




DETERMINANTS OF EXCHANGE RATE IN NIGERIA: A COMPARISON OF THE OFFICIAL AND PARALLEL MARKET RATES

 Yusuf Wasiiu
Akintunde¹⁺
Oyegoke Egunoluwa
O²
Gylych Jelilov³
Haruna Timipre
Mary⁴

^{1,2,3}Department of Economics, Nile University of Nigeria, FCT Abuja, Nigeria.

¹Email: yusufwasiiu@nileuniversity.edu.ng

²Email: ebunoluwa.oyegoke@nileuniversity.edu.ng

³Email: jelilov@nileuniversity.edu.ng

⁴Central Bank of Nigeria, FCT Abuja, Nigeria.

⁴Email: tintoiks@gmail.com



(+ Corresponding author)

ABSTRACT

Article History

Received: 30 July 2019

Revised: 4 September 2019

Accepted: 8 October 2019

Published: 11 November 2019

Keywords

Official exchange rates
Alternate exchange rates
Monetary policy
GDP
ARDL
ADF.

JEL Classification:

E52.

The need to understand what drives exchange rates is now very crucial, an understanding of its determinants particularly in a developing nation like Nigeria would indeed aid in policy decisions of the sovereign monetary authorities. The study examines the determinants of exchange rate in Nigeria comparing the official exchange rates and the parallel market rates from the post SAP era of 1986 to 2017 using quarterly time series data. The potential determinants of the exchange rate was identified resting on existing literature viz ; GDP, inflation, interest rates, imports, oil exports, non-oil exports, and reserves. The time series properties were tested utilizing the Augmented Dickey-Fuller (ADF) unit roots test of stationarity, the variables were tested for co-integration and the Auto-regressive Distributed Lag Model (ARDL) was applied. The result suggests that GDP, inflation, interest rates non- oil exports, oil exports and reserves are the major determinants of official exchange rates in Nigeria, while inflation, Non-oil exports and GDP are the major determinants of alternate or parallel exchange rates.

Contribution/Originality: The study contributes to the literature by examining the determinants of exchange rate in Nigeria comparing the official exchange rates and the parallel market rates from the post SAP era of 1986 to 2017 using quarterly time series data.

1. INTRODUCTION

1.1. Background to the Study

Nigeria in recent times has witnessed the greatest depreciation of its currency since its existence as a nation; the fall in her exchange rate has been adduced to erosion of her reserves, triggered by the global decline in oil prices. Nigeria being a mono- product export nation highly dependent on the proceeds of crude oil sales has experienced a decline in its foreign exchange receipts and is presently struggling to meet the demand of its teeming import reliant populace. The unusual large divide between the parallel market rates and the official rates of the naira, is indeed a cause for concern to the monetary authorities who have implemented various policies to address the anomaly to no avail. Traditionally it has been argued that a country's optimal real exchange is determined by some key macroeconomic variables, and differing theories abound as to what typically determines exchange rates, the recent decline of exchange rates has been in some instances without any corresponding link to the existing macroeconomic fundamentals. This indeed accounts for the recent popularity and interest in exchange rate determination as it appears to be one of the most important problems in the theoretical field of monetary economics.

The need to understand what drives exchange rates is now more than ever very crucial, as an understanding of its determinants particularly in a developing nation like Nigeria would indeed aid in policy decisions of the sovereign monetary authorities.

With the exclusion of macroeconomic variables such as GDP, interest rates and inflation, exchange rates are considered crucial to a country's relative economic health; their impact on the country's level of trade can be viewed from export prices, which represent a substantial part of aggregate demand, import prices and inferentially balance of payments. It is also critical to most world free economies as most countries often consider exchange rates when determining interest rates in the short term. Thus, exchange rates fluctuations are transmitted into the economy via their impact on interest rates and a host of other macroeconomic variables. This indeed explains why exchange rates are among the most scrutinized, analyzed and manipulated by national monetary authorities. The recent fall in the naira and huge gaps between official rates set by the Central Bank of Nigeria (CBN) and parallel market rates set by autonomous markets has been an issue the monetary authorities have tried to combat utilizing different exchange rate regimes and varying policies that are in tandem with existing macroeconomic objectives.

Table-1. Major characteristics of different exchange rate arrangements.

