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OIL PRICE AND EXCHANGE RATE VOLATILITY IN NIGERIA

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Abstract: *This study examined oil price influence on the Nigeria exchange rate volatility spanning the retro of thirty five (35) years. The Simultaneous equation modeling of Granger causality test and Vector Error Correction Model (VECM) techniques were adopted, to analyzed the data stream from 1983 – 2019. A dynamic framework analysis that includes test of unit root, descriptive statistics and co-integration preliminary test were carried out. Specifically, the empirical findings show that the coefficient of oil price and other variables (rate of interest, inflation rate and external reserve) considered has varying degree of significant relationship with volatility of exchange rate in Nigeria both in the succinct and long run during the retro under review. The study concludes that oil price has a long run positive non-significant influence on exchange rate volatility and a short run negative non-significant influence on exchange rate volatility in Nigeria during the sample retro under concern.*

Keywords: Oil Price, Exchange Rate Volatility, Co-integration, Causality, VECM, Nigeria

JEL Classification: C22, O24, F31

1. Introduction

By means of different channels oil price capriciousness influence the global economy, including wealth transfer from consumers to producers of oil. Cost of production increase of goods and services influences consumer confidence, inflation and the financial market (Omojimite and Akpokodje, 2010). The salient responsibility of oil price in determining exchange rate fluctuation path is evidenced particularly in post – Breton woods era (Adedipe, 2004 as cited in Ogundipe, Ojeaga and Ogundipe, 2014). In an economy, exchange rate is a pivotal and a veritable price variable that perform the dual responsibility of supporting global competitiveness and serves as domestic price nominal anchor. It should be relatively stable because it is imperative for external and internal growth in the economy (Mordi, 2006). Exchange Rate Volatility (herein after refers to ERV) can spur the uncertainty and the risk of foreign transactions and expose the country to the related risk of exchange rate (Englama, Omotunde, Ogunleye and Ismail, 2010). Nwogwugwu, Ijomah and Uzoechina (2016) positioned that in design and evaluation of policy the behaviour of real exchange rate occupies a cardinal role especially in emerging economies like Nigeria. However, one of the most dynamic prices is oil price which impact macroeconomic

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behaviour significantly in many developed and developing economies like Nigeria and this has been empirically established (Guo and Kliesen, 2005).

1.1. Statement of Research Problem

Just before the crisis of the global meltdown, exchange rate was stable with high oil price in the Nigeria economy, the 2008 financial crisis arrival nosedive oil price and exchange rate caved-in above 20%. Political and economic shock is sent around the world as a result of oil price decline in recent period in the international market (Ogundipe, Ojeaga and Ogundipe, 2014). Crude oil price and ERV are perceived as a core research subject in oil consuming and producing countries and both variables produced interesting influence on macroeconomic conditions holistically which have been studied mainly for causality and guidelines of interaction. Considerable sum of study have been done on oil price and ERV, however, scanty recent empirical studies like Abdulkareem and Abdulhakeem (2016), Ogundipe, Ojeaga and Ogundipe (2014), Osuji (2013), Azeez, Kolapo, and Ajayi (2012) were found in Nigeria case.
The findings of these studies were mixed with some finding positive relationship, negative relationship while others found no relationship between oil price and ERV, thus more research is needed. And the scope of these studies stopped at 2011 (except for Osuji (2013) and Abdulkareem, et'al, (2016) that stopped at 2014 respectively). And some of these studies did not used co-integration techniques in their methodology; this is a serious flaw in the estimation procedure that leads to inefficiency parameters and spurious regression result (Engle and Granger, 1987). In the light of the above, the effect of oil price on exchange rate volatility needs to be re-examined, considering the scope of major prior studies in the case of Nigeria that stopped at 2011, that is quite distant from current period and high degree ERV that bedevil the economy of Nigeria trigger more research instinct. Thus, it is pertinent for us to know the actual effect of oil price on ERV and the causality relationship between them in an unstable macroeconomic environment is the gap in knowledge this study intend to fill with more recent data stream as the broad purpose of the study. The specific objectives are to;

i. Examine effect of oil price on exchange rate volatility in Nigeria
ii. Determine the direction of causality between oil price and exchange rate volatility in Nigeria

1.2. Importance of the Study

The study does not duplicate efforts of previous studies on effects of oil price on Nigeria exchange rate volatility by adopting oil price, exchange rate volatility, interest rate, inflation rate and external reserve dataset. The outcome of this study will benefit the government, financial institutions and policy makers. By providing the understanding needed to diversify and promote other sectors in the economy by managing exchange rate volatility to spur economic growth and standard of living improvement in Nigeria.

