THE DYNAMICS AMONG CRUDE OIL AND GOLD PRICE MOVEMENT ON THE EXCHANGE RATE AND STOCK MARKET INDEX IN NIGERIA

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Abstract
This study empirically investigates the dynamic relationships between crude oil and gold price movements on Nigeria's exchange rate and stock market index using the Autoregressive Distributive Lag technique on the monthly data spanning from 1991 to 2019. The ARDL results revealed that in the short-run and long-run, oil prices positively influence the price of Nigeria's stock and inversely affect the exchange rate, while gold price inflation brings about a fall in Nigeria stock prices and an increase in Nigeria exchange rate in the short-run and long-run respectively. We suggest that the monetary authority develop a sound monetary policy that will stabilise the exchange rate since stability in the exchange rate might aid both investors and regulators interested in the collective behaviour and risk-return trade-off of stock return, gold and oil price returns in Nigeria.

Keywords: ARDL, Exchange rate, Gold price, Oil price, Stock price
JEL Classification: C32, E52, L61, F31, G15

1.0 INTRODUCTION
The most widely traded commodities in the globe are oil and gold, making them the most popular economic indicators (Mongi, & Aymen, 2017), both are used as investment assets, and they are closely related to the origin of the stock market and are influenced by the exchange rate, any fluctuation on decisions about oil or gold investment portfolios influence the exchange rate and can affect the stock market returns. Consequently, suppliers of commodities follow the evolution of the stock price, exchange rate, and commodity markets to infer the movement or trend of each market to design substitution investment strategies (Singhala, Choudhary, Biswal, 2019).

The price link connecting the internal and external economy is the exchange rate (Liu, Failler, Peng, & Zheng, 2020). Therefore, in a market-based economy, crude oil price fluctuation will cause a change in the exchange rate. Relevant empirical literature proves that crude oil prices and the exchange rate have a long-run equilibrium relationship, and its fluctuation will result in to change in the exchange rate (Chang, Huang & Chin, 2013; Hussain, Zebende, Bashir & Ding, 2017). Similarly, Degiannakis, Filis & Arora (2017) suggest that the stock market's response towards change in oil price depends upon factors such as a change in oil price, emerging economy, and oil-exporting oil-importing, developed economy, etc. Therefore, most global economies rely on crude, so its prices are expected to affect the various fundamental of an economy, especially the stock market. Sathyanarayana & Gargesha (2018); Singhala et al. (2019); Kumar

(2019) empirical obtained that oil price fluctuation influences shock in the stock market significantly. Likewise, in Nigeria, Abraham (2016) obtains that the stock market's response towards change in oil price depends on three fundamental factors: importing oil price fluctuation, oil subsidies, and quantity of crude exported.

Similarly, Sujit & Kumar (2011); Kumar, Biswal & Swain (2019) ascertained that the gold and exchange rates vary; fluctuations in the exchange rate can significantly influence gold prices. For instance, during economic contraction or when the economy is in recession, potential investors impulse to shift their investible funds in gold. Consequently, increases in the gold price and less stock investment result in a stock market fall. Gold is one of the most hunted investments globally with a stable price (Yahyazadehfar & Babaie, 2012; Bhunia, 2013; Bhunia & Mukhuti, 2013; Tiwari & Gupta, 2015).

The interrelation and interaction between the commodity markets (oil price and gold), exchange rate, and stock market) is very important in Nigeria. Nigeria is a major exporter of crude oil and an importer of petroleum products; oil prices considerably influence the country's exchange rate and the stock market. The oil price is taken as a crucial indicator of the exchange rate movements in Nigeria because both exportation and importation of oil transactions are carried out mainly in USD ($); hence greater oil demand results in depreciation of the Nigeria currency, Naira (N). For example, in 1985, Nigeria's oil price was valued at $27 billion at an exchange rate of N0.89 to a dollar, and the stock price was traded at N117.28 billion. With the bit of slash down (4.14%) in the oil price from $16.33 billion in 1993 to $15.53 billion in 1994, the Naira appreciated by N0.16 over the US dollar, from N22.05 to N21.89 and stock price floor positively from N42.37 billion to N52.64 billion respectively. However, from 2016 to 2019, Nigeria's oil price fluctuates between an average of $65 billion with an average exchange rate of N306 to N360.