Regime	Main characteristics and principal issues
Dollarization	Major feature: foreign currency is the legal tender; anchor country is saddled with monetary policy decisions. Pros: The time-inconsistency problem is removed and so is real exchange rate volatility Cons: Under external shocks, cannot be buffered by exchange rate movements Issues: fiscal authority performs the lender-of-last-resort function
Currency boards	Major feature: Fixed exchange rate regime as well as a minimum backing requirement for domestic money in foreign currency. Pros: The time-inconsistency problem is reduced and real exchange rate volatility is minimal. Cons: External shocks cannot be buffered by exchange rate movements, lender of last resort has a scope that is restricted to fiscal mechanisms and excess reserve holdings. Issues: Lender of last resort limitations. Requires high reserve holdings
Monetary union	Major feature: a collection of countries utilizing a common currency issued by a common regional central bank e.g. euros. Pros: time inconsistency is reduced due to the multinational agreement policy, exchange rate volatility is minimized. Cons: loss of stabilization too; by member countries experiencing asymmetric shocks. Issues: Responsiveness of the price and wage setting behavior is unknown Potential sensitivity of voting equilibria to distribution of shocks.
Traditional peg	Major feature: Fixed exchange rate against a currency basket or a single currency. Pros: Time inconsistency problem is minimized through the decision to strive to attain a verifiable target. The option to devalue is a potential policy tool in responding to large shocks. Exchange rate volatility is diminished. Cons: speculative attack on the exchange rate is a possibility. Hard constraints on monetary and fiscal policy is minimal, hence is only a partial panacea for the time inconsistency problem; Issues: when there is full capital mobility there are doubts as to its sustainability.
Crawling peg	Major feature: A rule-based system for altering the par value, typically at a predetermined rate or as a function of inflation differentials. Pros: Combines flexibility and stability. Cons: At the margins set it is a target for speculative attacks. It imposes the least restrictions amongst its variants, yields the smallest credibility benefits. Issues: The Exit strategy is either to a harder peg, or greater flexibility.
Bands	Major feature: Within a predetermined band, the exchange rate is set. The bands are defended per time via interventions, Pros: Exchange rate movements have limitations in counteracting external shocks, exchange rate uncertainty is retained and this motivates the development of exchange rate risk management tools. Cons: Partial solution to the time inconsistency problem, and is usually subject to speculative attacks.

Source: Lothian and Taylor (1996).

This indeed informs the need to empirically ascertain the determinants of exchange rate in Nigeria comparing the official rates and Parallel market rates. Unless the policy framework and management of foreign exchange is properly articulated, a country can run the risk of imbalances that are both internal and external in nature, This

study in itemizing the determinants of real exchange rate in Nigeria and in seeking to establish any long or short run relationship with these variables will assist the nation's economic planners in their policy formulation, as well as add to the existing body of knowledge.

The two major exchange rate regimes upon which various hybrids have been created are the Fixed, which involves pegging a currency to the value of another currency and floating where the value of a currency is freely determined by the market forces of demand and supply. Various arguments persist on the superiority of one over the other; however various economies adopt either regime depending on their peculiar economic goals and challenges. The [Table 1](#) depicts hybrid regimes with features and characteristic as adopted by varying world economies

1.2. Theories of Exchange Rate Determination

1.2.1. The Monetary Approach

Variations of the monetary model abound in literature but they all share the premise that exchange rate movements between two currencies can be attributed to changes in the demand and supply of money in the two countries. The shortfalls of the portfolio balance theory led to the development of the monetary approach. [Frankel \(1979\)](#) posits that this model of exchange rate determination attains equilibrium when existing stocks of money in the two countries are willingly held. [Obioma \(2000\)](#) holds the view that asset market or monetary approach attributes variation in exchange rate essentially to income and expected rates of return as well as to other factors that influence the supplies of and demands for the various national monies. Thus, based on the fact that supply and demand for monies is determined by the level of income, the monetary model postulates three basic determinants of exchange rate as follows: relative money supplies, relative income and interest rate differentials.

1.3. Traditional Flow Model

The model postulates that exchange rate is primarily determined by market forces of demand and supply of foreign exchange, thus, equilibrium exists when demand just equals supply of foreign exchange, exchange rate is thus determined by trade and capital flows. The model is based on the assumption that relative income and interest rate differential interact to determine exchange rate, since foreign demand for goods and services is a function of income and demand for assets is a function of domestic and foreign interest rates this assumptions are justified.

