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EXAMINING THE CONDITIONAL CORRELATIONS BETWEEN OIL PRICES AND SECTORAL STOCKS IN NIGERIA

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Abstract

This study examined the conditional correlation between oil and stock prices in Nigeria using a high frequency disaggregated data on the variables. The Engle-Shepherd Chi-square test favoured the constant conditional correlation CCC-GARCH model that was used. Results reveal low conditional correlation coefficients between oil and the stock sectors. The study recommends among others for investors to consider investing in both assets for potential gains.

Keywords: Conditional, Correlations, Stocks, Oil Prices.

JEL Codes: C22, C32, G11, G12, G15

1. Introduction

It is common knowledge that the integration of financial markets have significantly helped in promoting economic development and growth. However, such developments are characterized by high level of uncertainty shock and volatility especially in less developed economies, such as ours. Consequent upon these, prices of securities and commodities have now become prone to different types and levels of shocks.

The stock market has been viewed worldwide as a market where elements that feed into the development of a nation's economy is said to operate. In both developed and underdeveloped economies, stock markets, which are part of the financial system plays a pivotal role in the development process. A well-functioning economy is one which is binged on a sound financial system of which the stock market is a

major player. The Stock market is often seen as a place for accessing long term securities comprising both the primary and secondary market for the issue of new securities and trading of existing share respectively. Stock markets, as posited by Adenuga (2010) support resource allocation and spur growth by reducing transaction costs, affecting the average productivity of capital mobilizing savings and altering the rate of investment, promoting and improving resource allocation among others.

In Nigeria, the stock exchange is said to have recorded tremendous success over the years leading to its consideration as a frontier market (Kumeka, Adeniyi & Orekoya, 2017). An empirical in-depth examination of the return spillover intensity offers more insight into constructing forecasts of the return of both oil and stock markets in Nigeria. Individual investors, fund managers, portfolio advisors would come to the

knowledge of the risk and value of their portfolio as a result of these spillover effects.

The link in the co-movements between crude oil and stock nexus hinges on the fact that oil is regarded as an important input in the production process over time Abdala (2013). Additionally, it influences the level, volume and magnitude in the returns across sectors Rashid and Malik (2017).

The kind and type of correlation between and among asset returns across different categories of markets and assets have practical importance to individual investors worldwide. The main motivation for studying correlation among financial assets such as oil prices and sectoral stock returns hinges on the need to conduct portfolio selection and the need for investors to diversify their investment avenues to mitigate the incidence and risk of losses.

The notion of portfolio diversification as outlined by Capiello, Engle and Shepperd (2006) is achieved either by investing in a variety of assets that have very low or even negative correlations or doing so in similar asset classes under multiple market situations.

The objective of this paper therefore, is to examine the conditional correlations between oil prices and the eleven industrial sectors listed of the Nigerian Exchange Limited (ngx). Following this introduction, is section two which is focused on literature, section three on methodology, section four on analysis and discussion of findings, while section five concludes

2. Literature Review

2.1 Conceptual Review

Conditional Correlation

Conditional Correlation is viewed as the correlation between at least two variables (oil price) and (sector specific stock price) conditioned on an event (shocks) happening or occurring. Assuming the two events are denoted by x and y , conditional correlation can be expressed as:

$$\rho_{xy|A}$$

i.e The correlation of x and y happening or occurring together, given even A .

Oil Price

The price of oil refers to the spot price of a barrel of oil (about 160 litres) benchmark crude, which is a reference price for buyers and sellers of crude oil such as West Texas International (WTI), Brent oil, OPEC basket, Tapis crude oil, Bonny light and several others. EIA (2020) oil price differentials are based on their gravity, sulfur content and location EIA 2020).

Sectoral Stocks

A sector is regarded as an area within the economy by which business activities share the similar and related activities, product or service. It represents a heterogenous grouping of firms with similar business activities that operate together within the same environment or institutional arrangement Umm and Wenglong (2020). For this study, we are concerned with the eleven industrial sectors such as Agriculture, Conglomerates, Construction/Real estate, Healthcare, Oil and gas, Services, ICT, Natural resources, Industrial goods, Financial services, Consumer goods These together form part of the stock market and engages in trading in shares which are valued based on quoted prices on daily basis.