Correspondingly, gold price was valued at $369.80 billion in 1985 at an exchange rate of N0.89 and financial market value at N117.28 billion. Gold price is found to have a progressive trend with the stock prices and exchange rate, exception of 2019 which stock prices have taken declined value from N37.19 billion in 2018 to N29.06 billion. This was associated with the global fall in the crude oil price, which shrunk the financial market. This was reported in the work of Le and Chang (2012), who stated that the stock market is a reason for the increasing gold rate.

Nigeria is the world's tenth producer, the largest reserve of global oil, and the exporter of gold. Before the discovering of oil in Nigeria, it has been the highest and significant source of revenue, accounting for about 90% of total export and not less than 70% of total income, as well as the most contributors of gross domestic product in Nigeria (Madugba, Ekwe & Okezie, 2016). Downward fluctuation in international oil price reduces the price of non-traded goods, reduces real exchange rate and nominal exchange rate depreciation, causes an imbalance in the current account, reallocation of the portfolio, reduction in foreign reserve, and GDP and verse versa. Similarly, fluctuation in oil price driven by aggregate demand raises stock prices, and that moved by market specification falls stock prices. Investors usually become more uncertain about the outlook for corporate earnings during periods of high oil prices, which, in turn, may result in higher equity risk, putting downward pressure on stock prices.

Furthermore, recent empirical evidence has proven the eligibility of gold in the reviving economy. Mindful investors prefer to invest in gold and the stock market to minimise or reduce the systematic shock, which is considered insurance against the risk to invest in gold, as in using gold as a hedging

tool (Bhunia, 2013). Gold is perceived as a store of value, while the stock market is seen as a return of value (Shahzadi, 2016). These gold and stock market characteristics drive investors' behaviour when investing in gold or stocks (Al-Ameer, Hammad, Ismail & Hamdan, 2018). Accordingly, Tiwari and Sahadudheen (2015) show that most oil-importing countries settle their oil import via paying in gold. Therefore, depreciation of the Dollar against Naira may shift potential investors' preference to incorporate gold in their portfolio, leading to a boost in demand for gold, increasing the price, and appreciating Naira's value. This is so because gold is dollar-denominated; any weakness in the Dollar pushes up gold prices, all things being equal. Likewise, declining stock prices increase investors' demand for gold. Gold is perceived as a haven due to its price stability.

It has been noticed that there are non-accessible studies in Nigeria that have attempted to investigate the interrelation among the international oil price, international gold price, exchange rate, and stock price. Therefore, this study fills the gaps in Nigeria and complements the growing global literature on the subject matter. This study aims to analyse the volatility among international oil prices, international gold prices, exchange rates, and stocks in Nigeria. This relationship was modeled using linear or symmetric theory as a theoretical framework. The theory assumes a strong correlation between oil price and macroeconomic variables. This relationship was validated by (Hamilton 1983; Gilbert, 1984) and discovered that oil price significantly impacts macroeconomic variables. Thus, this paper relates to oil and gold prices to macroeconomic variables such as stock market and exchange.

The study's contribution to the knowledge, thus: First to investigate the kind relationship between oil and gold price movement on the exchange rate and stock price in Nigeria to the best of our knowledge. Secondly, the study uses data from 1991 to 2019, which provides robust findings. Third, the model was evaluated using dynamic ordinary least square methods (ARDL) and estimates different cointegration tests among the variables to make comparisons. The choice for the use of the ARDL approach is that it is suitable for small sample size and robust, accommodates a variety of lag structures, and allows to model the effect of dependent variable appear as the explanatory variable on regressor. However, the problem of spurious correlation may arise due to the dependent variable appearing as an independent variable. Many lags can also reduce the degree of freedom, Multicollinearity problem, etc.

