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Balance of Payments Response to Crude Oil Price Asymmetry in Nigeria: An NARDL Approach

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Abstract
This study investigates the Balance of Payments Response to Crude Oil Price Asymmetry in Nigeria from 1981 to 2018 using the Nonlinear Autoregressive Distributed Lag technique. The results from bounds test revealed that there is cointegration between crude oil prices and balance of payments, exchange rate and oil exports. Crude oil prices were decomposed into positive and negative shocks to capture asymmetry. The short run estimates reveal that positive shocks of crude oil price generates a positive response from balance of payments and also the one-period lag of balance of payments impacts positively on current period balance of payments. Meanwhile, in the long run, estimate show that only negative shocks of crude oil prices are statistically significant and they generate a negative response in balance of payments. Furthermore, the error correction coefficient shows that the speed of adjustment towards long run equilibrium is at 59.5 per cent. Therefore, the study concludes that crude oil prices have direct link with the balance of payments and the study recommend that the authorities should encourage local production and discourage importation of consumer goods so as to reduce the weight assigned to crude oil in the balance of payments.

Keywords: Balance of payments, Crude oil prices, Exchange rate, NARDL
JEL Classification: C32, F32, P28.

1. Introduction

Since the discovery of crude oil in Nigeria in 1956 till date, the Nigerian economy has gradually shifted to an oil dependent economy to the detriment of other real sectors. This has made crude oil the base of the economy on which all fiscal activities are planned and budgeting is made. This is evident from the fact that in 2018, crude oil trade constituted about 66% of total trade, its export constituted more than 96% of total exports while non-oil imports constituted 99% of total imports, thereby indicating that Nigeria is basically a consuming economy due to negligence of other sectors of the economy(CBN, 2020).Furthermore, Crude oil balance of trade stood at ₦ 14159.69 billion as compared to non-oil balance of trade of ₦ -8324.76 billion which further buttresses the large oil-export dependence

of the Nigerian economy while it contributes more than 58% of federal government revenue (CBN, 2020).

The overdependence of the economy on crude oil is indicative of the Dutch Disease Syndrome, which is explained as a structural economic imbalance emerging from mismanagement of oil income that brings about negative influence on the economy, thereby leading to lower prices for the nation's non-oil output in the highly competitive international market (Afolabi, 2019). This consequentially leads to uncertainty in fiscal planning expectations as regards to the price of crude oil, on which the economy depends. This price of crude oil is highly unstable and can hardly be influenced by a single country except in cases like Saudi Arabia or the Russian Federation which have a large share of about 12.9% and 12.6% respectively of global production (BP, 2020).

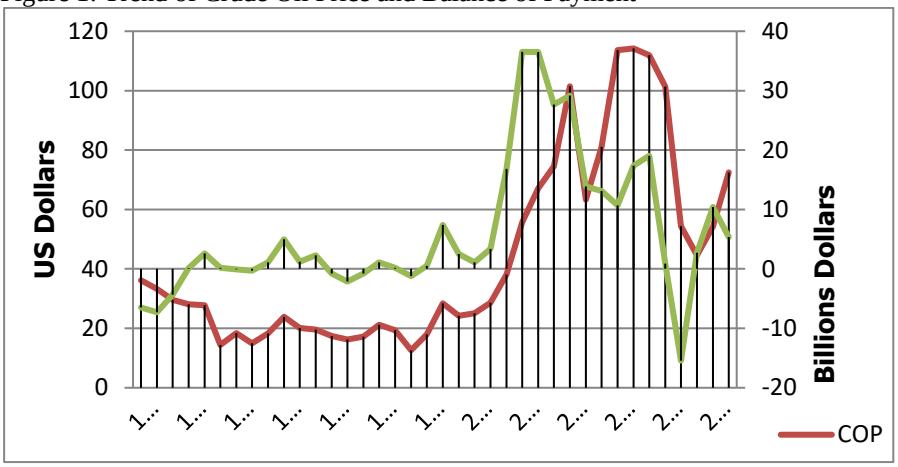
The crude oil-dependent nature of the Nigerian economy has made it difficult to steer the economy properly. This is because of the unstable and highly volatile nature of crude oil prices, during the periods of high crude oil prices, which brings about windfall gains, the government tends to get carried away and end up squandering the revenues on relatively unproductive ventures while in times of crude oil price attenuation, such economies were unable to meet their fiscal obligations and hence, will relent to depleting their reserves and in most cases, venture into borrowing, thereby leaving them with crushing debt servicing problems (Matthew &Adegboye, 2012) as well as balance of payment issues, high levels of inflation as well as unfavourable exchange rate.