2.2 Theoretical Framework

The Arbitrage Pricing Theory (APT) is a prominent theoretical model used to validate the effect of shocks and other risks on stock market returns and volatility in financial literature. The theory assumes that the asset (stock) returns are generated by the following equation as outlined in Salisu and Isah (2017).

$$R_i = \lambda_i + \beta_i \psi + e_i$$

Where;

R_i is the return on asset (stock) i

λ_i is the unconditional expected return

ψ is a vector of different risk factors

β_i is a vector measuring the influence that each risk factor has on return on asset i

e_i is the error term for the residual effect of the returns series in question.

Therefore, for the purpose of this study, we isolate only the effect of oil price shocks among other risk factors. Therefore a 'reduced form' version of the APT presented above is rewritten as:

$$R_i = \lambda_i + \beta_i Op + e$$

Where;

R_i and λ_i are as previously defined

Op = oil price

2.3 Empirical Review

Abioglu (2021), examined the return and volatility correlation between oil prices and stock sectors in Turkey using weekly data from 2002 to 2020. Findings from the DCC model indicate significant return spillovers from oil to market to the 12 sectoral indices on the Turkish Exchange. The study did not disclose how the DCC model was chosen. Also, the study quoted oil price in the local currency instead of dollars.

Umm and Wenlong (2020), investigated the dynamics of volatility spillover between oil prices and stock market returns at the sector level in Pakistan using data from January 2003 to December 2017, using the VARMA – GARCH framework, findings indicate negative return spillover effects from oil market to agriculture, energy, machinery sectors, while the return spillover effects from stock to oil market were not significant. The study captured adequately, the return and volatility services at daily frequency using all the sectors, however, it chose the CCC variant arbitrarily.

Malik and Rasid (2017) examined the return and volatility spillover between sectoral stock and oil price in Pakistan. The study used oil price and sectoral stock returns on eight different sectors on the Pakistan Stock exchange as variables of interest from January 2001 to December 31st 2015. Using the VAR-GARCH modeling technique, the results indicate no short run price transmission between world oil prices and stock sectors of the PSE. However, past shocks in world oil prices have significant effect on volatility individual sectors of the PSE.

Yaya et al (2017) examined the returns and volatility spillover from oil to FOREX markets in oil exporting countries using VARMA-GARCH models where results indicate significant bi-directional returns spillovers between oil and FOREX markets in OPEC countries. Though the methodology is relevant here, the focus is more on exchange rate dynamics.

Kalu (2016). Modelled the dynamic correlation between stock market returns and crude oil prices for a developing economy, using monthly observations on all share index, and crude oil prices from M1 1993 – M2 2014. Using the DCG, GARCH, results reveal no direct correlation between crude oil price and stock market returns in Nigeria. This study used aggregate stock data, thereby binding so much information on sectors.

Degians, Fills and Floros (2011) examined dynamic correlation between stock market and oil prices of both oil importing and exporting countries using monthly data on oil prices and stock market indices from M1 1988 to M9 2009. Results from the DCC-GARCH model indicate positive correlation between oil and stock markets for most of the countries.

Examining the conditional correlation in the returns on oil and stock prices, Giovannini, Grasso, Lanza and Manera (2014) utilized data on crude oil prices and stock market returns. The result of the CCC-GARCH indicate both low and high interdependence of the variables.

Gencer and Kilic (2016) investigated the effect of conditional correlation among gold-oil and instambul stock exchange sector returns using monthly data from M9 2002 to M7 2014 on 28 sector returns and oil prices. Results indicate negative correlation coefficients between gold-oil and at least three sector indices.

3. Methodology

3.1 Data and Sources

The study covers the period 2011 – 2021. Oil data is sourced from the US energy information administration (eia)) while the sector based stock prices are obtained from the ngx on agriculture, conglomerates, construction, consumer goods, natural resources, financial services, oil and gas, ICT, industrial goods, healthcare and services. The daily return of each series is computed as:

$$R_{it} = \log \frac{\rho_{it}}{\rho_{it-1}} = \log \rho_{it} - \log \rho_{it-1}$$

Where ρ_{it} is the daily closing price of oil, and the 11 industrial sectors indices on the Nigerian Exchange Limited (ngx).