2. Literature Review

Gounder and Bartleet (2007) adopted the multivariate framework to examine the short run effect of oil shocks on economic growth in New Zealand. Findings show that linear price changer, asymmetric price increase and the net oil price variables impacted significantly on the economy. Impulse responses and error variance decomposition confirms direct nexus between net oil price shock and growth and its indirect linkages through inflation and the real exchange rate. Nikbakht (2009) examined the long run nexus between oil price and real exchange rate, among OPEC countries using quarterly data from 2000 – 2007. The regression result confirms that real oil price is the dominant source of real exchange rate and long run relationship were also confirm between both variables. Lizardo and Mollick (2010) studied the link between U.S dollar value movements against major currency. Findings revealed that movement in U.S dollar significantly influence oil price. Furthermore, currency of oil importers like China depreciates when oil prices increase. And increase in oil prices depreciates U.S dollar in net-oil exporters like Mexico, Russia and Canada. Beckmann and Czudaj (2012) examined the causalities between real oil prices and real dollar exchange rates using monthly data for different oil-exporting and oil-importing countries. On one hand, findings show that changes in nominal oil prices trigger real exchange rate effects via the nominal exchange rate and the price differential. Conversely, shocks in nominal exchange rates also influence nominal oil prices in some cases. Moshen and Nooshin (2013) examined the influence of oil price on real exchange rate fluctuations in Iran from 2000 - 2011. Adopting structural VAR estimation technique, findings reveal that oil price is a significantly and positively impact exchange rate volatility in Iran during the studied period.

Liu, Zahra, Javed and Amna (2015) studied the impact of oil price fluctuations and exchange rate volatility on economic growth using annual data of 40 years in France. Using the co-integration technique, they found out that the relationship between oil price and exchange rate volatility on economic growth is significant and there exists a long run relationship between them. Yip, Tan, Habibullah and Khadijah (2019) studied oil price influence on exchange rate volatility in India from 1991Q1 to 2013Q1. The Engle and granger two stage, Johansen co-integration test and momentum threshold autoregressive consistent model were employed. Findings suggest co-integrating relationship between both variables. And evidence in favour of asymmetric co-integration was also shown by the result.

Some Nigerian studies include; Ayadi (2005) whom studied the effects of oil production shocks and exchange rate movement in Nigeria as a net exporter of oil from 1975-1992. Regression methodology was adopted; Finding reveals positive response of output after a positive oil production shock in Nigeria. Olomola (2006) investigated the impact of oil price shocks on aggregate economic activity in Nigeria. The study used quarterly data from 1970 to 2003. Findings contrarily discovered that oil price shocks only significantly influence exchange rate not output and inflation in Nigeria. Umar and Abdulhakeem (2010) looked at how oil price shocks affect macroeconomic variables of GDP, money supply, unemployment, exchange rate and consumer price index using VAR techniques; Findings point out that oil price shocks strongly impact GDP and money supply, and the effect on consumer price index is not significant. Englama et al (2010) studied the impact of oil price volatility, foreign exchange demand, and external reserves on exchange rate dynamics in Nigeria using monthly data from 1999 to 2009. They utilized the co-integration technique and Vector Error Correction Model (VECM) for the long and short-run analysis respectively. The results showed that oil price and foreign exchange demand dynamic positively influence exchange rate volatility in the long run.

Jebbin and Osu (2012) examined the effect of oil price fluctuations, foreign exchange, real gross domestic product on exchange rate fluctuations; using the co-integration, VAR and GARCH techniques to examine the long-run relationship. The study found out that real exchange rate fluctuation in Nigeria is significantly influenced by oil price fluctuations. Oriakhi and Osaze (2013) examined the consequences of oil price volatility on the growth of the Nigeria economy within the period 1970 to 2010. With the use of VAR model, the study find that oil price volatility has direct impact on government expenditure, real exchange rate, and real import while real GDP and inflation are indirectly influenced by the oil price volatility. Hodo, Akpan and Offiong (2013) employed annual time series data spanning 1970-2010 and VAR techniques to examine the asymmetric effect of oil price shocks on exchange rate volatility and domestic investment in Nigeria. The study reveal that government expenditure exhibited immediate positive response to oil price shock, but public investment, private investment and industrial production exhibited negative response to oil price shock, further