Crude oil prices have been very unstable over time as is evident from its trend in Figure 1. In the early 1980s, there was a steady decline of crude oil price from36.18 dollars in 1981 down to around 1986 when it dipped to 14.46 dollars per barrel (BP, 2020), this abysmal drop reflected on the balance of payments which has been on a steady incline from -6.47 billion dollars in 1981 to about 2.60 billion dollars in 1986 and then afterwards, it witnessed a decline for about three consecutive years. Prior to 2001 from the 1990s, crude oil price maintained an average of 19.02 dollars per barrel until in 1998 when it suddenly dipped to 12.62 dollars per barrel due to the Asian financial crisis. The early 2000ssawa gradual incline in crude oil prices until it leapt to 101.43 dollars per barrel in 2008. Economic scholars and observers have argued that this leap was as a result of the invasion of Iraq as well as falling Dollar rates (BP, 2020). During this period, oil suppliers such as Nigeria had windfall gains while importers felt the blow of higher prices. In 2009, there was a sudden dip and by 2010, a crude oil price was already recovering with a steep rise and this also reflected on the balance of payments which rose to 19.05 billion dollars in 2013 (WDI, 2020).

Crude oil is arguably the most important global commodity as its uses cut across all spheres from domestic use to industrial use and there is no nation which is not involved in the trade of crude oil in one form or another (crude form, its by-products or its numerous derivatives). Several factors which range from geo-politics, war, economic, social and health crises to demand and supply issues as well as growing environmental concerns and development of cleaner energy

sources among others are the determinantsof crude oil prices in the international market, hence, it is highly volatile and delicate and as well, has a very significant and pronounced impact on the macroeconomic stability of economies, be it an oil exporter or importer (Umoru, Ohiomu&Akpeke, 2018).

Figure 1: Trend of Crude Oil Price and Balance of Payment



Source: Author's computation using Microsoft Excel, 2020.

Crude oil as the major export commodity in Nigeria is tightly associated with the balance of payments in that it is capable of bringing about a deficit (unfavourable) or surplus (favourable) balance of payments. This is because, following the laws of supply, higher crude oil prices will generate higher supply and as such, could improve balance of payments position through the current account, while a very low price could reduce supply and as such, reduce the weight of crude oil export in the trade balance which happens to be the largest and most significant item on the current account in the balance of payment. In addition, with crude oil export being the major driving component of current account balance, it therefore makes crude oil demand/supply, through its price, a major determinant of the Naira exchange rate as it is the major cause for Naira demand from other countries. Hence, a change in crude oil price is always accompanied by an exchange rate disruption (Alhassan & Kilishi, 2016), which has a pass-through effect on balance of payments.

Apart from being a major source of disruption of the external economic balance, crude oil price instability also causes internal disruptions. The nation's budget is prepared using a benchmark oil price, this means that if there is a sustained decline in the price of crude oil, the government will be unable to meet its fiscal obligations and this could lead to rise in level of inflation in the economy due to budget deficit and in most cases, borrowing on the part of the government (Aigheyisi, 2018).