3.2 Model Specification

In other to realize set objective, and following Yaya et al 2017, Malik and Rashid 2017, Fasanya, Oyewole

$$\begin{matrix} R_{oil_t} \\ R_{s_t} \end{matrix} = \begin{pmatrix} \gamma_{oil} \\ \gamma_s \end{pmatrix} + \begin{pmatrix} \varphi_{oil} \varphi_{oil,s} \\ \varphi_{s,oil} \varphi_s \end{pmatrix} \begin{pmatrix} R_{oil_{t-1}} \\ R_{s_{t-1}} \end{pmatrix} + \begin{pmatrix} \varepsilon_{oil_t} \\ \varepsilon_{s_t} \end{pmatrix} \quad (1)$$

Where

R_{oil_t} and R_{s_t} are the daily return of sector specific stock index and oil prices respectively, φ_s and φ_{oil} are the coefficients of own past lag effect of sector stock returns and oil price returns respectively. $\varphi_{s,oil}$ and

and Agbatogun 2019, the CC-VARMA GARCH model for the mean (return) and variance equation is specified as thus:-

3.2.1 Mean (Return equation)

$\varphi_{oil,s}$ both measure the return spillover effect of oil on the stock returns and stock on oil returns respectively.

3.2.2 The Conditional Variance Equation

The conditional variance equation for the oil stock series for objective three and four is specified as follows:

$$\begin{pmatrix} \delta^2_{oil,t} \\ \delta^2_{s,t} \end{pmatrix} = \begin{pmatrix} \omega_{oil} \\ \omega_s \end{pmatrix} + \begin{pmatrix} \lambda_{oil} & \lambda_{oil,s} \\ \lambda_{s,oil} & \lambda_s \end{pmatrix} \begin{pmatrix} \varepsilon^2_{oil,t-1} \\ \varepsilon^2_{s,t-1} \end{pmatrix} + \begin{pmatrix} \beta_{oil} & \beta_{oil,s} \\ \beta_{s,oil} & \beta_s \end{pmatrix} \begin{pmatrix} \delta^2_{oil,t-1} \\ \delta^2_{s,t-1} \end{pmatrix}$$

(2)

Where:

δ^2_{oil} and δ^2_s are the variance of the two series. ω_{oil} and ω_s are the non-negative constants of the model, λ_{oil} and λ_s measure the short run persistence or ARCH effects of the past shocks of both oil and sector stock return respectively at time $t-1$ on the present conditional variance series capturing the impact of direct transmitted shocks. and $\varepsilon^2_{oil,t-1}$ and $\varepsilon^2_{s,t-1}$

β_{oil} and β_s measures the long run persistence or GARCH effects of past shocks of oil and stock return at $t-1$ respectively, on the transmitted conditional volatility series capturing the direct impact of the effects of the transmitted conditional volatility series $\delta^2_{oil,t-1}$ and $\delta^2_{s,t-1}$.

$\lambda_{oil,s}$ and $\lambda_{s,oil}$ measures the cross value of the error terms $\varepsilon^2_{s,t-1}$ and $\varepsilon^2_{oil,t-1}$ on current conditional variance series for oil and sector stock respectively. Thus, these parameters and shock spillover or volatility spillovers coefficients that measure the effects of volatility shocks between oil and stock markets such that $\lambda_{oil,s}$ measure the impact of sector stock shocks (volatility) on oil market, whereas $\lambda_{s,oil}$ measure the

impact of oil market volatility shocks on sector stock volatility.

In the same vein, volatility spillover between oil price and sector stock returns are measured by $\beta_{oil,s}$ and $\beta_{s,oil}$, i.e $\beta_{oil,s}$ measures the impact of volatility spillover from stock to oil market while $\beta_{s,oil}$ measures the impact of volatility spillover from oil to sector stock market returns.

3.2.3 The Covariance Equation

The Covariance Equation represented by the constant conditional correlations (CCC) is specified as follows:- First, The CCC model is specified as

$$\rho_{s,o,t} = \rho^{so} \sqrt{h_{st}} \sqrt{h_{ot}} \quad (3)$$

Where

ρ^{so} is constant conditional correlation between factual specific stock returns and oil returns.

4. Results and Discussions

Time series was sourced from the United States Energy Information Administration in the case for oil prices and for the stock prices, data on the eleven sectoral prices was sourced from the Nigerian Exchange Group NGX. The daily data range is from 4th January, 2011 to

October 29th 2021 for the 12 series consisting of about 2,680 data points for each variable.