confirming the evidence of a “dutch disease” in Nigeria. Ogundipe et al (2014) examined the effects of oil price, external reserves and interest rate on exchange rate volatility in Nigeria from 1970 to 2011. The Johansen Co-integration and VECM technique was employed. They observed that a proportionate change in oil price leads to a more than proportionate change in exchange rate volatility in Nigeria; which implies that exchange rate is susceptible to changes in oil price in their findings.
Osuji (2015) examined the effect of oil price movements on USD-Naira exchange rate pair using 420 observations from monthly time series data for the period 2008 to 2014 using OLS and VAR models for analysis respectively. Findings point out that that oil prices on a relative basis significantly affect exchange rate compared to imports also evidence of unidirectional causality relationship from oil prices to exchange rate and from oil prices to foreign reserves was found. Nwogwugwu et al (2016) examined the effects of oil price shocks on exchange rate volatility in Nigeria using monthly data covering the period 1986 to 2015. The models employed are GARCH, PARCH and EGARCH, based on normal, student-t and GED distribution respectively. Findings show that real exchange rate fluctuation in Nigeria is significantly influenced by oil price fluctuations and a strong positive correlation exists between exchange rate return and future oil price volatility. Abdulkareem and Abdulhakeem (2016) analytically gave insight on modelling macroeconomic and oil price volatility in Nigeria using daily, monthly and quarterly data and employed the GARCH-M, EGARCH and TGARCH model and found out that all macroeconomic variables considered (real GDP, interest rate, exchange rate and oil price) are highly volatile and that oil price is a major source of macroeconomic volatility in Nigeria. While Onoja (2015) observed in his study that oil price is not a significant determinant of Exchange Rate Volatility (ERV) in Nigeria as shown in his regression result.
Olayungbo (2019) studied the effect of global oil price on exchange rate, trade balance and reserve in Nigeria from 196Q4 to 2018Q1. The frequency domain causality approach was adopted. Findings indicate that causality relationship was not detected between oil price and exchange rate movement in Nigeria. Bhattacharya, Jha and Bhattacharya (2019) studied oil price influence on exchange rate volatility in India using the Causality, GARCH model. Findings reveal a weak and long run co-movement between oil price and exchange rate volatility. Monday and Abdulkadir (2020) looked at the influence of oil price volatility, foreign exchange demand, and external reserves on exchange rate volatility in Nigeria using monthly data and ARCH model over the period from May 1989 to April 2019.

3. Methodology

3.1. Research Design, Type and Sources of Data

The longitudinal Research Design (LRD) is used in this study. The LRD is informed because the variables under consideration were gathered over a period of time and cannot be manipulated by the researcher. Secondary data stream sourced from CBN statistical bulletin and OPEC Website is used from 1983-2019).

3.2. Preliminary Test

The preliminary test starts with data properties summary and characteristics of the variables under consideration and present them in a convenient form with descriptive statistics. Followed by unit root test which was carried out with the Augmented Dickey-Fuller (ADF) and Philip Peron (PP) test given as:

$$\varDelta Y_t = \gamma + \beta t + \delta Y_{t-1} + \gamma \sum_{i=1}^{m} \Delta Y_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

While:

γ is the drift, t is the deterministic trend, m is the lag dimension
m = lag length significant to guarantee white noise process of ε_t

The Philip Peron test equation is given as:
$\Delta Y_t = \beta_0 D_t + \pi Yt - 1 + \mu t$ ……………………………………………………………..(2)
Where:
Δ = the first difference operator
t = time trend indicator
πY_{t-1}= Endogenous factors
μt = Residual term (Engle and Granger, 1987)

Furthermore, volatility of exchange rate figures is conditional variances generated using the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) as introduced by Engle (1982) and generalized by Bollersslev (1986) is given as;
$\partial_t^2 = \alpha o + \alpha_1 \mu_{t-1}^2 + \beta \partial_{t-1}^2$ ………………………………………………………..(3)
Where
∂_t^2 = Measure of exchange rate volatility
αo = Mean
α_1 and β = The coefficient
μ_{t-1}^2 = The ARCH term, the lag of squared residual and assesses news about changes from the lag period
∂_{t-1}^2 = The GARCH term, the lag of volatility measure itself.