The ARDL techniques were used to examine whether the international oil price and international gold price dynamically influence the exchange rate and stock price in Nigeria's short-run and long-run. Many less developed countries adopt policies to limit increasing global prices fluctuations effect on other macroeconomic variables without understanding the association (short-run or long-run) between them, leading to an unsuccessful desirable outcome. Therefore, this study aimed at identifying the kind of association. This is because the inability to understand this mechanism properly might lead to ineffective monetary policy options to address the instability of the twin price. Fourth, this study would assist the monetary policy regulators to have a clear understanding of the possible relationships between these variables to model dynamic export-import and exchange rate policies that will suit and promote economic growth and development. Fifth, it also provides bases that widen the understanding of policymakers, capital market investors, miners, government, and managers in risk management of portfolio diversification and how to manage oil price fluctuation, gold price, exchange rate and stocks price.

2.0 Literature Review

This study is built on Hamilton's symmetric theory as the underpinning theoretical framework. The approach establishes the theoretical relationship between crude oil price and macroeconomic variables. It assumes that oil and macroeconomic variables have a strong correlation; rising oil price influences macroeconomic variables. Several studies not from Nigeria have modelled this relationship using different macroeconomic indicators such as oil price, gold price, exchange rate, and stock prices. The earlier studies showed that this relationship's plausibility was gradually rooted in the developed economies to emerging markets (see Hamilton, 1983; Gilbert, 1984). The current studies that investigate the interactions between oil price, gold price, exchange rate and stock price include Sujit & Kumar (2011), the author's adopted Vector Autoregressive techniques and established that exchange rate is highly affected by changes in other variables whereas, the stock market has fewer roles in influencing the exchange rate. Raza et al. (2016) studied the asymmetric impact of gold, oil prices and their volatilities on stock prices of emerging markets using the NARDL technique and found that gold and oil price volatilities hurt the stock markets of all emerging economies in both short-run and long-run. Bam et al. (2017) observe an independent increase in the stock, oil or gold markets uncertainty coincides with negative returns in different industries. Maghyereh et al. (2017) employed the DCC-GARCH model to estimate dynamic correlations and hedge ratios and found significant spillovers from oil to equities, stressing the over-dependence of the local economies on oil.

Moreover, the spillovers of gold on the stock markets are insignificant. Mongi & Aymen (2017) found a reverse relationship between stock prices and oil price, but the oil price is significantly and positively affected by gold and USD. The US dollar is negatively affected by the stock market and significantly by oil and gold price. Similarly, Rahman and Mustafa (2018) employed the ARDL model and discovered the Short-run adverse effects of changes in gold and crude oil prices on US stock market returns. The gold price changes effect is statistically significant but insignificant oil price changes.

A contrary view was Kumar, Biswal & Swain (2019) findings using VAR and obtains that none of the variables (gold, oil, exchange rate, and stock prices) influences each other. Singhala, Choudhary & Biswal (2019) employed the ARDL estimation technique, and the findings suggest that international gold prices positively affect the stock price while oil price affects them negatively. Oil prices negatively influence the exchange rate in the long run, and gold prices do not significantly impact the exchange rate. Umaid, Asad, Zahid, & Umer (2020) found the asymmetric relationship between oil prices, gold prices, exchange rate, and stock prices in Pakistan.

Other studies that investigate the individual's relationships between oil price vs exchange rate and stocks price, gold price vs exchange rate, gold price vs stock price, oil price vs stock price, gold price vs stock prices, and exchange rate vs stock prices both in developing and developed countries are empirically reviewed as well, given as; Ogundipea, Ojeagaa & Ogundipe (2014) observed that a percentage change in oil price results to a more than the percentage change in exchange rate volatility in Nigeria. Fratzscher, Schneider & Robays (2014) found bidirectional causality between the USD and oil prices. Delgado, Delgado & Saucedo (2018) analysed VAR on monthly data and discovered that oil prices are statistically significant against the exchange rate. Liu, Failler, Peng & Zheng (2020) used the Time-Varying Parameter-Vector Auto Regression model. The result indicates that shocks to crude oil prices have immediate and short-term impacts on movements in the exchange rate.