1.4. The Portfolio Balance Model

This model views posits an asset pricing view of exchange rate, the underlying idea is that a portfolio choice exists for domestic and foreign assets, the constituent assets of the portfolio offer an arbitrage from expected returns and this is what determines the process of exchange rate ([Dornbusch, 1988](#)). [MacDonald and Taylor \(1994\)](#) explain that at least in the short run exchange rate is determined by the demand and supply of a wide range of financial assets and that it is not automatic.

1.5. Purchasing Power Parity

This theory originated with [Cassel \(1918\)](#) and continues to be a very influential way of thinking about exchange rate, it posits that exchange rates between two countries will be equal to the national price level of these, this theory is also known as the law of one price and states in its absolute form that exchange rate between the currencies of any pair of countries should equal the ratio of the general price levels in the two countries, and it implies that exchange rates adjust to compensate for pricing differentials amongst countries. Thus implying that if cakes are sold for one dollar in the US and the same cake is sold for 100 naira in Nigeria then the exchange rate should be 100 naira to one dollar. Despite the criticisms that abound on the assumptions of this theory it remains a valid explanatory exchange rate determination approach.

1.6. Exchange Rate Management in Nigeria

1.6.1. Exchange Rate Management before 1986 (PRE-SAP)

Prior to 1973 Nigeria practiced its exchange rate policy as stipulated by the IMF (Bretton woods) par value system, the Naira not being a traded currency, was largely passive and being subjected to administrative management, Naira was pegged to the British pound sterling up until to 1967 when the pound was devalued and thereafter it was pegged to the dollar. Years after the collapse of the Bretton Woods agreement, particularly in 1978, the naira was pegged to a basket of currencies embracing all of the nation's major trading partners. This policy was jettisoned in 1985 in favour of quoting the naira against the dollar. A policy adopted to equilibrate the balance of payments, stabilize exchange rate and maintain the value of external reserves only led to an over appreciated naira value, which discouraged non- oil exports, encouraged heavy over reliance on imports, , and led to the collapse of the agricultural sector, this in turn led to balance of payments deficits and depletion of the external reserve was inevitable in the wake of this challenges. The adoption of a policy that would gradually depreciate the naira against the US dollar was inevitable and was adopted in 1981; the pre- sap era was fraught with the overvaluation of the naira which mirrored movement in oil prices in the world markets.

1.7. Exchange Rate Management after 1986 (POST-SAP)

The Introduction of the structural adjustment programme (SAP) in July 1986 saw what was categorized as a managed float system adopted by the government of Nigeria the strategy of the establishment of a market determined naira was pursued through the introduction of second tier foreign exchange market S(FEM) which would metamorphose to a veritable exchange rate determination mechanism. Achieving long-term balance of payments equilibrium and the allocation of foreign exchange to guarantee short- term stability was paramount in the agenda of the monetary authorities. A dual exchange system was birthed through the S(FEM), a few official foreign transactions saw the use of the official rates and was termed the first tier market, purely administrative in nature and the market determined rates applied to all other transactions. The essence of the dual exchange rate system was a continued downward adjustment of the exchange rate until the market determined rate and the official rates converged, culminating to a realistic exchange rate. This was actualized on the 2nd of July 1982 at the rate of N3.74 to one dollar. In the years following various modifications were made such from the S(FEM) to the Foreign exchange market (FEM) the introduction of the autonomous foreign exchange market(AFEM), the Dutch auction system (DAS) and the wholesale Dutch auction system (WDAS). Also FEM had which comprised of the official foreign exchange market auction and the autonomous foreign exchange. IFEM which was a merger of the autonomous and official markets in January 1989, was discontinued in 1990 and reintroduced in 1999. The DAS was also introduced in 1987, reintroduced in 1990 and 2002 as retail DAS, since 2006 the wholesale DAS has been in operation until the recent suspension of the W(DAS) following the recent fall in reserves which is as a result of the global fall in oil prices.