Evidence shows that there were very scanty literature which treats the subject matter of crude oil price and balance of payments. However, there are a lot of studies which investigated crude oil prices; its relationship with exchange rate,

economic growth, inflation or some other macroeconomic variables (see Alhassan & Kilishi, 2016; Oghenebrume, 2018; Hashimova, 2017; Wu & Yu, 2017). Some of the few available literature that actually examined crude oil price and its impact on balance of payment in Nigeria include Sakanko *et al*., (2019), Afolabi (2019) and Broni-Bediako, Onyije and Unwene (2018). The difference with this study however, is that, while other studies assume that crude oil price is symmetric in its effect, this study will among other things examine the impact of crude oil price asymmetry on balance of payments in Nigeria hence, assuming an asymmetry in crude oil price effects following the position of Hamilton (1983); Adeniyi, Oyinlola and Omisakin(2011); and Shin (2014); that macroeconomic variables have asymmetric responses to crude oil price changes as well as Adeyemi and Hunt (2007) which posits that energy resource prices have a likelihood for asymmetric impact due to the nature of their demand.

The importance of crude oil cannot be overemphasized as it is the lifeline of the Nigerian economy, and with its unstable prices over time, it then becomes germane that its impact on balance of payments be ascertained since balance of payments serves as an important external performance measure or indicator and defines the strong point of a nation's trade position.The rest of this paper is structured as follows: section two is literature review, wherein necessary concepts will be treated and related literature will be examined; section three contains the methodology which deals with the data presentation, model specification, definition and sources of data and as well, states the techniques of analysis; section four presents the result and its interpretation and discussions while in section five, conclusions and policy recommendations will follow.

2. Literature Review

The balance of payment, otherwise called the balance of international payments is a very important macro-economic indicator as it serves as the balance sheet of an economy. Broni-Bediako, Onyije and Unwene (2018) define balance of payment as the documentation of all economic operations between residents of a country and the rest of the world within a given time frame. It recaps an economy's dealings with other countries of the world. CBN (2020) defines balance of payments as a systematic record of economic and financial transactions for a given period between residents and non-residents of an economy. These transactions involve the provision and receipts of real resources and changes in claims, and liabilities on the rest of the world.The fact that no nation is self-sufficient has led to interdependency in the need to exchange goods and services among economies, and this transnational trade among economies is possible only through the buying and selling of a country's currency hence, the need for exchange rate. Exchange rate shows the value of one country's currency in relation to another.

Olanipekun and Ogunsola (2017) posit that exchange rate policy has an extensive array of effects on both external and internal balances. Appreciation of a country's currency by the monetary authorities in an importer-economy may have unfavourable outcome on the real sector, balance of payments and general prices. Therefore, an exchange rate movement in relations to balance of payments has been

a major focus to policy makers since it is believed to have a pass-through effect via exports and imports following the Marshall-Lerner condition.

The Marshall-Lerner condition states that an increase in exchange rates (devaluation) has a positive impact on the balance of payments given. That the country's exports and imports are considered to be price elastic when summed up in absolute terms since currency devaluation makes exports cheaper and imports more expensive thereby encouraging demand for export. The Marshall-Lerner condition is the theoretical base for this study as relates to exchange rate, which is greatly determined by oil prices and oil exports to balance of payments thereby, creating a relationship between the variables. According to the Marshall-Lerner condition, an increase in exchange rate is expected to improve the Nigerian balance of payments position through increase in demand for crude oil export since it is the major export commodity.

There are a few existing studies which have examined the balance of payment and crude oil price nexus. For instance, Sakanko, Obilikwu and David (2019) investigate oil price volatility and balance of payments in Nigeria using data from 1980 to 2017. The Autoregressive Conditional Heteroskedasticity (ARCH) results reveal that the volatility in crude oil price is not mean-reverting; its negative shocks generate more influence than positive shocks. Results from the Autoregressive Distributed Lag (ARDL) model, test the presence of long run relationship between included variables. The results reveal a negative significant relationship between oil price and balance of payment in the long run while oil export hasa positive significant impact in the long run. The short run estimates show current period oil price, one-period lag real GDP and one-period lag oil export with a negative coefficient while one-period lag oil price, current period GDP and oil export are found to be positively related to balance of payments. All regressors are significant with a 36.01 per cent adjustment speed.