Thereafter, the Johansen co-integration technique is estimated to establish the long run convergence of the variables under concern (Engle and Granger, 1987).

3.3. Theoretical Framework and Model Specification
This study is based on the macroeconomic theory of exchange rate of Balassa-Samuelson (1964). Most times “Penn Effect” (i.e strong direct association between price levels and GDP per capita) is noticed. The estimated concise specification of the model is stated as;

$LnA_t = \Theta + yLnJA_t + Z_t + u$……………………………………………………(5)
Where:
A = The price of US dollars per one unit of domestic currency
JA = Labour productivity differentials
Z = other determinant of exchange rate movement
t = at current time
u = random term (Chowdhury, 2011)

Ogundipe et al (2014) model is adapted. Adjusted version of equation (5), with exchange rate volatility infused as a salient factor inputs, and Inflation rate, external reserve, exchange rate, as ancillary variables. Putting these variables into equation (5) gives the functional form of the model given as:

$Z_t = f$[EXRV, OP, INFR, INTR, LERV]……………………………………….(6)
Where:
Z_t = K vector of endogenous and exogenous variables
EXRV = Exchange rate volatility (Generate with equation 4 and used in equation 7)
OP = Oil price (Price per barrel in international market)
INFR = Inflation rate (annual inflation rate)

LERV = Log of External reserve (percentage of unused foreign currency from international trade)
INTR = Interest rate (annual sum of charges on capital borrowed)
The VECM is a restricted type of Vector Autoregressive Model (VAR) in which the variables have been differenced and one period lagged value of the error correction mechanism included. Thus, the above model can be re-written in its compact econometric form as;

$$\Delta Zt = \alpha io + \sum_{i=j}^{k} Ai\, \Delta Zt\text{-}1 + \sum_{i=j}^{k} \theta\, ECMt\text{-}1 + \varepsilon it \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (7)$$

Where, Δ is the first difference operator, α_{io} is the factor of autonomous variables, A_i is the matrices of exogenous variables, ECM is the error correction mechanism, Θ is the coefficient of ECM, ϵ_{it} is the vector of innovations and Z_t is as earlier defined. *A priori* expectation as derived from theories $\beta_0 > 0$, β_1, β_2, β_4, $\beta_5 > 0$ while $\beta_3 < 0$

Finally, the stationary variables were used to perform the granger causality test as follows:

$$\Delta Y_t = \beta_0 + \sum_{t=1}^{n} \beta_1 (1\text{-}Z)\Delta Y_{t-1} + \sum_{t=1}^{n} \beta_2 (1\text{-}Z)\Delta K_{t-1} + \emptyset 1Ecm(-1) + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(8)$$

While, Z = selected positive coefficient; β_1 and β_2, are parameters and β_0 is the intercept, **ε** is the disturbance terms. ΔY_t = first difference at time t of the variables.

3.4. Data Analysis Method

The Vector Error Correction Model (VECM) is used to analyze our data in this study. It is effective in capturing the rich dynamics between macroeconomic variables in the system equation framework and this was demonstrated by Ogundipe, et'al, (2014). Since the variables under investigation are co-integrated, we use the VECM. This is because the error correction mechanism helps to incorporate the long run property of the variables lost in the process of differencing, back into the model. It becomes imperative to note here that all the preliminary test and model specified in this study were implemented using Econometric Views software (E-view) vision 8.0.

4. Data Presentation and Analysis of Results

4.1. Descriptive Statistics

Table 1: Summary Statistics

	EXRV	OP	INFR	INTR	LERV
Mean	71.15600	40.31571	20.42514	12.58086	3.880286
Median	21.35000	27.60000	12.00000	12.82000	3.870000
Jarque-Bera	4.144906	8.159732	15.45273	3.772232	1.093297
Probability	0.125877	0.610910	0.440400	0.151660	0.578887

Source: Researcher's Computation Using E-view (2019)

Table 1 shows that the proportion of mean to median is almost one. The Jarque-Berra statistic reveals that the variable considered in this study is normally distributed with their non-significant probability value at 5% level of confidence.

