OIL PRICE BEHAVIOUR, EXCHANGE RATE MOVEMENT AND THE COVID-19 PANDEMIC IN NIGERIA: ANALYSIS OF THE FIRST THREE QUARTERS OF 2020

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Abstract: *This paper evaluates the response of oil price and exchange rate to the corona virus pandemic shock aside from the link between oil price and exchange rate for the first three quarters of 2020 in Nigeria. The theoretical framework emanates from the informal approach and the terms of trade channels. Using VAR cointegration approach, results show existence of long run relationship among the oil price, exchange rate movement and the corona virus indicators based on Max-Eigen and Trace test statistic. End of first quarter oil price, discharge rate and fatality rate negatively relate with current exchange rate. First quarter exchange rate and fatality rate positively relates to oil price behaviour in the third quarter while end of first quarter discharge rate increase fosters oil price decline. First quarter spread rate increase gradually reduces oil demand and the price in the third quarter. All corona virus indicators and exchange rate variable Granger Cause current oil price. Diversification is key to widen export base and increase foreign exchange and stability. Policy measures to sustain the economy in the post COVID-19 and beyond are necessary for long term development.*

Key Words: Oil price, exchange rate, COVID-19, Unit root test, VAR-cointegration

JEL Classification: E30, F00, F30, F41

1. General Introduction

Interest in the study of oil price movement is not only based on its influence on economic performance but also on its relationship with international financial variables such as exchange rate, balance of payment among others. This demonstrates the importance of Nigeria, some other African countries and developed world as major crude oil exporters. It has been noted that Canada, Mexico, Saudi Arabia, Venezuela, Angola, Iraq, Nigeria, Brazil, Kuwait and Ecuador are the top ten sources of United States crude oil imports in million barrels per day with Nigeria occupying the 7th position accounting for about 84% of all her crude oil imports while the top five only accounted for about 64%. The emergence of the novel corona virus pandemic accompanies both health and economic risks lowering trade integration among countries with shrinking demand and supply chains as evident from the global demand decline for oil and exchange rate instability. Attention has been on containing health risk (spread, death rate etc.) involved including focusing on quality medical services, social distancing, and other lockdown measures. Nigeria economy is strictly oil dependent and as such government relies heavily on the revenue generated from oil to fund

Cite as:
Saka, J.O., 2021. Oil Price Behaviour, Exchange Rate Movement and the Covid-19 Pandemic in Nigeria: Analysis of the First Three Quarters of 2020. *Oradea Journal of Business and Economics,* 6(1), pp. 51-61. http://doi.org/10.47535/1991ojbe121 .