4.1 Descriptive statistics

The descriptive statistics for the study is presented below

Table 1a: Descriptive Statistics (Price Series)

<i>Variable</i>	Mean	Median	Max	Min.	Std. Dev.	Skewness	Kurtosis	JB
<i>Oil Price</i>	75.791	67.510	126.65	19.330	27.125	0.2464	1.6709	224.37 (0.000)
<i>Agriculture</i>	19.751	18.292	46.182	5.254	8.950	0.3479	2.2779	112.277 (0.000)
<i>Conglomerate</i>	6.6725	5.0625	14.608	2.0133	3.6848	0.4773	1.8088	260.221 (0.000)
<i>Constr. Real Estate</i>	25.8305	24.6260	34.5072	16.218	5.2442	0.03456	1.6997	189.258 (0.000)
<i>Consumer goods</i>	63.3966	63.2327	101.6696	31.398	17.9699	0.0344	2.0106	109.831 (0.000)
<i>Financial Services</i>	14.5785	14.7891	17.9615	11.2541	1.0398	-0.7439	4.4989	498.102 (0.000)
<i>Health Care</i>	4.6679	3.3915	8.7600	2.0270	1.9491	0.5927	2.13092	241.282 (0.000)
<i>ICT</i>	17.3129	2.5700	124.540	1.7690	30.4569	1.9579	5.6483	2495.495(0.000)
<i>Industrial Goods</i>	22.4501	20.7306	45.6066	9.2746	8.5286	0.2907	2.2614	98.6659 (0.000)
<i>Natural Resources</i>	4.2089	4.2786	5.9525	3.0750	0.7259	0.07829	1.7631	173.573 (0.000)
<i>Oil & Gas Services</i>	65.6838	70.1785	111.520	22.8107	24.679	-0.3190	1.8315	197.929 (0.000)
	2.2787	2.3155	3.2359	1.6664	0.3476	0.18455	2.6804	28.6160 (0.000)

Table 1b: Descriptive Statistics (Return Series)

<i>Variable</i>	Mean	Median	Max	Min.	Std. Dev.	Skewness	Kurtosis	JB
<i>Oil Price</i>	-1.67R-2	0.000351	0.0828	-0.1214	0.0100	-0.971	23.665	48099.14
<i>Agriculture</i>	0.000341	0.00001	0.03974	-0.2257	0.008092	-7.8870	231.71	586889
<i>Conglomerates</i>	-0.000197	0.0000	0.064729	-0.07296	0.00764	-0.1490	10.552	6379.55
<i>Constr. Real Estate</i>	-8.50E-02	0.0000	0.04986	0.106934	0.00322	-120377	487.87	2631814
<i>Consumer goods</i>	0.00152	1.60E-05	0.03650	0.03949	0.005302	0.09624	141.173	13944.9
<i>Financial Services</i>	1.32E.05	-1.66E-05	0.088896	-0.08028	0.00326	2.0971	419.892	1940956
<i>Health Care</i>	8.91E-05	0.0000	0.04537	-0.08499	0.00606	1.31093	31.018	88431.28
<i>ICT</i>	0.000609	0.00011	0.8778	-0.0677	0.02039	36.2494	1448.64	2.34E ⁰⁸

<i>Industrial Goods</i>	0.00022 6	0.00010	0.06303 1	- 0.04017	0.00534	1.85925	24.589	53591.8
<i>Natural Resource</i>	1.26E-05	0.0000	0.07185	0.07947	0.00374	088076	177.7732	3409703
<i>Oil & Gas</i>	0.00015 6	-4.57E ⁰ 2	0.28383	- 0.05557	0.00824	15.28319	529.080	3100928 4
<i>Services</i>	7.52E-05	0.0000	0.06208 8	0.03127	0.003318	6.0850	118.590	1508526

Source: Author's Computation

As seen from the descriptive statistics on table 1a, the mean average prices for oil price was \$75.8, and for the stock prices the mean prices for the Agriculture was 19.8, Conglomerates, 6.7 Construction/real estate 25.8, Financial services 14.6, Health care 4.7, industrial goods 22.5, Natural resources, 4.2, oil & gas 65.7, Services 2.28 and ICT 17.3.