1.8. Empirical Review

Exchange rate is considered the single most important price by some countries because of its role in the determination of international balance of payment (Levich, 2001). Mordi (2006) argues also that exchange rate movements have impact macroeconomic variables like inflation, prices incentives etc. also fiscal viability, balance of payments equilibrium; export competitiveness, resource allocation efficiency and overall international confidence have been seen to be impacted by same. Rahman (2016) postulates that determinants of exchange rate can be divided into five areas viz; infrastructure, parity conditions, speculation, political risks, and cross and portfolio investment. Rees (2011) state that economic fundamentals do not provide sufficient information for forecasting exchange rate movements partially because these fundamentals behave differently from the suggestions of the exchange rate determination theories. Faulkner and Makrelor (2008) posit that an improvement in the terms of

trade of a country that is a net exporter of a commodity would impact positively on its wealth however, decline in the terms of trade would apart from impacting the wealth of the nation negatively, impact negatively on domestic demand, and lead to a depreciation of the exchange rate. Faulkner and Makreler (2008) opined that, if a country has a positive net asset holding, it will enhance its capacity to import for some time. In addition, it will raise the country's demand for domestically produced goods (both tradeables and non-tradeables) as well as their prices, thus leading to exchange rate appreciation. Another important factor that affects the exchange rate is the degree of openness of the economy. If an economy protects its domestic producers (and goods) by introducing high tariffs, exchange controls and quotas on imports, domestic demand and commodity prices will increase. These lead to exchange rate appreciation. However, if the economy becomes more open and protection is reduced, the demand for domestic goods and their prices will fall, thus resulting to exchange rate depreciation. Chowdhury (1999); Jhingan (2005) assert that the demand for a country's currency is a crucial determinant of its exchange rate, thus an increase in the demand of country's currency will lead to an appreciation in its exchange rate. and a decrease in the demand will have an opposite effect, fiscal policies of government also affects exchange rate movement, this means that an expansionary fiscal policy that increases government expenditure would lead to increase in domestic demand for tradeables and non tradeables which will in turn lead to increase in commodity prices and an overall exchange rate appreciation. Chowdhury (1999) have explained that technological improvement may also be useful in explaining exchange rate movement as technological advancement aids efficiency in production, via reduction in costs of production and reduction in prices which in turn leads to increased demand, exchange rate will depreciate, on the contrary if the technological advancement increase demand for non-tradeables, and increases income, exchange rate will in turn appreciate.

2. METHODOLOGY

2.1. Data Sources, Analytical Tools, and the Model

The data for this study are secondary in nature. They were obtained from the Central Bank Nigeria Statistical Bulletin of various editions. A simple linear specification of the multivariate time series function using the partial adjustment approach to estimate given parameters of a model was followed by the study using the autoregressive distributed lag model (ADLM). However the assumption posed is that present exchange rate values is likely to be determined by past exchange rate values, furthermore the relationship between exchange rate and macroeconomic variables may be dynamic in nature and may transcend present periods. The utilization of the ADLM was to allow for the estimation of the relationships between exchange rate and the macroeconomics variables. The need may arise for the transformation of the model to an autoregressive distributed lag error correction (ADL-ECM) Model, to determine whether a co-integration exists among the macroeconomic variables. Both the short run and long run relationship of exchange rate and the macroeconomic variables was captured by the (Error/ Equilibrium Correction Model) ECM (Udoye, 2009); (Engle and Granger, 1987).

Countless researchers and economists have cited macroeconomic variables as the long run determinants of exchange rates; drawing from past apiori expectations that are peculiar to Nigeria we formulate the determinant of real exchange rate in Nigeria as follows:

$$\text{OER} = f(\text{GDP, INFR, INTR, IMP, NOEXP, OILEXP, RES,}) \quad (1)$$

$$\text{AER} = f(\text{GDP, INFR, INTR, IMP, NOEXP, OILE XP, RES,}) \quad (2)$$

Where

OER= Official exchange rate.

AER= Alternate exchange rate.

GDP = Gross domestic product.

CPI= Proxy for inflation rate.

INTR= Interest rate.

IMP= Imports.

NOE= Non-Oil export.

OE= Oil export.

RES= Reserves.

For the purpose of empirical computation, Equations 1 and 2 converge to:

$$OER = \lambda_0 + \lambda_1 GDP + \lambda_2 CPI + \lambda_3 INTR + \lambda_4 IMP + \lambda_5 NOE + \lambda_6 OE + \lambda_0 RES + \mu \quad (3)$$

$$AER = \lambda_0 + \lambda_1 GDP + \lambda_2 CPI + \lambda_3 INTR + \lambda_4 IMP + \lambda_5 NOE + \lambda_6 OE + \lambda_0 RES + \mu \quad (4)$$

λ_0 = Constant term.