the economy's budget. A 10.3 trillion naira was prepared as the budget for the 2020 fiscal year on a bench mark of oil price of $57. The drop in the price of oil is a signal for future low revenue and inability to fund the initial budget; hence the economy adjusted to a new equilibrium position. The aftermath effect of this is scarcity of the US dollar which is already manifesting in the parallel forex market and determines the demand, supply and the associated prices even with the autonomous power of the Apex bank to fix the naira official exchange rates. Again, the disequilibrium condition created by the pandemic on exchange rate fluctuation following dollar shortage further engineered other economic uncertainties through series of channels. In some cases, unemployment emerges due to inability to cope with payment responsibilities particularly in the private sector thereby increasing poverty level. Nigerian in Diasporas equally faced challenges with the shortages and in reaction to this, banks placed the extent to which spending can be made using debit card. All these slowed down investment expenditures, consumption spending, aggregate demand among others and further worsened by the hike in price of goods and services. In early September, 2020, the shock of rising costs of electricity and fuel again hit Nigerians and is currently under a serious peaceful agitation. While the government comes with reasons for the fuel price increases, the citizens also are with reasons that such increments are uncalled for. In all honesty, Nigerians are depressed following frequent unbearable economic circumstances which are in most part caused by the corona virus disease. The Nigeria's gross domestic product (GDP) growth rate was 1.87% in real term during the first quarter and dropped significantly to -6.10% growth consequent upon the cumulative effects of the corona virus pandemic. In 2016, oil price decline was one of the factors responsible for the recession that took place, there was however currency control measures by the government to prevent outflow of foreign currency amidst deteriorating foreign reserves. Numerous research works have investigated the link between oil price shock and exchange rate movement at various times such as (Amano and Norden, 1998; Chen and Chen, 2007; Narayan et al., 2008; and Uddin et al., 2013) whose studies are based on oil-importing countries while Akram, 2004 and 2009 and Nikbakht, 2010 among others focus on oil-exporting countries. The motivation for this study however centers on understanding the response of the two to the corona virus pandemic and their links. So far it is unlikely that many studies concentrate on this motivation. Besides, the two key variables-oil price and exchange rate and corona virus indicators are on daily basis which adequately makes it unique from some other studies in similar area. Thus, the study is set to answer the questions: What is the link between oil price behaviour and exchange rate movement in Nigeria? Does corona virus pandemic cause oil price increase and exchange rate depreciation? Consequently, the objectives of the paper are to: create an understanding of the link between oil price shock and exchange rate movement and to establish whether the corona virus pandemic causes oil price increase and exchange rate depreciation in Nigeria. The paper is organised as follows: Section 2 contains Literature review. Section 3 discusses the trend in oil price, exchange rate movement and COVID-19 pandemic while section 4 focuses on the theory and methodology. Section 5 demonstrates the results and discussion while section 6 concludes.

2. Theoretical and Empirical Literature

Some theories such as the exhaustible resources, supply and demand framework and the informal approach have been used in the energy economics literature to analyse the oil price behaviour. The focus here is on the informal approach since it bridges the gap between oil price movement and corona virus pandemic. In the informal approach, we link the oil demand and supply and hence its price to some fundamental economic, geopolitical and incidental factors and episodes of oil market history. The incidental factors have a good link

with the present corona virus pandemic which effectively creates disequilibrium in economic conditions. The informal approach gives a clue on whether the oil market witnesses some structural changes with long lasting effects on oil price movement or whether the cause is due to temporary drivers. The change here has been linked to low spare capacity which implies price bearing most adjustments in the event of any shocks such as the COVID-19 in the system. Again, if capacity constraints are the driving forces, accelerated increase in the average level of oil prices, spikes and volatility would be the price dynamics that emerge as evident from the corona virus pandemic.

In evaluating the link between oil price and exchange rate movement, three direct transmission mechanisms are considered: the terms of trade channel, the wealth effect channel and the portfolio reallocation channel (Buetzer et al, 2016). The terms of trade channel introduced by Amano and van Norden (1998a, b) is based on the underlying fact linking the price of oil to the price which subsequently affects the real exchange rate (Bénassy-Quéré et al., 2007). Given the non-tradeable sector, a country is more energy intensive compared to the tradable one. The output price its sector rises compared to the output price of another country. By implication, currency in the country in question faces real depreciation owning to increases in inflation (Chen and Chen, 2007; Buetzer et al., 2016).

If the price of the tradable is hence forth assumed not to be fixed, then its effect on the nominal exchange rate becomes highly noticeable. Therefore, inflation and nominal exchange rate changes are linked through Purchasing Power Parity (PPP).

The notion behind the portfolio and wealth channels as introduced by Krugman (1983) and Golub (1983) is linked to a threecountry framework and is given consideration by Bodenstein et al. (2011). The idea here is that oil exporting countries experience transfer of wealth given any increase in oil prices (Bénassy- Quéré et al., 2007). While the wealth channels reflect the short run impact, the portfolio describes the short and long run impacts. As oil prices rise, there is a transfer of wealth from oil-importing to oil-exporting countries (in US dollar terms) and is a reflection of a positive impact on the exports and current account balance in domestic currency. It is expected that currency of oil-exporting countries appreciate and those of the oil- importing countries depreciate (Beckmann and Czudaj, 2013b). The US dollars may again appreciate in the short run due to wealth effect if the oil-exporting countries reinvest their revenue in dollar assets of the US. The short and medium term effect on the US dollar relative to currencies of oil exporting countries is a function of dependence of the US on oil import relative to its share of exports in oil-producing countries and oil exporting countries relative to preference for US dollar assets (Bénassy-Quéré et al., 2007; Coudert et al., 2008; Buetzer et al., 2016).