4.2. Unit Root Estimation

Table 2: Stationarity Test

ADF Test				P-P Test			
Variable	ADF Indicator	Order	Remark	Var.	P-P Indicator	Order	Remark
EXRV	-2.1431 -5.2348*	1(0) 1(1)	NS S	***EXRV***	-2.1431 -5.2310*	1(0) 1(1)	NS S
OP	-2.0631 -4.0595*	1(0) 1(1)	NS S	***OP***	-2.1078 -4.0604*	1(0) 1(1)	NS S
INFR	-2.5632 -4.6371*	1(0) 1(1)	NS S	***INFR***	3.1653*** -11.7952*	1(0) 1(1)	S S
INTR	-3.3612*** -3.5217**	1(0) 1(1)	S S	***INTR***	-3.3552*** -7.9002*	1(0) 1(1)	S S
LERV	-3.9197*-7.0068*	1(0) 1(1)	S S	***LERV***	-3.9794* -6.9040*	1(0) 1(1)	S S
Critical Values					**Critical Values**		
1%	-4.2528 -4.2627	1(0) 1(1)	Level 1st Diff	1%	-4.2529 -4.2627	1(0) 1(1)	Level 1st Diff
5%	-3.5484 -3.5529	1(0) 1(1)	Level 1st Diff	5%	-3.5485 -3.5529	1(0) 1(1)	Level 1st Diff
10%	-3.2071 -3.2096	1(0) 1(1)	Level 1st Diff	10%	-3.2070 -3.2096	1(0) 1(1)	Level 1st Diff
S = Stationary NS = Not Stationary							

NB: * = 1%, ** = 5% and *** =10% significant level individually.
Source: Researcher's Computation Using E-view (2019)

Table 2 shows that both the ADF and PP estimation unanimously agree the stationarity of all variables selected at order one and uniform order of integration at 5% confidence level respectively. Thus, co-integration test is carried out.

4.3. Johansen Co-integration Result

Table 3: Co-integration Estimation

Trace Statistic				
Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**5% Critical Coefficient**	**Sig.****
None *	0.686494	73.28294	69.81889	0.0258
Max 1	0.459136	35.00508	47.85613	0.4477
Max 2	0.235049	14.72369	29.79707	0.7977
Max 3	0.156143	5.881562	15.49471	0.7095
Max 4	0.008421	0.279083	3.841466	0.5973
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
Maximum Eigen Statistic				
Hypothesized No. of CE(s)	**Eigenvalue**	**Max- Eigen Statistic**	**5% Critical Coefficient**	**Sig.****
None *	0.686494	38.27787	33.87687	0.0140
Max 1	0.459136	20.28139	27.58434	0.3220
Max 2	0.235049	8.842126	21.13162	0.8450
Max 3	0.156143	5.602479	14.26460	0.6646
Max 4	0.008421	0.279083	3.841466	0.5973
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level Max = Maximum or at most				

Source: Researcher's Computation Using E-view (2019)

Both Trace and Maximum Eigen statistic confirm long run association between variables. That is both results indicate one (1) co-integrating relationship at 5% confidence level.

4.4. Akaike Information Criterions

Table 4: Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	Lag	LogL
0	-522.9426	NA	4.27e+08	34.06081	0	34.29210
1	-429.6731	150.4346	5345006.	29.65633	1	31.04406
2	-405.8331	30.76129*	6603332.*	29.73117*	2	32.27534*
3	-387.5975	17.64737	15057611	30.16758	3	33.86819
* indicates lag order selected by the criterion; at 5% level for each test.						

Source: Researcher's Computation Using E-view (2019)

The importance of lag structures in Causality test cannot be under estimated, because causality test is highly sensitive to lag structures. To reduce this menace, the Akaike Information Criterion (AIC) was employed in deriving the optimum lag length and this was two (2).

4.5. Pair-Wise Granger Causality Tests

Table 5: Causality Result

Ho Hypothesis	Input	F-Stat	Sig.	Decision	Remark
DOP ⟶ DEXRV	34	0.00968	0.99	Accept	Partial Feedback
DEXRV ⟵ DOP		4.67982*	0.01	Reject	
DINFR ⟶ DEXRV	34	0.93695	0.40	Accept	None
DEXRV ⟵ INFR		1.93146	0.16	Accept	
DINTR ⟶ DEXRV	34	0.73113	0.49	Accept	None
DEXRV ⟵ DINTR		0.30411	0.74	Accept	
DLERV ⟶ DEXRV	34	1.17036	0.32	Accept	Partial Feedback
DEXRV ⟵ DLERV		3.63496**	0.04	Reject	
**** and ** indicates 1% and 5% level of significance respectively***					

Source: Researcher's Computation Using E-view (2019)

The F-value for hypothesis decision in this study is 2.6 approximately. From table 5 it is clear that oil price (OP) granger causes exchange rate volatility (DEXRV) unidirectional way, external reserve (DLERV) stimulate exchange rate fluctuation (DEXRV) in unidirectional manner (Partial feedback). However, causality relationship was not detected between interest, inflation rate and exchange rate fluctuation during the sample studied.