λs = The parameters to be estimated.

μ = Error term.

The response of the regressand i.e. (dependent variable) to the regressors i.e (independent variables) may not be instantaneous; hence the Equations 3 & 4 above may be converted into a dynamic flow model thus.

$$OER = \lambda_0 + \lambda_1 GDP_{t-i} + \lambda_2 CPI_{t-i} + \lambda_3 INTR_{t-i} + \lambda_4 IMP_{t-i} + \lambda_5 NOE_{t-i} + \lambda_6 OE_{t-i} + \lambda_0 RES_{t-i} + \mu \quad (5)$$

$$AER = \lambda_0 + \lambda_1 GDP_{t-i} + \lambda_2 CPI_{t-i} + \lambda_3 INTR_{t-i} + \lambda_4 IMP_{t-i} + \lambda_5 NOE_{t-i} + \lambda_6 OE_{t-i} + \lambda_0 RES_{t-i} + \mu \quad (6)$$

Where t-i = lag length.

The Akaike Information Criteria is utilized to ascertain the optimal lag length of the model. The possibility of a nuisance lag length after its application may arise, hence the need to introduce the Granger-marginalization procedure to make our model parsimonious.

2.2. Unit Root Test

Engle and Granger (1987); Dickey and Fuller (1981); Enders (1995); Pindyck and Rubinfeld (1998) and a host of others observed over time that data from macroeconomic variables may be “Spurious” if the time series properties of such series are not examined and are not stationary, this would necessitate the need to ascertain the properties of the variables in the model, this would be addressed utilizing the Augmented Dickey Fuller (ADF) test and the Engle-Granger co-integration procedure.

The testing procedure for the ADF is as follows:

$$\Delta OER = \lambda_0 + \beta t + \Delta OER_{t-i} + \delta \Delta OER_{t-i} + \dots + \delta_p \Delta OER_{t-p} + U_t \quad (7)$$

$$\Delta AER = \lambda_0 + \beta t + \Delta AER_{t-i} + \delta \Delta AER_{t-i} + \dots + \delta_p \Delta AER_{t-p} + U_t \quad (8)$$

Where λ_0 is a constant, βt is the co-efficient on a time trend and p is lag order of the autoregressive process and Δ is the difference operator. The unit root test is then carried out under the null hypothesis $\gamma = 0$ against the alternative hypothesis of $\gamma < 0$. If the test statistic is greater (in absolute value) than the critical value at 5% or 1% level of significance, then the null hypothesis of $\gamma = 0$ is rejected and no unit root is present.

From the discussion above, our model in Equations 5 and 6 become:

$$\Delta OER = \lambda_0 + \lambda_1 \Delta ER_{t-i} + \lambda_2 \Delta GDP_{t-i} + \lambda_3 \Delta CPI_{t-i} + \lambda_4 \Delta INTR_{t-i} + \lambda_5 \Delta IMP_{t-i} + \lambda_6 \Delta NOE_{t-i} + \lambda_6 \Delta OE_{t-i} + \lambda_7 \Delta RES_{t-i} + \mu \quad (9)$$

$$\Delta AER = \lambda_0 + \lambda_1 \Delta ER_{t-i} + \lambda_2 \Delta GDP_{t-i} + \lambda_3 \Delta CPI_{t-i} + \lambda_4 \Delta INTR_{t-i} + \lambda_5 \Delta IMP_{t-i} + \lambda_6 \Delta NOE_{t-i} + \lambda_6 \Delta OE_{t-i} + \lambda_7 \Delta RES_{t-i} + \mu \quad (10)$$