The relation between oil price, exchange rates, and stocks price was modelled by Basher, Haug, & Sadorsky (2012) using SVAR on monthly data from 1988 to 2008 and found that positive oil price shocks tend to decrease USD exchange rates and stock prices on emerging market in the short run. Abraham (2016) examines the effect of crude oil price movement on the Nigerian stock market using the Autoregressive Distributed Lag (ADL) model and found that oil prices are positively related to the performance of the Nigerian stock market. Soyemi et al. (2017) used three-stage least squares (3SLS) and obtained that oil shock directly affects company stock returns in Nigeria. Kelikume & Muritala (2019) discovered that oil prices hurt stock markets in Africa using dynamic panel analysis.

Capie, Mills & Wood (2005) used GARCH and found a negative relationship between gold and exchange rates. Sjaastad (2008) used forecast error data to analyse the relationships between the exchange rates and the price of gold. The findings reveal that appreciations/depreciation of the Dollar influence the price of gold in other currencies. Kanungo and Dang (2021) studied the relationship between Gold price, Crude oil price, and exchange rate in India, employed the Vector Autoregression technique. The findings reveal that the exchange rate negatively affects the stock markets for the Pre-Crisis and Crisis periods and is proportionally related to the stock market for the Post-Crisis period.

Le and Chang (2012) employed VAR and found a significant relationship between stock market prices and gold prices. Shaique, Abdulaziz & Herani (2016) used the VAR estimation technique and obtained no long-run relationship between stock prices (KSE 100 index) and gold prices in Pakistan. Similarly, Al-Ameer, Hammad, Ismail, and Hamdan (2018) employed a cointegration test and found a long-run relationship between gold and the stock market.

Le and Chang (2012) investigated the dynamics between oil price and gold market returns using a structural vector autoregressive technique. They ascertained that oil price fluctuations have a significant and positive contemporaneous transmission effect on actual gold returns. The authors concluded that oil price fluctuations could predict gold price dynamics. Likewise, Wang and Chueh (2013) found a positive interaction between gold and oil prices from 1989-2007. Reboredo (2013) analysed the oil and gold dependence structure using the copula approach and found a positive and significant relationship. Bampinas and Panagiotidis (2015) studied the causal relationship between crude oil and gold prices using dynamic bootstrap causality analysis and found a linear and unidirectional causality running from oil to gold. Tiwari et al. (2020) employed the time-varying Markov switching copula technique and found that gold is a good hedge for oil returns for short and medium investors.

Kumar (2013); Ajaz, Nain, Kamaiah, & Sharma (2017) examines the relationship between the exchange rates and stock prices of IBSA countries (India, Brazil, and South Africa) utilising the Vector Autoregressive techniques and found that volatility spillover between the exchange rates and stock prices of these countries. Similarly, Tang and Yao (2018) reported an indirect relationship between stock prices and exchange rates whereas, Simbolon and Purwanto (2018) obtained a direct and significant relationship between exchange rate and stock prices. Delgado, Delgado & Saucedo (2018) investigate the relationship between the exchange rate and the stock market. The study employed VAR and obtained that the exchange rate has a diminishing and statistical significant impact on the stock market index. Andriansyah and Messinis (2019) employed the Toda Yamamoto causality test to measure the relationship between exchange rates and stock prices of 8 countries and found that exchange rates

Granger causes the stock price fluctuations in all seven countries.

3.0 METHODOLOGY

The short-run and long-run association of oil and gold prices with stock prices and exchange rates in Nigeria is examined in this study. This study uses the Brent crude spot price benchmark to proxy international oil price movements denoted as OP. It is measured in USD/barrel. One of the articles of high value traded in Nigeria is Gold, and it is proxies with the international gold spot price. It is measured in USD/ounce and represented by GP. Virtually all international payments done in Nigeria are done in US Dollars, therefore for exchange rate movements, Nigeria (Naira) and US dollar (the US $) currency pairs are used. They are measured as USD/Naira and represented by ER. In this study, all share index of Nigerian stock is used to proxy the stock price, and SP represents it. We have used price data on levels for all the series; however, the variables are used in their log form in the model estimation. The sample period ranges from 1991 to 2019, and the data is obtained from the Central Bank of Nigeria statistical bulletin.

