank

Review, 50(1), 1-20.

- Anthony-Orji, O. I., Orji, A., Ogbuabor, J. E., & Uka, L. C. (2023). Money matters a lot: empirical analysis of financial development, financial inclusion and economic growth in Nigeria. *International Journal of Economic Policy in Emerging Economies*, 17(1), 100-117.
- Anyanwu, J. C. (2014). Factors affecting economic growth in Africa: Are there any lessons from China? *African Development Review*, 26(3), 468-493.
- Asemeh, G. A. & Gang, Z. (2018). The impact of monetary policy on economic growth in America's economy using a new approach tvp-favar. *Amazonia Investiga*, 7(15), 58-68.
- Asfaw, H. A. (2014). Trade policy and economic growth in sub-Saharan Africa: A panel data approach. *American Journal of Trade and Policy*, 1(3), 94-101.
- Awadzie, D.M., Attah-Botchwey, E & Mawudor B.G. (2024). Determinants of exchange rate threshold effect on economic growth. Evidence from Ghana. *African Journal of Economic and Management Studies*. https://doi.org/10.1108/AJEMS-10-2023-0383
- Bisiriyu, S. O., Oresanwo, A. M., Feyisina, D. O., & Nyishagba, S. C. (2021). Trade integration and economic growth in Nigeria. *Bells University of Technology Journal of Management Sciences*, 1(2), 33-42.
- Carlson, K. M. (1978). Does the St. Louis equation believe in fiscal policy? *Federal Reserve Bank of St. Louis Review*, 13-19.
- CBN (2017). *Monetary policy at a glance*. A publication of the Central Bank of Nigeria. www.cbn.gov.ng
- Chang, C., & Mendy, M. (2012) Economic growth and openness in Africa: What is the empirical relationship? *Applied Economics Letters*, 19(18), 1903-1907.
- Chughtai, M. W., Malik, M. W., & Aftab, R. (2015). Impact of major economic variables on economic growth of Pakistan. *Acta Universitatis Danubius*, *11*(2), 94-106.

- Deimante, B., Lina, G., & Kristina, M. (2020). Trade balance effects on economic growth: evidence from European Union countries. *Economies*, 8(3), 54. https://doi.org/10.3390/economies8030054
- Ehikioya, B. I. (2019). The impact of exchange rate volatility on the Nigerian economic growth: An empirical investigation. *Journal* of Economics & Management, 37(3), 45-68.
- Etale, L.M., & Ochuba, I.S. (2019). The relationship between exchange rate volatility, trade balance and economic growth in Nigeria: An empirical analysis. *International Journal of Development and Economic Sustainability*, 7(6), 1-14.
- George, C., Suoyai, E., Tema, L., & Boloekeye, M. (2018). Impact of money supply on some macroeconomic variables on the Nigerian economy. *Journal of Business Management* and Economic Research, 2(5), 32-46.
- Hansen, B. E. (1999). Threshold effects in nondynamic panels: Estimation, testing, and inference. *Journal of Econometrics*, 93, 345-368.
- Hussain, M. I., & Zafar, T. (2018). The interrelationship between money supply, inflation, public expenditure and economic growth. *European Online Journal of Natural and Social Sciences*, 7(1), 1-24.
- Inam, U. S., & Ime, B. S. (2017). Monetary policy and economic growth in Nigeria: Evidence from Nigeria. *Advances in Social Sciences Research Journal*, 4(6), 41-59.
- Ingabire, T., Uwineza, J., Benimana, M. L., Musafiri, F., Berimana, G., Ishimwe, N. C. & Nshizirungu, N. (2020). Effect of money supply on economic growth in Rwanda. *International Journal of Research and Innovation in Social Science*, 4(6), 225-229.
- Karahan, Ö. (2020). Influence of exchange rate on the economic growth in the Turkish economy. *Foot & Ankle International*, 11, 21-34. <u>10.5817/fai2020-1-2</u>
- Kenton, W. (2018). *What is the monetarist theory*? Available online at: <u>https://www.investopedia</u>.
- Khabo, V. S. (2002). The impact of monetary policy of the economic growth of a small and open Economy: The case of South

Africa. Department of Economics, University of Pretoria.