The mean for the oil price is \$67 and the oil and gas sector having the highest median price among the stock sectors. This indicates that over time, volatility of returns (earnings) may be high or low on both sides of the mean. The maximum value of prices is that of oil price at about \$127 during the study periods while the ICT sector recorded the volatility of the series for the oil price is \$27. While that of ICT is highest among the stock with natural resources reported as the least. This means that ICT sector is the most volatile while the Natural resources stock sector is the least volatile. This high standard deviation values validates the use of GARCH models for this study.

For the skewness, oil price is positively skewed, with about 0.245 value. It is worthy to note that all the stock series have positive skewness except financial service. This is an indication that large positive changes are more likely to occur frequently than negative changes.

Apart from financial services and the ICT stock sector, all the variables exhibit Kurtosis above the threshold of three (3) which reveals a leptokurtic behavior. The Jarque-Bera value for oil price is about 224.3 with a probability of 0.0000, indicating non-normality. As a matter of fact all the stock sectors Agriculture, ICT, Health care, conglomerates, etc. exhibit non-normality which is another reason for the adoption of GARCH models in line with Alhassan and Killishi, 2016.

Turning to the return series on table 1b, we can observe that the return mean on oil during the study period is 1.67E.0.5, while that of agriculture, consumer goods, financial services, industrial goods, Natural resources, oil and gas and ICT were all positive while that of the other remaining sectors reported negative values.

The highest returns for the series are that on financial services about 4.32E-05. The maximum return on investment in oil market is about 0.082%. Looking at the stock market, the highest return of investment is on ICT, followed by oil and gas sector. The standard deviation, which reveals the volatility of the series indicate that the volatility of oil return is 0.0100, which is far from the mean, indicating that oil returns are highly volatile. A look at the stock returns reveal that the ICT sector with a standard deviation of 0.020390 is the most volatile, while the construction sector seem to be the least volatile. The standard deviation values indicate the preference for GARCH model. The kurtosis of the returns are high, i.e they are leptokurtic for most series, while the Jarque Bera value indicate that all the variables are non-normal just like the price values thus, necessitating the use of our models. The non-normality of data and high value of kurtosis (peaked) provides justification for the use of GARCH models as evidenced by Tule *et al* (2018), Uzonwanne (2021).

4.2 Stationarity Tests:

Though the study uses return series, which are already stationary nonetheless, unit root tests are conducted on the price data just for confirmatory reasons. The result is presented as follows.