Causality from exchange rate to oil prices can theoretically be observed on the notion that the oil price is denominated in US dollars. An appreciation of the US dollar increases the oil price expressed in terms of the domestic currency thereby lowering the demand outside the economy in question and consequently leading to a fall in oil price all things being equal (Bloomberg and Harris, 1995; Akram, 2009). (Coudert et al., 2008). Meanwhile, oil-exporting countries may tend to adjust oil prices or supply in response to exchange rate dynamics but again this depends on their price strategy (Yousefi and Wirjanto, 2004).

Empirically, numerous studies have embarked on the crucial relationship between oil prices and exchange rates. Al Rasasi (2017) examines the impact of oil price shocks on the Gulf Cooperation Council (GCC) exchange rates using quarterly data from 1980-2014and linear VAR model. Depreciation of the GCC exchange rate results from an economically significant one-standard deviation shock to the price of oil. For the non-linear model, appreciation of the exchange rate results. Fowowe (2014) observes that an increase in oil price is related to reduction in the South Africa rand compared to the US dollar. Ahmad & Moran Hernandez (2013) estimated the long-run relationship in real terms between oil prices and exchange rates for twelve major oil producing and oil consuming countries. Results show cointegration

in five of the countries observed together with the Eurozone. García et al (2018) analyse the relationship between the nominal exchange rate of the Mexican peso relative to the US dollar and the spot and future prices of oil using a vector a vector autoregressive (VAR) model. They show that a decrease in the spot price of oil is linked to a depreciation of the Mexican peso relative to the US dollar and vice-versa and that future spot oil price is not statistically significant for the Mexico peso relative to the US dollar. Biswal (2019) used ARDL and bounds testing cointegration modeling frameworks with the results showing that oil prices negatively affect the exchange rate of the Mexican peso to the US dollar in the long run. The study concludes that the episodes have different effects on the returns pointing at the substantial effects of the COVID-19 pandemic on the US market returns compared to the effects of other crises. Albulescu (2020a) using ARDL modeling, studies the influence of COVID-19 data on WTI crude oil prices. Controlling for the effect of CBOE volatility index (VIX) together with economic policy uncertainty (EPU) index of the US, the study concludes that the global new infection cases and death ratio do not show any significant impact on the EPU but are directly related to the dynamics of the EPU when setting aside data for China. Nigerian empirical literature on the link between COVID-19 and oil price shock and exchange rate is grossly inadequate but attention has been on misconceptions, prevention and transmission rate. However, Adenomon and Maijamaa (2020) examine COVID-19 effect on the Nigerian stock exchange from January to April and conclude that the pandemic has resulted in loss and high volatility in stock returns. Ozili (2020) studies the link between COVID-19 and economic crisis in Nigeria. Using descriptive statistics, he shows that most economic factors including Purchasing Managers Index (PMI), inflation, crude oil price etc; react negatively to the pandemic. Hence, this study builds on this to explore on empirical linkage between the pandemic and oil price and exchange rate behaviour in Nigeria.

3. Oil price, exchange rate movements and COVID-19: A Trend analysis

Oil and exchange rates have had a long history within the Nigeria growth history. Nigeria, a member of the Organization of Petroleum Exporting Countries (OPEC), is an exporter of high and medium grade crude oil. Various fluctuations in the oil price and exchange rate have been in most part a consequence of external shocks over time. The 1973-74 and 1979 oil price shocks led to a huge oil transfer to the economy accompanied by increasing public expenditure and access to international capital markets. This period of oil price shock facilitated the emergence of the Dutch Disease and as such agriculture the main stay and non-tradable sector declined continuously. The sudden collapse of oil in 1982 and the real interest rate increase put the economy on another phase. Nigeria then experienced inflation increase, foreign exchange tight rationing and envisaged debt rescheduling. Around the same period was the rise in parallel markets and illegal floating-rate parallel market maintained same level with official-fixed-rate market.