Afolabi (2019) examines crude oil price fluctuations and balance of payment in Nigeria using data from 1987 to 2017. The bound test result reveals a long run relationship between balance of payment and the explanatory variables. The short run estimates reveal that both oil prices and exchange rate have negative significant impact on balance of payment while in the long run, both oil price and exchange rates have a negative significant effect on balance of payment. Broni-Bediako, Onyije and Unwene (2018) examine the economic effects of oil price in Nigeria using a series of different Ordinary Least Squares (OLS) equations. Using data from 1990 to 2015, they find that crude oil prices had positive impact on exchange rate as well as on balance of payments.

Examining the movement of exchange rates on balance of payment in South Asia, Jayasooriya (2020) used panel data from 1980 to 2015 on all south Asian countries. The dynamic fixed effects regression shows both GDP and exchange rate to have positive significant relationship on balance of payments in the long run while in the short run, exchange rate had a negative impact while GDP has a positive impact, although both are statistically significant. David and Elijah (2020) examined the exchange rates and balance of payments nexus in Nigeria using data from 1986 to

2018. Results from pairwise correlation show a weak positive correlation between balance of payment to GDP ratio and exchange rates while ARDL estimates show a positive and significant relationship between exchange rate and balance of payments to GDP ratio in both the long and short run.

Sujianto (2020) investigates the macroeconomic factors responsible for determining balance of payments in Indonesia using annual data from 2010 to 2017. Evidence from cointegration and VECM regression show that in the long run, exchange rates and GDP have significant negative and significant positive impact on balance of payments respectively while in the short run, both variables were insignificant in determining balance of payments. Further evidence from Granger causality shows that there is no causality running between exchange rate and balance of payment as well as GDP too. While Eke, Eke and Obafemi (2015) assess the impact of exchange rate on the balance of trade of Nigeria from 1970 to 2012 using annual time series which were analysed in a cointegration and vector error correction model. The estimates show that exchange rate had a significant negative impact on balance of trade.

Evidence from reviewed literature show that there were mixed opinions on the impact of crude oil prices on balance of payments in Nigeria as some say it has a positive relationship (see Sakanko*et al*., 2019: Afolabi, 2019) while others report a positive relationship between oil prices and balance of payments (see Broni-Bediako*et al*., 2018). considering the results obtained from previous studies and the fact that there a only a handful of them, this study investigates the asymmetric impact of oil prices on Nigerian balance of payments in order to determine the real nature of relationship as well as add to the stock of knowledge.

3. Methodology

This study adopts the model used by Sakanko *et al*. (2019) with little adjustments aimed at tailoring the model to well suit the objectives of the study. Their empirical analysis was based on a symmetric ARDL model as follows:

$$\Delta BOP_t = \alpha_0 + \alpha_1 \sum_{i=0}^{n} \Delta BOP_{t-i} + \alpha_2 \sum_{i=0}^{n} \Delta OILP_{t-i} + \alpha_3 \sum_{i=0}^{n} \Delta OILEXP_{t-i} + \alpha_4 \sum_{i=0}^{n} \Delta GDPR_{t-i} + \delta_1 BOP_{t-1} + \delta_2 OILP_{t-1} + \cdots + \delta_4 GDPR_{t-1} + \mu_t \quad \ldots\ldots\ldots 1$$

Where: BOP is balance of payments, OILP is crude oil price, OILEXP is crude oil export, GDPR is real GDP, Δ is the difference operator which shows the short run estimates, t is time period and μ is error term. In this study, we include exchange rates as it has been identified as a major determinant of balance of payments position (Afolabi, 2019) and this study excludes GDP from its analysis as it is not relevant in determining BOP. Furthermore, following Shin, Yu & Greenwood-Nimmo (2014), we decompose crude oil price into its positive and negative changes. This gives the model for this study in its functional form as thus:

$$BOP = f(COP\_POS, COP\_NEG, OXP, EXR) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