The model for examining the short-run and long-run association of oil prices, gold prices, stock prices, and exchange rate in Nigeria is modelled after the work of Singhal, Choudhary & Biswal (2019), who examined return and volatility linkages among international crude oil price, gold price, exchange rate and stock markets in Mexico. The functional relationship among these variables is therefore depicted explicitly in Equation 3.1 and 3.2 as thus;

$$SP_t = \beta_0 + \beta_1 ER_t + \beta_2 OP_t + \beta_3 GP_t + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots\dots (3.1)$$

$$ER_t = \alpha_0 + \alpha_1 SP_t + \alpha_2 OP_t + \alpha_3 GP_t + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots\dots (3.2)$$

Where; SP is the stock price, ER denotes exchange rate, OP represents oil price, and GP connotes gold price. The μ is the error term or random variable that accounts for other variables' effects.

This study model the dynamic movements among international oil prices, international gold prices, exchange rates, and the stock market index in Nigeria. To test the long-run relationship between oil, exchange rate, stock price, and gold price, the ARDL-bound approach (Pesaran, Shin, and Smith, 1996) is used. Unit root tests (ADF and Phillip-Perron) were initially applied in this study on both the series at the levels and the first difference. This is done to check the variables' stationery and ascertain that none has a quadratic trend I(2). In the second step, the ARDL model is estimated with the optimal lag specifications based on the Akaike information criterion (AIC). This is followed by bounds testing to check for a co-integrating relationship between the dependent and the explanatory variables. Since there has been no consensus about the directions of the long-run relationships, each variable is used as the dependent variable in turns and check for the model that the evidence of cointegration is found. Hence, the ARDL form of the model specified for this study is presented in equations 3.2 and 3.4;

$$\Delta LSP_t = c_0 + c_1 t + \pi_1 LSP_{t-1} + \pi_2 LER_{t-1} + \pi_3 LOP_{t-1} + \pi_4 LGP_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta \mathrm{LSP}_{t-i} + \sum_{j=1}^{q} \delta_j \Delta \mathrm{LER}_{t-j} + \sum_{k=1}^{r} \theta_k \Delta \mathrm{LOP}_{t-k} + \sum_{l=1}^{s} \emptyset_l \Delta \mathrm{LGP}_{t-l} + \varepsilon_t \dots\dots\dots\dots (3.2)$$

$$\Delta LER_t = c_0 + c_1 t + \pi_1 LSP_{t-1} + \pi_2 LER_{t-1} + \pi_3 LOP_{t-1} + \pi_4 LGP_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta \mathrm{LSP}_{t-i} + \sum_{j=1}^{q} \delta_j \Delta \mathrm{LER}_{t-j} + \sum_{k=1}^{r} \theta_k \Delta \mathrm{LOP}_{t-k} + \sum_{l=1}^{s} \emptyset_l \Delta \mathrm{LGP}_{t-l} + \varepsilon_t \dots \dots \dots \dots (3.4)$$

$$\Delta LSP_t = c_0 + c_1 t + \pi_1 LSP_{t-1} + \pi_2 LER_{t-1} + \pi_3 LOP_{t-1} + \pi_4 LGP_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta \mathrm{LSP}_{t-i} + \sum_{j=1}^{q} \delta_j \Delta \mathrm{LER}_{t-j} + \sum_{k=1}^{r} \theta_k \Delta \mathrm{LOP}_{t-k} + \sum_{l=1}^{s} \emptyset_l \Delta \mathrm{LGP}_{t-l} + ECMt - 1 + \varepsilon_t \dots \dots \dots \dots (3.5)$$