The shocks of the early 70s and 80s fourteen years after oil discovery brought about various dynamics in oil price, terms of trade and exchange rate among others. Being a mono-product nation, Nigeria is vulnerable to international crude oil price movement. During the period of favourable oil price shock, the rising demand for the commodity, seasonality factors and trade linkages among others, the country was placed on favorable terms of trade, and exchange rate appreciation. With unfavourable oil price shocks, foreign exchange inflow dropped significantly and consequently budget deficit and slow growth. Growth of High-Powered money was truncating between 1973 and 1977 and even during the second oil price increase episode. The fact that growth of money supply led to the rising inflation despite the nominal appreciation of the naira in these years, suggested that the flow of money demand was lower than flow of money supply.

Overtime, GDP growth has responded to oil price and exchange rate fluctuations. The average annual GDP growth reached 7% between 2000 and 2014 but following another oil price collapse between 2014 and 2016, together with negative production shocks, there was a significant decline of growth performance to 2.7% by 2015 an by 2016, the economy was already in recession, the first of its kind in 25 years with a negative GDP growth of 1.6%. Since the 2015 experience, Nigeria has been battling with unstable low growth but by 2018, growth on the average 1.9% and later at a stable level of 2% in the first half of 2019. Inflation stood at 11% around same period constraining domestic demand through impeding private consumption. Some notable sectors such as the telecommunication, enhanced production side in 2019 while agriculture performed below expectation due to socio-economic crisis in some parts of the country.

As Nigeria still battles with the negative multiple effects of the 2008-2009 global financial and economic crises, a global corona virus pandemic emerged from Wuhan in China by late 2019 and found its way into the economy in February, 2020. Effects on oil price and exchange rates around this period were insignificant and as such average of oil prices and exchange rates stood at $66 and N306/$ in January and $58 and N306/$ in February.

Table 1: COVID-19 related and Economic variables three quarters of 2020

Quarterly	Spread Rate	Fat. Rate	Discharge Cases	Oil price ($)	Exchange rate(N/$)
Q_1 (2020)	10.397265	0.01646	1.2	33.0159	326.125
Q_2 (2020)	5.98147554	0.02811	2479.06593	27.7987	360.5
Q_3 (2020)	0.9358417	0.02031	31150.6364	43.6435	371.5

Source: Author's computation using NCDC data

On a quarterly basis and as described on table 2 above, average spread rate in the first quarterly was highest compared to the other subsequent quarters. Fatality rate (0.02) and discharge cases (1.2) were lowest accordingly for this quarter. This may be linked to the low cumulative number of cases around this period. For the three months, only March could be effectively captured as the pandemic effect was more pronounced compared to January and February. Oil price and exchange rates were respectively $33.01 and 326.13/$ on the average demonstrating a gradual impact of the pandemic demand and supply and hence on oil price and naira-dollar exchange rates. Drastic reduction of oil demand remained more pronounced in the second quarter and consequently lowering the oil price to the average level of $27.80 with depreciation higher (360.5/$). The ease of lock down in the third quarter gradually brought back economic activities and as predicted oil price gradually picked with corresponding 371.5/$, a depreciation of about 3.05% from the previous level.