Table 2 Unit Root Test

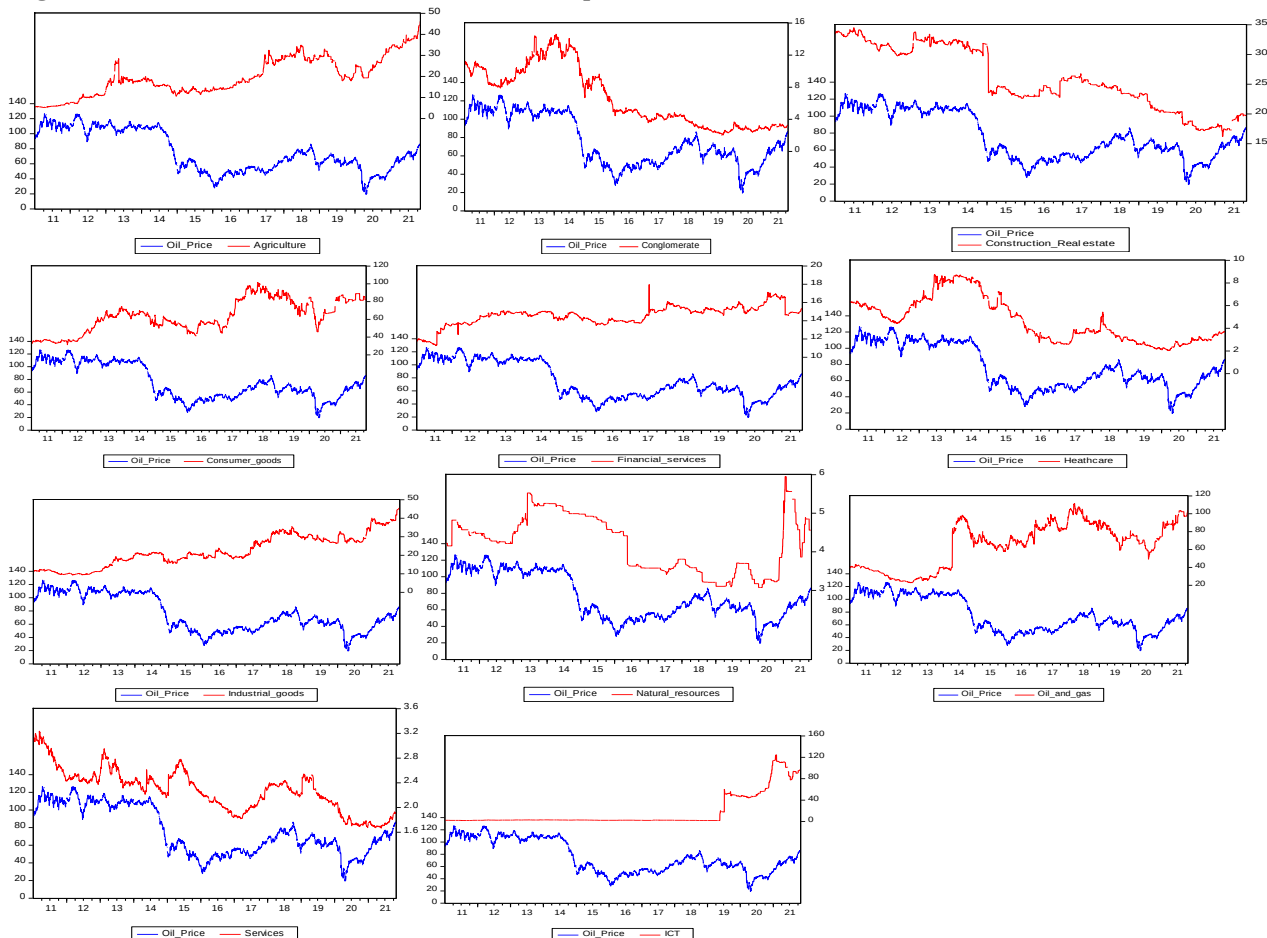
Variable	ADF Stat	Prob	Decision
Oil Price	63.59203	0.0001	1(1)
Agriculture	47.24475	0.0001	1(1)
Conglomerates	46.85522	0.0001	1(1)
Consumer goods	47.14081	0.0001	1(1)
Construction/Real Estate	50.17499	0.0001	1(1)
ICT	39.03502	0.0000	1(1)
Industrial Goods	-50.27804	0.0001	1(1)
Health care	-32.60718	0.0000	1(1)
Natural Resources	-33.31252	0.0000	1(1)
Oil and Gas	-48.36656	0.0001	1(1)
Financial Services	-45.98963	0.0001	1(1)
Services	-49.47295	0.0001	1(1)

Source: Author's Computation based on E-views 12 Output

As we can see from the unit root test above, all the series are stationary after been differenced once. Consequently, the series are adequate for analysis using appropriate volatility models.