Where, BOP is balance of payments, COP_POS is positive crude oil price shocks, COP_NEG is negative crude oil price shocks, OXP is crude oil export and EXR is real exchange rates. The sources of data are all of secondary sources, covering the

period from 1981 to 2018. Specifically, data on BOP and OXP were gotten from CBN annual statistical bulletin (2020), data on COP is the Nigerian Forcados annual spot price gotten from BP statistical yearbook (2020), while data on EXR were gotten from World Bank WDI (2020). For the purpose of empirical investigation, equation (2) is restated into its general statistical form as thus:

$$BOP_t = \alpha_0 + \alpha_1 \text{COP\_POS}_t + \alpha_2 \text{COP\_NEG}_t + \alpha_3 OXP_t + \alpha_4 EXR_t + \mu_t \ldots\ldots\ldots 3$$

Where α_0 is constant or equation intercept, $\alpha_1 - \alpha_5$are unknown parameters or slope coefficients and μ_t is the stochastic disturbance term. In order to avoid multicollinearity due to difference in scaling as well as extremely large values, COP, OXP and EXR will be transformed into their logarithm form, and BOP having negative values which make lo transformation impossible, will be used as a percentage of GDP. The transformation yields the following linear-log model:

$$BOP_t = \alpha_0 + \alpha_1 log\text{COP\_POS}_t + \alpha_2 logCOP\_NEG_t + \alpha_3 logOXP_t + \alpha_4 logEXR_t + \mu_t \ldots\ldots\ldots 4$$

The first step is to examine the time series properties of the series using Phillip-Perron stationarity test designed by Philip and Perron (1988). This test is to check for the presence of unit root in the series. It tests the null hypothesis of non-stationarity against its alternative. If the test statistics in absolute terms is greater than the Mckinnon critical value at 5 per cent, then the null hypothesis is rejected. A series is stationary at levels if the null hypothesis is rejected without carrying out any differenciation while it is stationary at first difference if the null hypothesis is rejected only after first differencing.

The f-statistics generated from estimating equation (5) will be compared with critical bounds values by Pesaran, Shin and Smith (2001) at 5 per cent significance level. If the f-statistics is greater than the upper bounds value, there is cointegration among the variables; however, if the f-statistics is lesser than the lower bounds value, then there is no cointegration among the variables. In a case where there is cointegration, the levels form and the error correction form of the model will be estimated.

Following the Non-linear Autoregressive Distributed Lag (NARDL) frame work which according to Shin, Yu & Greenwood-Nimmo (2014) is capable of handling asymmetric explanatory variables when a non-linear relationship is suspected to exist between regressors and regressand, the following equation is to be estimated:

$$\Delta BOP_t = a_0 + \alpha_1 \sum_{i=0}^{n} \Delta BOP_{t-i} + \alpha_2 \sum_{i=0}^{n} \Delta COP\_POS_{t-i} + \alpha_3 \sum_{i=0}^{n} \Delta COP\_NEG_{t-i} + \alpha_4 \sum_{i=0}^{n} \Delta OXP_{t-i} + \alpha_5 \sum_{i=0}^{n} \Delta EXR_{t-i}\ \delta_1 BOP_{t-1} + \delta_2 COP\_POS_{t-1} + \cdots + \delta_5 EXR_{t-1} + \mu_t \ldots\ldots\ldots 5$$

The above equation is the general form of the NARDL model which is a varied form of ARDL. The first part with the difference operator (Δ) captures the short run dynamics while the second part captures the long run. The reason for selecting this method is because of the advantages the ARDL has over other techniques. It is able to combine both long and short run into one single reduced form equation and as

well, can handle the combination of stationary and non-stationary series without generating a spurious result.

4. Results

Descriptive Statistics

The descriptive statistics presented in Table 1 shows the individual properties of the variables in relation to their distribution. It shows Oil export (OXP) with the highest mean of 6.64 while balance of payments (BOP) has the lowest mean, 2.76 meanwhile crude oil price (COP) and exchange rate (EXR) have means of 3.55 and 3.42 respectively. Given the mean values, BOP appears to be the most varied as it has a standard deviation of 5.67 while COP is the least with a standard deviation of 0.68, OXP and EXR are between the highest and lowest with 2.68 and 1.98 respectively.