Nigeria relies on crude oil to sustain about 90% of its foreign exchange (FEX) earnings but the oil price slump lessened the FEX into the government purse and makes investors pull out much needed foreign capital. As a dollar outflow curtailing measure to mitigate its negative impact on the country's gross international reserves which was approximately $34.3billion as at May 11, 2020, the APEX bank adopted the FX reforms and commercial banks limited customers' international spending engagements as FX supply tightened. The naira exchange rate at the Investors' and Exporters' window was adjusted to reflect the worsening macroeconomic fundamental and hence the rate weakened to N386.94/ $ translating to 6%. While importers continue the search for hard currency, foreign investors opted for safe investment alternatives. As a measure to contain the spread of the virus, the APEX bank hindered the sales of FX to Bureau De change operators providing a secondary benefit of conserving the limited dollar resources amidst global risk aversion. This thus increased currency speculation with naira depreciating further N460/$ towards end of April,

2020. The bid-offer spread in the market resulted in low FX supply amidst the domestic demand for dollar which has since been putting huge pressure on the naira.
Nigeria Naira faces huge challenges given the oil price increases. Operating with currency pegs around persistent low foreign reserves and sovereign wealth assets makes the economy more vulnerable. However, the pegged regime could be optimal as floating type is likely to result in imported inflation in the period of economic recession.
Weak macroeconomic conditions in the short term may give rooms for more naira depreciation except that concessional flows support the naira through the CBN interventionist policy in the FX market. Meanwhile, as the economy remains more open consequent upon ease of lock downs and given that the spread of COVID-19 reduces, it is expected that the rising oil demand triggers oil prices as indicated in for the months of August and September reaching averages of $45 and $41 while naira continues on a depreciating trend with 377$/N and 380$/N.

4. Theory and Methodology

On the basis of the above theories the study relies on the terms of trade channel transmission mechanism modified to suit the present COVID-19 pandemic and the informal approach. Before the advent of the pandemic, demand for oil was not on a declining trend and accompanied by relatively higher prices for which Nigeria, a mono-product economy heavily relies upon for budget preparation. The theoretical idea here mainly relies on the terms of trade channels for the exchange rate behaviour and the informal approach to the oil price behaviour earlier discussed. The terms of trade reflect the condition in which the output price in a more energy intensive non-tradeable sector rises compared to that of other sector thus leading to currency depreciation due to inflation while the informal approach links the oil demand and supply to some fundamental economic, geopolitical and incidental factors on the basis of oil market history which thus affect the oil price. The incidental factors here reflect the present corona virus pandemic which effectively created a mismatch in the demand-supply condition and hence the oil price. On the basis of these the following VAR baseline model specifications are:

$$\ln oil.p = \alpha_0 + \alpha_1 \ln dis.rt_{-1} + \alpha_2 \ln dis.rt_{-2} + \alpha_3 \ln exc.rt_{-1} + \alpha_4 \ln exc.rt_{-2} + \alpha_5 \ln fat.rt_{-1} + \alpha_6 \ln fat.rt_{-2} + \alpha_7 \ln oil.p_{-1} + \alpha_8 oil.p_{-2} + \alpha_9 \ln sprd.rt_{-1} + \alpha_{10} \ln sprd.rt_{-2} + \varepsilon_1 \quad (1)$$

$$\ln exc.rt = \beta_0 + \beta_1 dis.rt_{-1} + \beta_2 \ln dis.rt_{-2} + \beta_3 \ln exc.rt_{-1} + \beta_4 \ln exc.rt_{-2} + \beta_5 fat.rt_{-1} + \beta_6 fat.rt_{-2} + \beta_7 \ln oil.p_{-1} + \beta_8 \ln oil.p_{-2} + \beta_9 \ln sprd.rt_{-1} + \ln \beta_{10} \ln sprd.rt_{-2} + \varepsilon_2 \quad (2)$$

Where $oil.p$ is current oil price behaviour, $Dis.rt$, the discharge rate, $exc.rt$ exchange rate, and is $fat.rt$, the fatality rate. $sprd.rt$ represents the spread rate and ε_1 and ε_2 are the error terms in each case which are independently and identically distributed. First and second lags of exchange rate and oil prices are included as explanatory variables for the VAR specification. All the variables are in natural logarithmic forms to attain normality assumption.
Methodology is rooted in the VAR-Cointegration estimation technique considering the optimal lag selection process. Regression based on VAR allows to predict the response of

the current values of dependent variable from any change in its lags and lags of other variables in the system.
Data for the corona virus indicators including the discharge rate, fatality rate, spread rate are carefully obtained from the Nigeria Centre for Disease Control (NCDC) and both oil price and exchange rate statistics on the daily bases are obtained from the National Bureau of Statistics (NBS) for the first three quarters of 2020.