2.3. Co-integration Test

If there exist a long run relationship between OER/AER and the explanatory variables, from which they can diverge in the short run, but must return to in the long run, then the residuals obtained from their linear combination will be stationary. If, however the variables diverge without bound (i.e. non-stationary residuals) we must assume no equilibrium relationship exists. In other words, if OER/AER and any of the explanatory variable(s)

are both integrated of order d (i.e. I(d)), then, in general, any linear combination of the ER and any of the explanatory variables will also be I(d); that is, the residuals obtained from regressing ER on the explanatory variable(s) are I(d). Should the residual be stationary it implies there is evidence of long run relationship among the variables. Hence our model in Equation 9 and 10 becomes:

$$\Delta OER = \lambda_o + \lambda_1 \sum_{i=0}^n \Delta OER_t + \lambda_2 \sum_{i=0}^n \Delta GDP_t + \lambda_3 \sum_{i=0}^n \Delta CPI_t + \lambda_4 \sum_{i=0}^n \Delta INTR_t + \lambda_5 \sum_{i=0}^n \Delta IMP_t + \lambda_6 \sum_{i=0}^n \Delta NOE_t + \lambda_7 \sum_{i=0}^n \Delta OE_t + \lambda_8 \sum_{i=0}^n \Delta RES_t + \mu_{1t} \quad (11)$$

$$\Delta AER = \lambda_o + \lambda_1 \sum_{i=0}^n \Delta OER_t + \lambda_2 \sum_{i=0}^n \Delta GDP_t + \lambda_3 \sum_{i=0}^n \Delta CPI_t + \lambda_4 \sum_{i=0}^n \Delta INTR_t + \lambda_5 \sum_{i=0}^n \Delta IMP_t + \lambda_6 \sum_{i=0}^n \Delta NOE_t + \lambda_7 \sum_{i=0}^n \Delta OE_t + \lambda_8 \sum_{i=0}^n \Delta RES_t + \mu_{1t} \quad (12)$$

The model in Equation 10 is the Autoregressive Distributed Lag Error Correction Model (ADLECM) we hope to estimate if there is evidence of co-integration among the variables. On the contrary, if there is no co-integration among the variables we shall estimate the Autoregressive Distributed Lag Model specified in Equation 9.

2.4. Techniques of Results

Three criteria would be employed in analyzing the results obtained from the model; economic (a priori expectations), statistical and econometric criteria. The economic criteria will verify if the signs of the variables coefficient are in agreement with postulates of economic theory. While the Statistical criteria shall focus on testing the significance of the variables using T-test, the econometric criterion would involve such multicollinearity and autocorrelation tests respectively. The autocorrelation will help to confirm the presence of serial correlation among the variables, while the multicollinearity test would assist in verifying variables collinearity.

2.5. Model Justification

There exist numerous models for research of this nature, however models should be selected based on the track record on their use in terms of reliability, effectiveness and finally adequacy of the model for the peculiar research. The Autoregressive Distributed Lag Error Correction model (ADLMECM) was actually selected for its relative simplicity, efficiency and the advantage of being able to aid in forming inferential information on the dynamic nature of the variables, the ECM is selected as it is appropriate and equally efficient in capturing long run behavioral patterns of variables under co-integration situation (See Enders (1995)). However, the existence of I(2) series in the outcome of unit root test put a stop to the use of ARDL as it violates the requirement for the use of ARDL estimation technique.

3. PRESENTATION AND INTERPRETATION OF RESULT

In Table 2 the variables to be stationary, a probability of 5% or less is expected. Apart from consumer price index (CPI) and alternate exchange rates (AER) which were stationary at second difference all other variables are stationary after first difference. In other words, the official exchange rate (OER), gross domestic product (GDP), non-oil export (NOE), oil export (OE), import (IMP), interest rates (INTR), reserves (RES), were integrated of order 1. This is a clear indication that the series exhibit short run stability individually and that pre-estimation diagnosis of the series can continue with co-integration test to affirm their long run stability.

Table-2. Augmented dickey- fuller test results for Unit root.

Variable	Level	T-ADF	PROB	1% CV	5% CV	10% CV
OER	AT 1st DIFF	-9.929551	0.0000	-3.482879	-2.884477	-2.579080
AER	AT 2nd DIFF	-8.255412	0.0000	-3.485115	-2.885450	-2.579598
LGDP	AT 1st DIFF	-14.32994	0.0000	-3.482879	-2.884477	-2.579080
CPI	AT 2nd DIFF	-17.25178	0.0000	-3.484198	-2.885051	-2.579386
INTR	AT 1st DIFF	-10.47778	0.0000	-3.482879	-2.884477	-2.579080
LIMP	AT 1st DIFF	-12.81214	0.0000	-3.482879	-2.884477	-2.579080
LNOE	AT 1st DIFF	-6.195815	0.0000	-3.484653	-2.885249	-2.579491
LOE	AT 1st DIFF	-9.158620	0.0000	-3.482879	-2.884477	-2.579080
LRES	AT 1st DIFF	-15.10560	0.0000	-3.482879	-2.884477	-2.579080