4.3 Time Plots (Graphical Trends for Price):

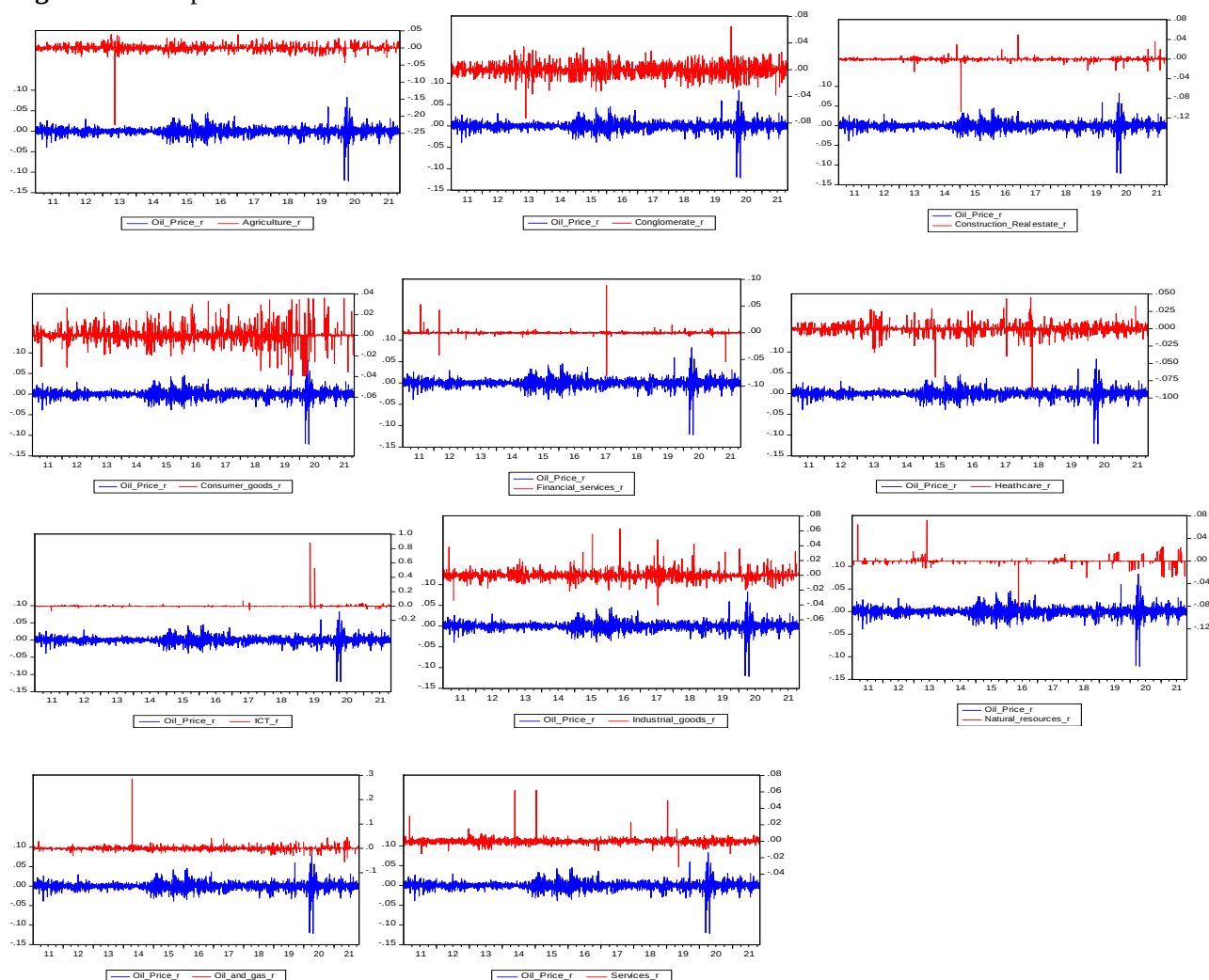
The time plots of the oil-stock pairs are presented as follows:

Figure 1: Time Plots, Oil Prices – Stock sectors prices

As can be seen from Figure 1, Oil prices were high above \$100, around the beginning of the study period, but however crashed to as low as less than \$30 around 2015/16. While the agriculture sector exhibit higher volatility. For the oil-conglomerates pair, it is observed that the Construction/Real estate sector exhibited a sharp decline by 2014, and early 2015, and thereafter, experienced a steady decline. The consumer goods exhibited an upward trend in prices especially in 2017, 2018 before dropping towards the end of 2020.

Furthermore, we observe that the financial services sector showed an upward trend throughout the sample period, while health care sector also showed some level of slow decline in prices.

Figure 2: Time plot for return series



The time plots of oil and the eleven sectoral indices are as presented above. For the agriculture xxx we observe

A striking observation, is on the time plots of the natural resources sector. As we can see from the plot, the prices exhibit a slow downward slide and a spike by 2020, before a sharp fall in 2021. Oil prices and the prices of the services sector seem to trend along together, perhaps due to reliance of the sector to oil products. For the ICT sector, prices were steady from 2011 till about late 2018 when they began to rise.

4.3 Time Plots for Return Series

The time plots of the return series are presented on figure 4.2 as follows:

spikes in oil return around late 2012, while return on agriculture sector was stable between 2011 to 2014.

However, as observed by 2020, there was a sharp spike in returns perhaps due to the COVID 19 Pandemic. We can also observe that all the return series exhibit volatility clustering given rise to excess kurtosis with very high values as evidence in the table 4.1 on descriptive statistics. Volatility clustering indicates that large positive changes in volatility are likely to be followed by negative changes in volatility. Thus scenario suggests the positivity of return and volatility spillover effects between the series which makes

GARCH based models ideal for estimation. Fracq and Zakoian (2010), cited by Abdala (2014).