5. Results and Discussion

Table 2: Descriptive Statistics

Variable	ln Dis.rt	ln exc.rt	ln fat.rt	ln oil.p	ln sprd.rt	Residuals
Mean	7.35	5.88	0.76	3.48	-0.27	0.00
Median	8.56	5.89	0.77	3.70	0.73	-0.00
Std Dev	3.46	0.06	0.34	0.45	0.10	0.01
Skewness	-1.00	-1.96	-0.97	-1.37	-9.65	4.81
Kurtosis	2.77	6.37	3.37	3.87	95.57	28.57
J-B Prob	0.00	0.00	0.00	0.00	0.00	0.00
Obs.	208	135	207	140	201	41

Source: Author's computation using E-views

Table 3: Pairwise Correlation

	ln Dis.rt	ln exc.rt	ln fat.rt	ln oil.p	ln sprd.rt
ln Dis.rt	1.00	0.79	0.43	0.54	-0.58
ln exc.rt	----	1.00	0.53	0.09	-0.28
ln fat.rt	----	-----	1.00	-0.24	0.22
ln oil.p	-----	-----	-----	1.00	-0.69
Ln sprd.rt	-----	------	-----	-----	1.00

Source: Author's computation using E-views

A table 2 displays the descriptive statistics sample mean and other descriptive statistics for the exchange rate and oil price and the corona virus indicator variables. Variables are already in natural logarithmic form to follow the normality assumption. The sample mean of exchange rate (5.88) is positive and followed that of the discharge rate (7.35). High mean value of the discharge rate is an indication of the frequent discharge of infected persons while that of exchange rate mean may be linked to the depreciating value of the naira. The mean value of oil price (3.48) also demonstrates cumulative price levels formerly and to a higher price subsequently. The spread rate (-0.27) relates to variations in spread rate overtime. The discharge rate (3.46) has the highest spread (fluctuation) in the distribution and followed by the oil price (0.45) which also fluctuates. The skewness coefficients are negative for all the variables except the residuals. This means that the variables are asymmetrically distributed. Kurtosis coefficients are positive but less than 3 for the discharge rate variable showing that it is flattened. The J-B probability indicates that all variables are not normally distributed. Correlation coefficients give an idea of the degree of association between the exchange rate and oil price and corona virus indicators as shown on table 3. The discharge rate and the spread rate (-0.58) are negatively correlated. Increasing level of discharge rate seems to narrow the margin of spread rate as experienced especially during the early stage of the pandemic. The exchange rate and spread rate are equally negatively correlated (-0.28) implying that higher spread rate depreciates naira value as experienced. Likewise, oil price and spread rate have a strong negative correlation (-0.69). As spread rate rises, demand for oil declines and oil price falls accordingly as witnessed in the second

quarter of 2020. Generally, the low correlation coefficient shows that multicollinearity is not likely to be a major problem.

Table 4: Unit root test results

	PP		Test eqn	Decision	OI
Variable	T-stat	Prob. V			
ln Dis.rt	-2.88	0.00	constant	No unit root	level
ln excr.rt	-2.90	0.07	constant	No unit root	First difference
ln fat.rt	-2.88	0.05	constant	No unit root	level
ln oil.p	-2.90	0.00	constant	No unit root	First difference
ln sprd.rt	-2.88	0.00	constant	No unit root	level

Source: Author's computation using E-views

The unit root test results as displayed on table 4 shows that the PP (Philips and Perron) test method is applied. First, the discharge rate does not show unit root at 5%. Exchange rate variable has no unit root at the 10% level. The fatality and spread rates do not show unit root at the 5% level but marginally for fatality rate. Both oil price and the spread rate do not show unit root at the first difference and level respectively.