The skewness statistic shows EXR and OXP to be negatively skewed while BOP and COP are positively skewed and with all the skewness statistics close to zero, it is concluded that the variables follow a normal distribution while the kurtosis statistics show all variables to be platykurtic as they have positive values. The Jarque-Bera statistics is used to show if the variable follows a normal distribution and from Table 1, the probability values show that only BOP does not follow a normal distribution.

Table 1: Descriptive Statistics

Variable	Mean	Std. Deviation	Skewness	Kurtosis	Jarque-Bera	Jarque-Bera Prob.
BOP	2.7585	5.6730	1.1221	4.4933	11.5053	0.0031
COP	3.5461	0.6757	0.4155	1.8640	3.1368	0.2083
EXR	3.4175	1.9764	-0.7633	2.2703	4.5331	0.1036
OXP	6.6443	2.6772	-0.5343	1.8459	3.9170	0.1410

Source: Author's computation using e-views 10, 2020.

Stationarity Test

The unit root test is conducted using Phillips-Perron test which was chosen over Augmented Dickey-Fuller test because of its ability to correct for serial correlation in the series. In Table 2, it is seen that all variables have their critical values in absolute terms greater than their PP statistics, thereby denoting the acceptance of the null hypothesis of non-stationarity at levels, while, at first difference, all PP statistics are greater than the corresponding critical values. This therefore, implies that all variables are stationary at first difference and as such, are integrated at order I(1). Following the provisions by Pesaran*et al*. (2001), a combination of first differenced stationary variables can be cointegrated. Hence, it becomes necessary that we test for long run relationship using bounds test.

Table 2: Phillips-Perron Test for Stationarity

Variables	Levels		First Difference		Remarks
	PP Statistics	5% Critical Value	PP Statistics	5% Critical Value	
BOP	-2.552524	-2.943427	-7.882306	-2.945842	I(1)
COP	-0.947678	-2.943427	-5.616624	-2.945842	I(1)
OXP	-1.194384	-2.943427	-6.327996	-2.945842	I(1)
EXR	-2.121944	-2.943427	-5.170057	-2.945842	I(1)

Source: Author's computation using e-views 10, 2020.

Bounds Test for Cointegration

The bounds test for cointegration is a test used in assessing the presence of cointegration among series. From table 3, it can be seen that the F-statistics at 4 degree of freedom is 5.310720 while the corresponding upper bound [I(10] value at 5 per cent level of significance is 3.49. this implies that the upper bound value is lesser than the f-statistics and as such, we reject the null hypothesis of no cointegration. Having established that there is a long run relationship among the variables, we go ahead to estimate the levels form and the error correction form of the models.

Table 3: Bounds Test for Cointegration

Test Statistics	Value	K=4
F- Statistics	5.310720	
Critical Value Bounds Significance	I(0)	I(1)
10%	2.2	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Source: Author's computationusinge-views 10, 2020.

Interpretation of Results

The levels form (long run estimates) of the variables is presented in Table 4. The estimates show that all included variables have negative relationships with the dependent variable. From the result, oil price positive shocks has a coefficient of -2.370305 which implies that a dollar increase in the price of crude oil brings about a decline of about 2.37 per cent in the balance of payments, while the negative crude oil price shock with a coefficient of -8.366916, shows that a dollar decrease in price of crude oil makes the balance of payments drop by about 8.37 per cent.

Likewise, oil export with a coefficient of -0.340606 implies that a billion naira increase in oil export brings about a 0.34 per cent decrease in balance of payments while the coefficient of exchange rates, which is -1.922646, means that a naira increase in the exchange rate makes the balance of payments to reduce by 1.92 per cent.

Table 4: Long-run Estimates
Dependent Variable: BOP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
COP_POS	-2.3703	2.2937	-1.0333	0.3103
COP_NEG	-8.3669	4.1900	-1.9968	0.0556
OXP	-0.3406	1.9465	-0.1749	0.8624
EXR	-2.0848	2.9864	-0.6981	0.4909
C	-1.9226	5.9199	-0.3247	0.7478

Source: Author's computation from e-views 10, 2020.