4.6. Vector Error Correction Model Estimation

Table 6: Vector Error Correction Estimates

EC:	Δ(DEXRV)	Δ (DOP)	Δ (DINFR)	Δ (DINTR)	D(DLERV)
CointEq1	-0.617419	0.044130	-0.262384	-0.050493	0.001247
S.E	(0.09248)	(0.07125)	(0.09246)	(0.01709)	(0.00169)
t-statistic	[-6.67625]	[0.61934]	[-2.83777]	[-2.95496]	[0.73805]
Vector Error Correction Results					
	D(DEXRV)	D(DOP)	D(DINFR)	D(DINTR)	D(DLERV)
Δ (DEXRV(-1))	0.511975	0.240884	0.224799	0.001213	-0.001263
	(0.23380)	(0.18013)	(0.23374)	(0.04320)	(0.00427)
	[2.18979]	[1.33729]	[0.96174]	[0.02807]	[-0.29548]
Δ (DEXRV(-2))	0.099929	0.049302	0.051443	0.051800	0.000430
	(0.23658)	(0.18227)	(0.23653)	(0.04371)	(0.00432)
	[0.42239]	[0.27048]	[0.21750]	[1.18503]	[0.09939]
Δ (DOP(-1))	-0.096344	-0.163743	0.194722	0.042336	-0.000770
	(0.29390)	(0.22644)	(0.29384)	(0.05430)	(0.00537)
	[-0.32781]	[-0.72312]	[0.66269]	[0.77961]	[-0.14335]
Δ (DOP(-2))	-0.185503	-0.118903	-0.114691	0.008827	-0.004180
	(0.30128)	(0.23212)	(0.30121)	(0.05567)	(0.00551)
	[-0.61572]	[-0.51225]	[-0.38077]	[0.15856]	[-0.75904]
Δ (DINFR(-1))	0.682223	-0.089927	0.421578	0.156966	-0.005244
	(0.23399)	(0.18028)	(0.23394)	(0.04323)	(0.00428)
	[2.91561]	[-0.49881]	[1.80208]	[3.63061]	[-1.22609]
Δ (DINFR(-2))	-0.518083	-0.045171	0.136396	0.101572	-0.004388
	(0.25687)	(0.19791)	(0.25681)	(0.04746)	(0.00469)
	[-2.01691]	[-0.22825]	[0.53112]	[2.14013]	[-0.93466]
Δ (DINTR(-1))	0.270995	-0.651812	-0.901425	-0.857891	0.035964
	(0.08332)	(1.21988)	(1.58297)	(0.29255)	(0.02894)
	[3.25246]	[-0.53432]	[-0.56945]	[-2.93250]	[1.24280]
Δ (DINTR(-2))	-0.861988	-0.784109	0.957968	-0.428901	-0.006263
	(1.08352)	(0.83481)	(1.08328)	(0.20020)	(0.01980)
	[-0.79554]	[-0.93927]	[0.88432]	[-2.14237]	[-0.31626]
Δ (DLERV(-1))	0.333066	-1.345205	-2.936549	-2.265352	-0.234918
	(10.0975)	(7.77967)	(10.0952)	(1.86569)	(0.18455)
	[0.03299]	[-0.17291]	[-0.29089]	[-1.21422]	[-1.27293]
Δ (DLERV(-2))	5.940742	-2.537349	4.228905	2.142499	-0.276215
	(9.94962)	(7.66574)	(9.94737)	(1.83836)	(0.18185)
	[0.59708]	[-0.33100]	[0.42513]	[1.16544]	[-1.51895]
C	5.299140	1.716457	-2.155440	0.084942	0.111251
	(3.50329)	(2.69913)	(3.50249)	(0.64729)	(0.06403)
	[1.51262]	[0.63593]	[-0.61540]	[0.13123]	[1.73753]
R^2	0.91087	0.262330	0.567499	0.609169	0.363766
Adjusted R^2	0.89108	-0.164742	0.317104	0.382899	-0.004581
F-Statistic0	57.35070	0.614253	2.266416	2.692220	0.987564