$$\Delta LER_t = c_0 + c_1 t + \pi_1 LSP_{t-1} + \pi_2 LER_{t-1} + \pi_3 LOP_{t-1} + \pi_4 LGP_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta \mathrm{LSP}_{t-i} + \sum_{j=1}^{q} \delta_j \Delta \mathrm{LER}_{t-j} + \sum_{k=1}^{r} \theta_k \Delta \mathrm{LOP}_{t-k} + \sum_{l=1}^{s} \emptyset_l \Delta \mathrm{LGP}_{t-l} + ECMt - 1 + \varepsilon_t \dots \dots \dots \dots (3.5)$$

Where;

c_0 is the intercept, $c_1$is the slope of the time trend, $\pi_1\ is$ slope of one lag period of LSP, $\pi_2\ is\ slope\ of\ LER,\ \pi_3 = slope\ of\ LOP,$ $\pi_4 = slope\ of\ LGP.\ p, q,\ r,\ s$ are the periods of the differenced term of the response variable and the regressors, respectively, while $ECMt - 1\ and\ \varepsilon_t$ is the error correction mechanism and error term. The error correction mechanism measures the speed of adjustment when disequilibrium occurs in the short-run to ascertain equilibrium in the long-run. Therefore, the lag structure of this model is $ARDL(p, q, r, s)$. Equations 3.2 and 3.3 are the long-run model while 3.4 and 3.5 capture the short-run. Furthermore, according to Pesaran and Shin (1995) and Pesaran, Shin, and Smith (1996), it is necessary to examine whether the variables of interest are co-integrated i.e. existence of long-run relationship among the variables under study using the ARDL F-Bounds cointegration test approach, provided that the stationarity properties of the underlying variables are I(0) and I(1) or a mixture of I(0) and I(1).

In carrying out this exercise, i.e., examination of the existence of long-run relationship among the variables, a test of the hypothesis was conducted, and the $H_0 := \pi_1 = \pi_2 = \pi_3 = \pi_4 = 0$ was tested against the $H_1 : \neq \pi_1 \neq \pi_2 \neq \pi_3 \neq \pi_4 \neq 0$. The t- statistics were also used to explore the significance of the features in the model, and the null hypothesis is $H_0 := \pi_1$. According to Pesaran, Shin, and Smith (2001), the $H_0 := \pi_1 = \pi_2 = \pi_3 = \pi_4 = 0$ is rejected when long-run co-movement or cointegration is established among LSP_t, LER_t, LOP_t and LGP_t, which implies that a long-run relationship exist among the variables under examination. Since cointegration exists among the underlying variables, the ARDL model is employed to estimate the dynamic short and long-run impact and relationship between the variables in the model.

4.0 RESULTS AND DISCUSSION

Table 3 Unit root test result

Variable	ADF			PP		
	Level	First diff.	Remark	Level	First diff.	Remark
Stock	1.63	10.24***	*I*(1)	1.74	16.06***	*I*(1)
Exchange rate	4.27***	12.71***	*I*(0)	4.34***	12.43***	*I*(0)
Oil price	2.28	15.21***	*I*(1)	2.22	15.19***	*I*(1)
Gold price	1.60	16.26***	*I*(1)	1.71	16.07***	*I*(1)

Source: Authors computation (2021) ****** p < 0.001; ** p < 0.01; * p < 0.05***

Table 3 above shows the ADF and the PP unit root test results for stock price, exchange rate, oil price, and gold price. It is clear from the table that all the variables are integrated of order one except the exchange rate, which is stationary. The statistical implication of this is that estimation using the variables in level will not follow the standard distribution, and the issue of spuriosity is feasible. There is a need first to conduct a cointegration test, and an ARDL-Bound test approach is adopted due to its flexible nature to accommodate mixed integrated variables.