A further look atTable4 reveals that of all the regressors, only the negative shocks of crude oil prices is statistically significant at 10 per cent given its probability value of 0.0556 hence, the rejection of the null hypothesis, while on the other hand, other regressors are insignificant in explaining balance of payment in the long run.

Table 5 presents the short run and error correction estimates. A cursory look reveals that only balance of payment from previous one year and positive shocks crude oil prices were included in the estimate and they were both significant, judging from the t-statistics. The coefficient of previous year balance of payment is 0.246901 which implies a positive relationship with current period balance of payment where a per cent increase in last year's balance of payment brings about an increase by 0.25 per cent in this year's balance of payments while positive crude oil shocks have a positive relationship with balance of payments as well judging from its positively signed coefficient. A dollar increase in crude oil prices brings about a 16.85 per cent increase in balance of payments in the short run.

The error correction term, denoted as *CointEq (-1)**which is the speed of adjustment towards long run equilibrium is appropriately signed and significant given its probability value of 0.00001. Its coefficient of -0.594586 implies that in the case of a disequilibrium in the system, it gets adjusted at a speed of 59.5 per cent. The R-squared value of 0.613190 shows that about 61.3 per cent of the variations in balance of payment are explained by the variables included in the model.

Table 5: Short-run Estimates
Dependent Variable: ΔBOP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(BOP(-1))	0.246901	0.116552	2.118388	0.0431
D(COP_POS)	16.85268	2.849223	5.914834	0.0000
CointEq(-1)*	-0.594586	0.097025	-6.128162	0.0000
R^2 =0.613190, Adj. R^2 =0.589747, Durbin-Watson stat = 2.110977				

Source: Author's computation from e-views 10, 2020.

Discussion of Findings

The results reveal a long run relationship among the variables with an error correction of about 59.5 per cent. This implies that the balance of payments adjusts quickly to shocks generated from the system in the model. This may be because the variables included are closely related to the workings of the balance of payments. The estimates obtained reveal that in the short run, only the positive shocks of

crude oil prices are important to balance of payments. This is related to the supply theory which states that suppliers increase supply in times of higher price so as to be able to make more profit from the higher prices. The case of crude oil is such that, its strategic placement as a universal product with numerous derivatives have made its demand to be price inelastic and as such, even at higher prices, importers have no choice than to keep importing while the exporters enjoy windfall gains which reflects on their trade balances. This finding is in accordance withSakanko*et al*. (2019) which contradicts Afolabi (2019).

The long run estimates however, reveal that all included regressors except negative shocks of oil prices, are not significant. The combination of exchange rate and oil export being insignificant contradicts the Marshal-Lerner condition. The negative effect of negative crude oil shocks in line with the initial estimate obtained for the positive shocks in the short run. In the long run, when the crude oil prices fall, importers may have put in place mechanisms to enable them reduce importation so as to force the price further down while the Nigerian government will elect to stay their supply also. This leads to reduction in the trade balance and consequentially, the balance of payments. This finding supports the findings of Broni-Bediako*et al*. (2018) and contradicts Afolabli (2019). The absence of net crude oil export and exchange rates from the short run estimates and the insignificant estimates in the long run indicate that the Marshall-Lerner condition does not hold for Nigeria during the period of study as Nigerian crude oil export accounts for a very small portion of the global export.

Model Diagnostic

The results in Table 5 are for diagnostic tests carried out to assess the model's fit and reliability of estimates. It is seen from Table 6 that, all tests have probability values greater than 5 per cent and as thus, the null hypotheses cannot be rejected thereby implying that the model is free from serial correlation, heteroskedasticity, specification bias as well as non-normality.