3.1. Co-Integration

Utilizing the Johansen co-integration tests we find that there is a long run relationship among the variables: Alternate Exchange Rate, Consumer Price Index, Interest rate, GDP, Imports, Non- oil exports, Oil exports, Reserves indicates the presence of a long run relationship, the trace tests indicate the possibility of at least 3 co-integrating equations at 5% level of significance. For the Official Exchange Rate, Consumer Price Index, Interest rate, GDP, Imports, Non- oil exports, Oil exports, Reserves variables while the trace test indicate 1 co-integrating equation at 5% level of significance.

3.2. Results of Estimations

The equations were estimated utilizing the Autoregressive Distributed Lag Model (ARDL) see Table 3 and Table 4 for AER and OER.

Table-3. ARDL result for the determinants of alternate exchange rate results.

S/N	Variable	Co-efficient	T-statistic	Probability
1.	AER(-1)	1.256877	14.10597	0.0000
2.	AER(-2)	-0.373059	-4.119754	0.0001
3.	CPI	-0.132699	-0.175145	0.8613
4.	CPI(-1)	2.027104	1.987774	0.0494
5.	CPI(-2)	-1.898815	-2.466609	0.0152
6.	INTR	0.612417	1.701592	0.0917
7.	LGDP	-7.426379	-0.679587	0.4982
8.	LGDP(-1)	24.48418	2.255420	0.0261
9.	LIMP	-2.752687	-0.715999	0.4756
10.	LNOE-	-0.577828	-1.079053	0.9371
11.	LNOE(-1)	0.947442	0.209076	0.8348
12.	LNOE(-2)	-5.782962	-1.444335	0.1516
13.	LNOE(-3)	12.41818	2.959293	0.0038
14.	LNOE(-4)	-10.52526	-2.581721	0.0112
15.	LOE	-8.441591	-0.920945	0.3592
16.	LRES	3.126790	1.558731	0.1220

3.3. Interpretation of Result

The lagged value of the official exchange rate to the first quarter, lagged values of GDP to the first quarter, and the lagged values of oil exports to the fourth quarter, all have positive and significant relationships with the official exchange rate, while the lagged values of CPI in the second quarter and lagged values of oil exports to the first quarter, and lagged value of non-oil exports to the fourth quarter all have a negative but significant relationship with official exchange rate, interest rates, non oil export and reserves all have a positive and significant relationship with official exchange rate. The estimated equation of the AER equation showed that the lagged value of the alternate exchange rate to the first quarter, lagged values of CPI to the first quarter, lagged values of GDP to the first quarter, lagged value of non-oil exports to the third quarter all have all have positive and significant relationships with the alternate exchange rate, while lagged value of the alternate exchange rate to the second

quarter, lagged values of CPI to the second quarter and lagged value of non-oil exports to the fourth quarter have a negative and significant relationship with alternate exchange rates. The positive relationship between Inflation and Alternate exchange rates meet apriori expectations as the inflation rates would lead to high exchange rate values of the naira which in turn represents depreciation. However for Official exchange rates the negative sign does not meet the apriori expectation. The Results for GDP is however surprising as the positive sign depicts that increases in GDP lead to depreciation of the naira, this is indeed an area for more research. Imports on the other hand have a negative but in significant relationship with Alternate exchange rates affirming apriori expectations and an insignificant positive relationship with official exchange rate. Non oil exports has a negative and significant relationship with both the Official and Alternate exchange rates affirming the apriori, oil exports on the other hand has a negative relationship with Official exchange rates, this is in tandem with theory as increased exports is expected to reduce the price of the naira in terms of other currencies which in turn is an appreciation of the naira. The results show that there is a significant positive relationship between reserves and official exchange rate, this negates apriori expectation and calls for further research.

Table-4. ARDL result for the determinants of official exchange rates.