Table 5 Estimated long-run coefficients

Model 1	Coef.	t-stat.	Model 2	Coeff	t-stat.
ER_t	0.96	5.37***	SP_t	-0.54	-0.13
OP_t	1.00	3.85***	OP_t	-1.05	-2.11**
GP_t	-0.58	-2.02**	GP_t	1.32	2.20**
$Const.$	5.13	4.24***	$Const.$	1.27	0.53

Source: Authors' computation (2021) ****** p < 0.001; ** p < 0.01; * p < 0.05***

Long-run coefficient estimates of the cointegration equations (Stock price equation and Exchange rate equation) are presented in Table 5. The results of the stock price equation reveal that the rise in the power of the Dollar against Naira (exchange rate depreciation) has positive and statistically significant effects on Nigeria's stock price. By implication, a percentage increase in the exchange rate would cause an increase in stock price by 0.96%. This corroborates the findings of Kumar (2013), Simbolon and Purwanto (2018), Andriansyah and Messini (2019). They found the exchange for having an appreciating effect on stock price but otherwise, was the findings of (Mongi and Aymen, 2017; Delgado and Saucedo, 2018; Tang and Yao, 2018).

Likewise, the oil price has positive and statistically significant effects on Nigeria's stock price. By implication, a one percent increase in the oil price would increase stock price by 1%. This corroborates the findings of Haug and Sadorsky (2012); Abraham (2016); Soyemi et al. (2017), whose studies obtained a positive relationship between oil price shocks and stock prices. However, Mongi and Aymen (2017); Kelikume & Muritala (2019) discovered a contrary view, and the oil price hurts stock markets.

On the other hand, a rise in the gold price is revealed to be negatively and statistically significant to the stock price. This implies that a 1 percent increase in the gold price would result in a 0.58% decline in stock price. This corresponds to the empirical

outcome of Shaique et al. (2016); Rahman and Mustafa (2018), that there is a negative relationship between stock prices and gold prices but disputed by Le and Chang (2012); Al-Ameer et al. (2018); Singhala et al. (2019), whose findings revealed long run and significant positive relationship between stock market prices and gold prices.

In the same manner, the results of the exchange rate equation reveal that stock price hurts the exchange rate and statistical insignificance. Especially, a percentage increase in the stock price would bring about 0.54% deflationary in the exchange rate. This corresponds with the empirical discovery of Mongi and Aymen (2017); Delgado et al. (2018); Tang & Yao (2018), who obtains an indirect relationship between stock prices and exchange rates.

It also revealed that oil prices negatively and significantly influence the exchange rate in the long run. This indicates that a percentage increase in oil price would prompt 1.05% depreciation in the exchange rate (i.e., currency appreciation of oil-exporting countries). This is an outcome implying that increasing oil prices is likely to boost Nigeria's oil revenues and, as a result, trigger currency appreciation. Al-Mulali and Che-Sab (2012), Mongi and Aymen (2017), Muritala (2019) found similar results in their studies.

However, gold price was found to have a positive and significant effect on the exchange rate. That is, one percent inflation in gold price would cause exchange to appreciate by 1.32%. This means a rise in the price of gold is shown to give rise to exchange rate depreciation. This discovery validates the work of Capie et al. (2005) and contrasts to the previous studies (Jain and Biswal, 2016; Jain and Ghosh, 2013; Sjaastad, 2008), gold price was not found to exert any significant impact on the exchange rate.

Table 6 Estimated short-run (ECM) coefficients

Model 1	Coeff.	t-stat.	Model 2	Coeff.	t-stat.
ΔSP_{t-1}	0.14	2.75***	ΔSP_{t-1}	-	-
ΔSP_{t-2}	0.14	2.72***	ΔSP_{t-2}	-	-
ΔSP_t	-	-	ΔSP_t	-0.00	-0.14
ΔER_t	-0.11	-1.18	ΔER_t	-	-
ΔER_{t-1}	-	-	ΔER_{t-1}	0.40	7.65***
ΔER_{t-2}	-	-	ΔER_{t-2}	-0.24	-4.57***
ΔOP_t	0.36	2.65***	ΔOP_t	-0.01	-1.88*
ΔGP_t	-0.02	-1.85*	ΔGP_t	0.02	2.90***
Ecm_{t-1}	-0.34	-3.98***	Ecm_{t-1}	-0.01	-2.04**