- Kimberly, A. (2018). Monetarism explained with examples, role of Milton Friedman. Retrieved from https://www.thebalance.com/monetarismand-how-it-works-3305866
- Lawal, N. A., Osinusi, K. B., Nyishagba, C. S., & Bisiriyu, S. O. (2022). Government Health Expenditure, Population and Economic Growth in Nigeria. Nigerian Journal of Energy Environmental Economics (NJEE), 13(1), 84-96.
- Menyah, K., Nazlioglu, S., & Wolde-Rufael, Y. (2013). Financial development, trade openness and economic growth in African countries: New insights from a panel causality approach. *Economic Modelling*, 37, 386-394. https://doi.org/10.1016/j.econmod.2013.11. 044
- Nam, H. J., & Ryu, D. (2024). Does trade openness promote economic growth in developing countries?. Journal of International Financial Markets, Institutions and Money, 93, 101985. <u>https://doi.org/10.1016/j.intfin.2024.10198</u> 5
- Njimanted, F. G., Akume, D., & Mukete, E. M. (2016). The impact of key monetary variables on the economic growth of the CEMAC zone. *Expert Journal of Economics, 4*(2), 54-67.
- Obi, K. O., Oniore, J. O., & Nnadi, K. U. (2016). The impact of exchange rate regimes on economic growth in Nigeria. *Journal of Economics and Sustainable Development*, 7(2), 115-127.
- Olaniyi, E., Adeniji, S., Nwaogwugwu, I., Kelikume, I., Dakaree, O., & Oke, O. (2018). The relative effect of monetary and fiscal policy on economic development in Africa: A GMM approach to the St. Louis equation. *Business and Economic Quarterly*, 2, 3-23.
- Omodero, C. O. (2019). Effect of money supply on economic growth: A comparative study of Nigeria and Ghana. *International*

Journal of Social Science Studies, 7(3), 16-23. <u>10.11114/IJSSS.V7I3.4137</u>

- Onakoya, A. B., Aworinde, O. B., & Yinusa, O. G. (2019). Exchange rate, trade balance and growth in Nigeria: An asymmetric cointegration analysis. *The Journal of Developing Areas*, 53(4), 115-127.
- Osinusi, K. B., Lawal, N. A., & Bisiriyu, S. O. (2022). Trade balance, exchange rate and money

supply in Nigeria: growth implications and lesson for African countries. *Management* & *Economics Research Journal*, 4(2), 25-44. <u>https://doi.org/10.48100/merj.2022.213</u>

- Owolabi, A. U., & Adegbite, T. A. (2014). Money supply, foreign exchange regimes and economic growth in Nigeria. *Research Journal of Finance and Accounting*, 2(8); 121-130.
- Prasert, C., Kanchana, C., Chukiat, C., & Monekeo, K. (2015). Money supply influencing on economic growth – wide phenomena of AEC open region. *Procedia Economics and Finance, 24*, 108-115. <u>https://doi.org/10.1016/S2212-</u> <u>5671(15)00626-7</u>

- Sakyi, D., Villaverde, J., Maza, A., & Bonuedi, I. (2017). The effects of trade and trade facilitation on economic growth in Africa. *African Development Review*, 29(2), 350-361. <u>https://doi.org/10.1111/1467-8268.12261</u>
- Salih, T. K. (2012). financial development, international trade, and economic growth: The Case of Sub-Saharan Africa. *Ekonomista*, 117-127.
- Ubi-Abai, I., & Daniel, E. (2018). Fiscal policy, monetary policy and economic growth in sub-Saharan Africa. *Munich Personal RePEc Archive*. Online at <u>https://mpra.ub.uni-muenchen.de/91950/</u>
- Ufoeze, O., Odimgbe, S., Ezeabalisi, V., & Alajekwu, U. (2018). Effect of monetary policy on economic growth in Nigeria: An empirical investigation. *Annals of Spiru University Economic Series*, 123-140.
- Zahonogo, P. (2017). Trade and economic growth in developing countries: Evidence from sub-Saharan Africa. *Journal of African Trade*, 3(1-2), 41-56. https://doi.org/10.1016/j.joat.2017.02.001