Table 5: Unrestricted Cointegration Rank Test (Trace)

Hypothesised No of CE(s)	Eigen value	Trace stat	5% critical val.	Prob.	Max.Eigen stat	5% Critical val	Prob.
r≤0	0.73	84.13	69.82	0.00**	50.45	33.98	0.00
r≤1	0.35	33.69	47.86	0.52	16.95	27.58	0.58
r≤2	0.28	16.74	29.80	0.66	12.99	21.13	0.45
r≤3	0.09	3.75	15.49	0.92	3.60	14.26	0.90
r≤4	0.004	0.15	3.84	0.69	0.15	3.84	0.69

Source: Author's computation using E-views

The Johansen cointegration test results (table 5) reveal that there exists one cointegrating equation at the 5% level for both Trace and Max-Eigen test statistics. Generally, the results show that the corona virus indicator variables and the economic variables have a long run relationship and hence move jointly. However, given the number of cointegrating equations, the system is unlikely to be stable. The existence of long run relationship justifies estimation of cointegrating vectors.

Table 6: Lag Length selection (VAR)

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-108.25	NA	0.00	3.38	3.54	3.45
1	394.29	915.07	0.00*	-10.87	-9.89*	-10.48
2	436.91	71.24*	0.00*	-11.40*	-9.59	-10.68*

Source: Author's computation using E-views

The optimum lag length selection is carried out using the Sequential Modified Likelihood Ratio (LR) test, Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hanna Quin Information Criterion (HQ). Table 6 above indicates that only FPE and SC select lag 1. Lag 2 is therefore selected as majority of the test procedures select "2" as the optimum lag.

Table 7: VAR Results

	ln Dis.rt	ln exc.rt	ln fat.rt	ln oil.p	Ln sprd.rt
ln Dis.rt_1	0.52*	0.002	-0.18	0.02	-0.97
ln Dis.rt_2	0.42*	-0.002	0.22	-0.0004	0.85
ln exc.rt_1	1.06*	0.95**		-0.77	0.43
ln exc.rt_2	1.53	-0.01		0.25	-0.42
ln fat.rt_1	-0.58*	0.004	0.76	-0.08	-0.16
ln fat.rt_2	0.60*	-0.01	0.04	0.05	0.52
ln oil.p_1	0.08	0.01	-0.02	0.78**	-0.13
ln oil.p_2	0.04	-0.003	-0.06	0.05	-0.15
ln sprd.rt_1	-0.02	0.0003	-0.01	0.01	0.41
ln sprd.rt_2	0.05	0.0004	0.04	-0.01	0.23
C	-15.16	-15.16	5.73	3.50	24.58
$R^{2\ bar}$	0.998	0.97	0.78	0.98	0.96
F-stat	23.77	3751.39	23.77	202.42	23.77
Log L	-59.51	47.13	-59.51	80.61	-59.51
AIC		-1.08	-2.10	-2.08	2.10
SSC	-0.72	-1.72	2.47	-6.67	2.47

Source: Author's computation using E-views

Results of the VAR are as indicated on table 7. Oil price and exchange rate equations are discussed being the key endogenous variables. Starting from the oil price equation, oil price increase during the first (0.05) and second quarters (0.78) triggered the oil price increase in the third quarter but significant for the second quarter. An exchange rate increase in the first quarter is positively (0.25) related to current oil price while it reversed in the second quarter. A 10% increase in the second quarter discharge rate brought about a 0.2% increase in the current oil price while the latter decreased with the increase in first quarter discharge rate. Fatality rate follows similar trend but with reversed signs during the period. Effect of the first quarter spread rate increase (-0.01) was noticeable on the current oil price. This is probably because incidence of the pandemic was gradually having a declining effect on oil demand. In the exchange rate equation, coefficient (-0.01) shows that first quarter exchange rate negatively related to the current exchange rate and by the second quarter, it demonstrated a significant positive relationship (0.95) with current exchange rate. A 10% increase in the discharge rate in the first quarter reduced current exchange rate by about 0.02% and an increase of same during the second quarter. Fatality rate has similar effect on exchange rate in both first and second quarters as the discharge rates though with different magnitudes. A 10% increase in the first quarter oil price gave about a 0.03% decline in the exchange rate in the third quarter while a 10% increase in the second quarter oil price generated about 0.1% increase in the current exchange rate. The relationship between oil price and exchange rate in the second quarter demonstrated the instability between the two amidst COVID-19 pandemic. As shown by the spread rate coefficients, the rising spread in the first and second quarters related positively with current exchange rate movement. This is not surprising because the spread has continued to create economic instability through exchange rate fluctuations. The corona virus pandemic indicators explain over 90% of the variation in both the oil price and exchange rate during the quarters.