Source: Authors' computation (2021) ****** p < 0.001; ** p < 0.01; * p < 0.05***

Table 6 presents the short-run estimates for stock price and exchange rate models. The results for the stock price equation revealed that the oil price has an appreciation and significant effect on the stock price. By implication, a 1 percent inflate in the oil price would lead to a 0.36% improvement in the stock price in Nigeria. In addition, the result also indicates that the exchange rate has a negative and insignificant effect on the stock price. A percentage increase in the exchange rate would cause the stock price to decrease by 0.11%. Similar to the discovery of Tang and Yao (2018).

Likewise, a negative and statistically significant relationship was established between the gold price and stock price. Implying that a percentage increase in the gold price would bring about 0.02% deflation in the stock price in Nigeria. This was also established by Rahman and Mustafa (2018). The results for the exchange rate equation revealed that the stock price has an adverse and insignificant impact on the exchange rate. A percentage increase in the stock price would decrease the exchange rate by 0.00%. Delgado and Saucedo (2018) ascertained alike. Oil price was obtained to have an inverse and statistically significant impact on the exchange rate. A percentage increase in oil price would result in a 0.01% decrease in the exchange rate. This is in line with the empirical findings of (Mongi and Aymen, 2017; Muritala, 2019)

Furthermore, the gold price was found to have a positive and significant effect on the exchange rate. A percentage increase in the gold price would cause the exchange rate to appreciate by 0.02%. In the studies of (Al-Ameer et al., 2018; Singhala, 2019) similar relationship was obtained. The error correction term is correctly signed for both, and it shows that about 34% and 10% of disequilibria in the stock price and the exchange rate due to one-time temporary shock is corrected within a year. After obtaining long-run and short-run ARDL results, there is a need to test for the assumptions of the technique used (Normal distribution of error term, serial correlation, and heteroscedasticity) as well as the stability of the estimated model to determine whether the method of analysis adopted passed the classical OLS assumption and stability test or not, established in table 7 and 8 below:

5.0 Conclusion and Policy Recommendations

This study empirically investigates the dynamic relationships among crude oil and gold price movements on Nigeria's exchange rate and stock market index, using monthly data from January 1991 to December 2019. The presence of long-run relationships among the variables is tested by using the ARDL-bound test approach. The findings of the stock price model revealed that oil price has both short-run and long-run positive and statistically significant effects on Nigeria's stock price, while gold price inflation brings about a decline and statistical significance in Nigeria stock prices both in the short long-run.

On the other hand, the oil price increase decreases the exchange rate (i.e., appreciation in Naira exchange rate to Dollar) for the exchange rate model. It is statistically significant both in the short-run and long-run, while both in the short-run and long-run increase the gold price would lead to a rise in the exchange rate (i.e., depreciation in Naira exchange rate to Dollar). Based on these, the following were recommended:

The monetary authority should develop a sound monetary policy to stabilise the exchange rate since its instability has both long-run and short-run implications in macroeconomic variables. Fair stability in exchange rate might aid both investors and regulators interested in the determinants of the joint behavior and risk-return trade-off of stock return and volatility in Nigeria.

As one of the major exporters of oil, Nigeria should devise strategies to ensure stability in the capital markets by vigorously pursuing pro-growth policies irrespective of the shocks in oil price and other exogenous macroeconomic indicators.

Gold price is found to have an inverse and positive effect on the stock price and exchange rate. Therefore, bold steps are suggested to be taken by the government while including building resilience investment and risk strategies, intervening in the market to correct the unfavourable effect of gold price on stock price and exchange rate, and negotiating for

internalisation of Naira for direct payment among gold exporting Nations to reduce unhealthy dollar exchange effect on Naira.

The government should press more for new ways to diversify the economy from oil dependence. This is because oil price was found to have both long-run and short-run appreciating effects on the stock price and an inverse effect on the exchange rate.

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