4.4 ARCH and Serial Correlation Tests

Evidence from the unit root test, Jarque-Bera and Kurtosis support the adoption of GARCH model however, the ARCH test serial correlation test were conducted. The Engle (1982) ARCH tests were conducted where results reveal existence of ARCH effects and serial correlation in the series as follows.

Table 3: ARCH & Serial Correlation Test.

Variable	ARCH LM	JarqueBera
Oil Price	6.7606	38.873
Agriculture	3.646	49.495
Conglomerates	4.3863	30.820
Consumer goods	2.8613	7.5563
Construction/Real Estate	32.5634	47.084
ICT	590.3996	221.37
Industrial Goods	19.6183	63.979
Health care	2.7309	8.7091
Natural Resources	28.559	20.075
Oil and Gas	3.9690	67.689
Financial Services	6.0223	31.634
Services	2.4601	4.776

Significant figures in bold.

4.5 Engle-Sheppard (2001) X^2 Test: The results of the Engle-Sheppard CCC X^2 test are presented below:-

Table 4: Engle-Sheppard X^2 Test:

Variable	Engle-Sheppard CCC X^2 test
Agriculture	0.4651822
Conglomerates	0.48348
Construction and Real Estate	0.2935295
Consumer Goods	0.6470932
Fin. Services	0.0599017
Health care	0.438078
ICT	0.998648
Industrial goods	0.981255
Natural resources	0.8919798
Oil and Gas	0.9565208
Services	0.0522417
Oil	

Source: Author's Computation

From the results of Engle-Sheppard X^2 tests, we observe that the null of constant conditional correlation (CCC)

cannot be rejected as all the series show probability values greater than 0.05 as evidence in Yaya, *et al* (2016) Uzonwanne 2021 and Tule *et al* 2018.

4.6 CCC VARMA GARCH Results¹

Based on the results of the Eagle-sheppardtest, the estimates of the CCC for the oil stock nexus is presented as follow:

Table 5: Results of the Estimated CCC Coefficients

Variable	Coefficients	Residual Diagnosis	
	ρ^{so}	Ljung-Box	Mcleoid-Li
Oil-Agriculture	-0.000177	0.4068	0.2713
Oil-Conglomerates	0.0156150	0.5142	0.1287
Oil-Construction/Real Estate	0.060853	0.1890	0.2143
Oil-Consumer Goods	0.015499	0.6281	0.4887
Oil-Financial Services	-0.002026	0.6034	0.1272
Oil-Health Care	0.040400	0.4464	0.0908
Oil-ICT	9.02E-03	0.5382	0.2469
Oil-Industrial Goods	0.007855	0.2689	0.9397
Oil-Natural Resources	0.037600	0.8051	0.1438
Oil-Oil and Gas	0.011986	0.4507	0.1268
Oil-Services	0.006298	0.7351	0.0599

¹Based on the objective of this paper, which is to examine conditional correlations between oil shocks and sectorial returns, the result of the mean and variance equations are suppressed but available

Tables 5 also displays the results of the constant conditional correction coefficient estimates Results reveal that the CCC estimate for all the oil- stock are low, thereby validating the assumption of constant correction among and between the oil-stock pairs, this agrees with Rashid and Malik (2017); Tule *et al*, (2019). The highest CCC is between construction/real estate this impact is due to the fact this sector is sensitive to oil price fluctuations. Low conditional correction is an indication of the existence of potential gains by investors from investing in both oil and stock markets. These findings can therefore be used to construct portfolio weight and hedge ratios to guide investor and investment decision.

The diagnostic tests on table 5 are for remaining ARCH effects and serial correction. Results of the Mcleod-Li test is used to test for the presence of ARCH effect we observe that going by the p values, there are no remaining ARCH effects of our Ljung-Box test show

that is no more evidence of serial correction the returns series.

5. Conclusion and Recommendations

In this study, we investigated and examined the conditional correlations between oil and the Nigerian stock prices using a disaggregated sector level data on high frequency daily observation. Overall, the results of the constant conditional correlation reveal low coefficient values between the oil-stock pars, which suggest the potential investors could make substantial gains by investing in both the stock and oil market.

Based on the results of the CCC-GARCH model and the analysis carried out, this study recommends that investors should invest in both oil and stock market in Nigeria with the aim of getting higher returns on their investment. The proportion of investment between these assets should however be done after thorough hedge ratios and portfolio weights are constructed.

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