Table 8: Short run Equilibrium

	ln *Dis.rt*	ln *exc.rt*	ln *fat.rt*	ln *oil.p*	ln *sprd.rt*
Error correction	-0.005	0.0005	0.004	-0.002	-0.02

Author's computation using E-views

On table 8, the error correction term coefficient for the oil price equation is negative (-0.002) as expected. By implication about 0.2% error is corrected once there is a distortion from equilibrium position for every quarter. The exchange rate equation does not follow expectation in terms of error correction coefficient.

Table 9: Var-Granger Causality/Block Exogeneity Wald Tests

	ln exc.rt		Ln oil.p	
	Chis-sq/df	Prob.	Chis-sq/df	Prob.
ln Dis.rt	1.68/1	0.19	9.19/1	0.00
ln exc. Rt	—————	-------	2.37/1	0.12
ln fat.rt	0.41/1	0.52	3.06/1	0.08
ln oil.p	0.29/1	0.59	------	------
Ln sprd. Rt	0.10/1	0.75	1.39/1	0.24
All	2.29/4	0.68	11.35/1	0.02

Author's computation using E-views

The VAR Granger Causality/ Block Exogeneity Wald Test results indicate that Discharge rate, and fatality rate Granger Cause oil price increase although at the 5% level for the discharge rate. In fact, all of the corona virus related variables and the exchange rate jointly Granger Cause oil price changes during the first three quarters.

6. Main Conclusion

This paper examined the relationship between oil price trend, exchange rate movement and the COVID-19 Pandemic with focus on the Nigerian economy. The trend demonstrated the rising level of the spread rate due to increase in number of confirmed cases, resulting in low demand for oil and hence low price at the first instance. By this, dollar scarcity accompanied naira depreciation. However, due to regulatory measures and ease of lock down to make the economy boom further, oil price began to rise particularly around the third quarter. The theoretical ideas adopted are based on the informal approach and terms of trade channels for oil price and exchange rate behaviours. With optimal lag selection, the Var-Cointegration methodology demonstrated a long run equilibrium relationship among the oil price, exchange rate and corona virus indicators-discharge rate, fatality rate and spread rate-Moreover, about 0.2% disequilibrium error is corrected for per quarter. First quarter exchange rate movement positively related to oil price. First quarter increases in discharge rate and fatality rates reduced and increased oil price respectively. First quarter spread rate reduced oil price as demonstrated by the VAR results. First and second quarters oil price behaviour negatively and positively affected exchange rate respectively. Discharge rates for the two quarters impacted on exchange rate in equal magnitude but opposite in signs while the first and second quarters spread rate impacted positively on exchange rate though negligible. Diversification has always been agitated for through reliable agricultural practices as a drastic cut in the oil demand due to corona virus calls for attention particularly for a mono-product economy like Nigeria. This can increase Nigeria export base and create a better avenue for increasing foreign exchange and boost exchange rate stability. COVID-19 pandemic creating a new normal can be reduced through adhering strictly further to its rules but again must be complemented by adequate palliative care. Poverty, hunger, unemployment, unsettled minds and other social menaces are highly disturbing and are further worsened by the outbreak of COVID-19. Small and medium scale enterprises should be assisted through investible funds that can help reduce unemployment in the short term.

All necessary measures needed to sustain the economy presently and in the post-COVID-19 era are a pointer toward achieving development in the long run.

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