S/N	Variable	Co-efficient	T-statistic	Probability
1.	OER (-1)	0.830016	17.18718	0.0000
2.	CPI	0.858261	1.672984	0.0974
3.	CPI(-1)	0.806356	1.104045	0.2721
4.	CPI(-2)	-1.657322	-3.129296	0.0023
5.	INTR	1.395744	2.962167	0.0038
6.	INTR(-1)	-0.711265	-1.465240	0.1459
7.	LGDP	-14.02422	-1.781315	0.0778
8.	LGDP(-1)	15.79837	2.003652	0.0477
9.	LIMP	2.425127	0.886523	0.3774
10.	LNOE	20.04812	3.016071	0.0032
11.	LNOE(-1)	8.099195	1.671050	0.0977
12.	LNOE(-2)	3.055347	0.625290	0.5332
13.	LNOE(-3)	0.772014	0.154181	0.8778
14.	LNOE(-4)	-23.22421	-3.478219	0.0007
15.	LOE	-9.299517	-1.204640	0.2311
16.	LOE(-1)	-22.729918	-3.252198	0.0015
17.	LOE(-2)	-2.748014	-0.399486	0.6904
18.	LOE(-3)	3.850462	0.558576	0.5777
19.	LOE(-4)	16.78706	2.306549	0.0231
20.	LRES	5.916424	3.446988	0.0008

Table-5. Summary of major determinants of OER and AER.

S/N	Determinants	OER	AER
1.	OER lagged values	Yes	N/A
2.	AER lagged values	N/A	Yes
3.	CPI /CPI lagged values	Yes	Yes
4.	GDP /GDP lagged values	Yes	Yes
5.	INTR/ INT lagged values	Yes	No
6.	IMP	No	No
7.	NOE / NOE lagged values	Yes	Yes
8.	OE / OE lagged values	Yes	No
9.	Reserves	Yes	No

4. SUMMARY, CONCLUSION AND POLICY RECOMMENDATION

4.1. Summary of Major Findings

This study examined the determinants of both the official and the alternate exchange rate specifically from the post SAP era of flexible exchange rate regimes of 1986 to 2015 using quarterly time series data. Relying on existing literature, macroeconomic variables such as Inflation, GDP, interest rates, imports, oil and non-oil exports and

reserves were itemized as potential determinants of both the alternate and official exchange rates. The time series properties of the data utilized in the modeling was first tested for stationarity, using the Augmented Dickey Fuller (ADF) unit root tests and the long run static equation was derived. Co-integration was determined between Official and Alternate exchange rates and the selected variables. The empirical result shows that determinants of official exchange rates are inflation, Interest rates, GDP, Non-oil exports, Oil exports and Reserves while the determinants of the alternate exchange rates are Inflation, GDP, and Non-oil exports.

4.2. Conclusion

The determination of an appropriate exchange rate regime is a decision that must be taken with numerous considerations, as its impact on the economy and the possible ripple effects it may have on other macro-economic variables which are vital for the economic stability of a nation are far reaching. Various policies have been employed some have worked and others are yet to achieve the desired results. The flexible exchange rate stance adopted by the CBN and the various policies put in place to close the wide margin that existed between official and alternate exchange rate shows that policies must be dynamic to address economic issues which are also dynamic. Furthermore the structural challenges as well as the historical occurrences must be examined in the adoption of an exchange rate policy that would ensure macroeconomic stability in the long run, with exchange rate being an important sub set.

4.3. Policy Recommendation

Implications abound for monetary policy formulations from the results of this study. The recommendations that stem from this empirical study include; the need to ensure price stability as its effects on the exchange rates is evident. GDP, Inflation and Non oil-exports have impacts on both official and alternate exchange rates hence the need for the monetary authorities to ensure that these variables are studied to ensure their utilization in achieving stability of the naira. Oil exports which impact the official exchange rate should be maintained at a level that would aid the healthy appreciation of the naira. However a cursory look into the determinants of alternate exchange rate may aid the monetary authorities in providing a panacea to the highly speculative activities of the parallel markets. GDP and Inflation at lagged values and interest rates at current values are major determinants of the official exchange rates, the need therefore arises for the monetary authorities to watch these variables and ensure that they are manipulated to achieve the desired appreciated naira value in tandem with other macroeconomic goals and objectives.

Funding: This study received no specific financial support.

Competing Interests: The authors declare that they have no competing interests.

Acknowledgement: All authors contributed equally to the conception and design of the study.

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