EC = Error Correction
Source: Researcher's Computation Using E-view (2019)

Generally, exchange rate volatility (DEXRV), inflation rate (DINFR) and interest rate (DINTR) the variables were correctly signed while oil price (DOP) and external reserve (DLERV) were not correctly signed. This also showed that government policies in oil price and external reserve have not impacted well on EXRV. The coefficient of determination R^2 and it Adjusted version for exchange rate volatility has a very good-fit of the regression line of 91% and 89% respectively. This means that all the variables considered in the exchange rate volatility model account for approximately 89% of total systematic variation in exchange rate volatility in Nigeria. The F-statistic coefficient of 57.35 is significant at 1% confidence. This demonstrated a significant association between all the endogenous variables taken together in the model. Thus, the overall goodness-of-fit of the model was on the affirmative.

4.6.1. Discussion of Findings and Policy Insinuations

The VECM result in Table 6 reveals that three of the co-integrating variables D(DEXRV), D(DINFR) and D(DINTR)] are adjusting. This is embedded in the negative values of their respective coefficients when compared to their corresponding t-values in CointEql. This means that the error correction has the proper sign and speed of adjustment in the three variables converges in the long run. Based on the rule of criteria, and three of the converging variable [D(DEXRV)], D(DINFR) and [D(DINTR)] were statistically significant. This is seen from their corresponding t-value of 6.68, 2.84 and 2.95 respectively that is greater than two. [D(DOP)] and [D(DLERV)] are the non-adjusting variables and they are not statistically significant. This means that oil price (OP) and log of external reserve (DLERV) in the long run has a non-significant direct effect on exchange rate volatility. This means that all the converging variables are mutually causal as shown by Vector Error Correction Model (VECM).

From Table 6, the exchange rate volatility D(DEXRV) model which is the model of major concern reveals that only one period lag value of exchange rate volatility D(DEXRV(-1)) considered in the model has a significant direct effects on present year EXRV at 5% level of confidence. This spurs high level of exchange rate volatility that is prevalence in the Nigeria economy. The one and two period lag value of oil price (D(DOP)-1)) and (D(DOP)-2)) also impacted negatively on current year exchange rate volatility. This was not statistically significant 5% level respectively. This means that government attention to oil price in Nigeria economy has not yielded the desire result in mitigating EXRV in Nigeria. The one and two period lag considered for inflation rate (DINFR-1) and (DINFR-2) revealed a significant mixed influence on current year EXRV, the effect of the second period is negative while the first period was positive. In the same vein, the one and two period lag considered for interest rate (DINTR-1) and (DINTR-2) revealed a significant mixed influence on current year EXRV. Similarly, the one and two period lag considered for external reserve (DLERV-1) and (DLERV-2) revealed a non-significant inverse effect on current year EXRV in both period, This indicates that government management of external reserve have not yielded the desired results in exchange rate volatility reduction during the period under review. Olomola (2006), Habib and Kalamova (2007), Nikbakht (2009) and Englama et al (2010), Beckmann and Czudaj (2012) confirm similar findings in their study. However, contrary to the findings of Korhonen and Juurikkala (2007), Jebbin and Osu (2012) in the literature.

5. Conclusion and Recommendations

This study x-rays empirically the effect of oil price on exchange rate dynamics in Nigeria spanning the period of thirty five (35) years. Result shows that the coefficient of oil price and other variables (interest rate, inflation rate and external reserve) considered has varying degree of significant relationship with exchange rate fluctuation in Nigeria both in the short and long run retro under review. Specifically, oil price does not significantly impact exchange rate in Nigeria both in the short and long run. Other auxiliary variables of (interest rate, inflation rate) significantly influence exchange rate volatility only in the long run. This shows that interest and inflation rate exact significant pressure on exchange rate volatility in

Nigeria. Furthermore, it was found that unidirectional causality relationship runs from exchange rate volatility to oil price in Nigeria and not the other way. Also, partial causality relationship runs from exchange rate volatility to external reserve not the other way. Thus, this study concludes that Oil price has no causality relationship and significant influence on exchange rate dynamics in Nigeria during the sample period. From the findings this study recommends that appropriate government policies on these different variables especially interest rate and inflation rate that influences exchange rate volatility will help to tackle the menace of exchange rate volatility in Nigeria if properly managed.

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