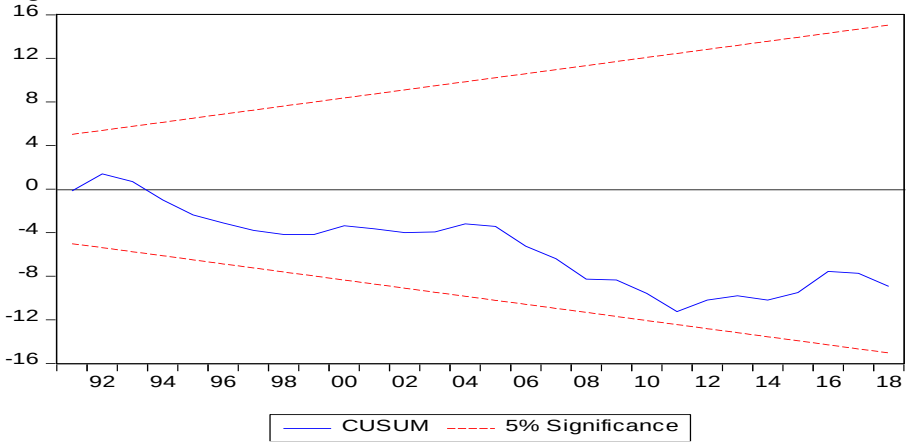
Table 6: Model Diagnostic

Test Statistics	P-value
Serial Correlation: Chi-Square(2)	0.7041
Heteroskedasticity: Chi-Square(7)	0.7721
Normality: Jarque-Bera	0.7691
Specification Error: F-statistic(2, 26)	0.1371

Source: Author's computation from e-views 10, 2020.

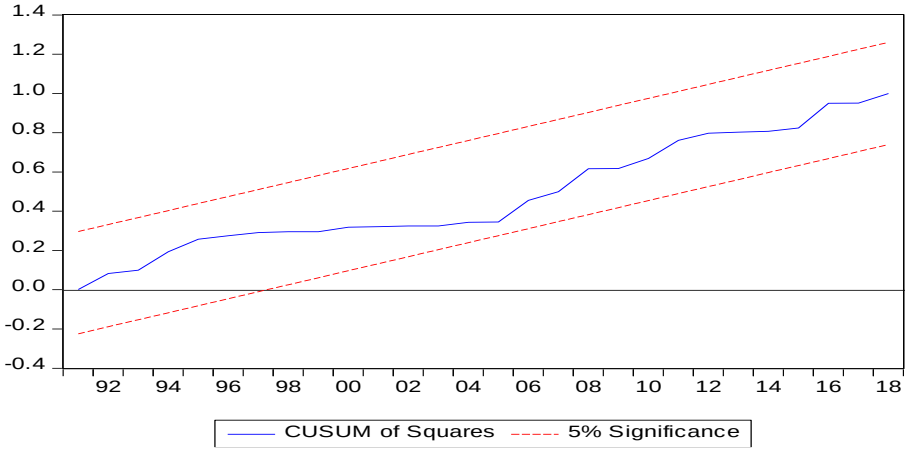
Further look at the cumulative Sum (CUSUM) test and the cumulative sum of squares tests for stability, reveals that the model is of good fit and is stable over time because in both figures 2 and 3, the trend line did not exceed the upper and lower 5 per cent boundary.

Figure 2: CUSUM Test



Source: Author's computation from e-views 10, 2020.

Figure 3: CUSUM of Squares Test



Source: Author's computation from e-views 10, 2020.

5. Conclusion and Recommendation

The study used the non-linear ARDL to estimate the impact of crude oil price asymmetry on balance of payments in Nigeria from 1982 to 2018. The results showed evidence of cointegration between balance of payments and the included regressors. Estimates from ARDL (2, 1, 0, 0, 0) reveal that there was an asymmetric response of balance of payments to crude oil prices where in the short run, balance of payments responds positively to crude oil price increases while in the long run, it responds negatively to crude oil price decrease. This implies that any drop in crude oil prices will definitely generate a deficit balance in the balance of payments, while increase in crude oil prices will create a surplus from large trade balance. This implies that Nigeria balance of payments position is largely

dependent on crude oil prices, which is not determined by forces within the country.

Based on the findings, the study thereby suggest that, the governmet should look in developing other alternatives sectors, by encouraging local production of agricultural and other manufactured consumer goods that can be produced within the country for export; so as to have a soft landing for the effects of crude oil price change.

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