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Covid-19 Pandemic and the Socioeconomic Development in Nigeria: Evidence from Toda and Yamamoto Procedure

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ABSTRACT

This paper investigates the impact ofCovid-19 pandemic on the socioeconomic development of Nigeria using Modified Toda and Yamamoto causality test for the period spanning 23rd March -23rd July, 2020. The long run causality test outcome indicates that there is a bidirectional causality running from Covid-19 pandemic to exchange rate and from Covid-19 pandemic to crude oil price while unidirectional causality exists running from exchange rate to crude oil price. This suggests that Covid-19 pandemic has impacted on crude oil price and exchange rate. It is recommended that Nigerian government should continue struggling towards achieving economic diversification and also ensure that safety measures given by the NCDC is strictly followed in order to reduce the daily spread of the virus in the country.

KEYWORDS: *Covid-19 Pandemic, Socioeconomic, Toda and Yamamoto Approach, Johansen and Juselius Co integration*

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1. INTRODUCTION

The Covid-19 pandemic posed a horrendous shock in global economy that the world has never witnessed since the Great Depression of 1930s (CRS, 2020). The world economy is currently in turmoil and in severe recession due to the Corona virus disease, widely known as Covid-19. The Virus was first reported in Wuhan, at the end of 2019 in China. Since then, the Virus has continued to spread globally with its manifestation in all continents affecting more than 200 countries and territories. As of 30th July, 2020, there have been 16,812,755 confirmed cases of the Covid-19 globally, and the global death stood as 662,095in 214 countries and territories as maintained by World Health Organization (WHO, 2020). Since the outbreak of the pandemic, the world economy is experiencing unprecedented challenges that cut across all sectors of the international political economy. It has disturbed the economic, political, cultural, social, religious and financial structures of the whole World. The lockdown policies adopted by both governments of developed and developing economies further intensified the negative impact of the Viral Corona virus on the global economy. It was estimated that Major economies would lose 2.4 percent value of their gross domestic product (GDP) over 2020, compelling economists to change their earlier 2020 forecast of global economic growth from 3.0 percent to 2.4 percent (Erin, 2020). The impact of the Covid-19 pandemic may be felt more than that of World War II due to its predicted social, economic and humanitarian effect (CODE, 2020).

In Nigeria, since the official confirmation of the Covid-19 on 27th February, 2020 by the NCDC, the viral virus continued to spread to all part of the country affecting all states of the federation. As of 30th July, Nigeria reported more than 42 thousand confirmed cases of Covid-19 and related death cases of 878 (NCDC, 2020). Just three weeks from the official announcement of Covid-19 in Nigeria, Stock market investors lost over NGN2.3 trillion which is equivalent to US$5.9billion (Peterson, 2020). The Nigerian economy is largely dependent on oil and gas sector which accounts for a very large chunk of the country's foreign exchange. The oil and gas sector is also a major source of foreign exchange for Nigeria and has recently had a very steep decline in oil prices resulting from the effect of the Covid-19 pandemic (CODE,2020). The oil price shock due to the corona virus came as a great surprise to the Nigerian government and the impact has put significant challenge on the 2020 budget, leading to its review and adjustment to meet the current global oil price (Maijama'a et al., 2020). Based on this

background, the paper would examine the impact of Covid-19 pandemic on the socioeconomic development of Nigeria.

1.1. Statement of problem

Prior to the outbreak of Covid-19 pandemic in Nigeria, the Nigerian economy was struggling for economic recovery as a result of the intensive impact of the insecurity, financial crisis of 2016, socioeconomic challenges, and unemployment. Correspondingly, the Nigerian economy was bedeviled by slow growth, high inflation rates and currency fluctuation, and high levels of poverty. These and other myriads of challenges constituted a stumbling block in the quest for socio-economic development in the country. The ongoing public health crisis due to the outbreak of Covid-19 triggered economic crisis in Nigeria and further consolidated the problem of socioeconomic development. It is therefore, based on this statement of research problem, this paper intents to examine the impact of Covid-19 pandemic on socioeconomic development in Nigeria.

1.2. Significance of the study

The importance and significance of this study cannot be overemphasized. This study is a contribution to the ongoing researches on the impact of Covid-19 on the global economy and Nigerian economy in particular. The finding of this study would serve as reference point for future research. It would also be useful and relevance for policy makers in their policy making enterprise. Furthermore, the paper and its finding will contribute significantly to the existing literatures on the subject areas, thereby filling the gap in the existing knowledge.

1.3. Motivation for the study

Researchers all over the world shifted their research attention and focus on finding lasting solution to the diverse effect of Covid-19, how do individual states, global citizens, and corporate institutions can survive amidst Covid-19 pandemic, analyzing the impact of the pandemic on the economy, politics, culture and social world. In Nigeria, the spillover effect of Covid-19 is visible with its vivid manifestation in both formal and informal sectors of the Nigerian economy. The aforementioned postulations constituted a motivation for this research. Therefore, the authors were heavily disturbed with ongoing global health crisis, economic crisis due to the effect of Covid-19 pandemic and attempted to embark on this study.

Thus, the paper is dissolved into the following sections: the first section encompasses Introduction, statement of the problem, significant of the study, and motivation for the study; followed by section two that provides discussion on related literature reviewed; section three covered the research methodology; section four reports on the data and results discussion and the final section is devoted to conclusion and policy recommendations.

2. Related literature review

The literature review is divided into three sections. The first section contains the review of related literatures on the impact of Covid-19 pandemic on the energy demand in general while the section is concern with the impact of Covid-19 pandemic on the insurance sector of the economy with evidence from around the world. The third section conclude on the impact of Covid-19 pandemic on the cultural base of the society in general.

the review of related literatures on the impact of Covid-19 pandemic on the energy demand that consists of evidence from Nigeria and evidence from around the world include the works of researchers such as Maijama'a et al. (2020) who studied the impact of Covid-19 pandemic on global energy demand with specific reference to people's republic of China using daily data for the period of 23th January to 8thFebruary, 2020 on total cases of the virus, Chinese population and currency exchange rate. After realizing cointegration relationship with help of Engle and Granger, the result from OLS revealed that Chinese population is significantly associated with the total cases of the virus while crude oil price is negative and significantly related to the total cases of the disease. Exchange rate was found to be negative but insignificant. In another development using Nigeria as a case study, Maijama'a et al. (2020) examined the impact of Covid-19 outbreak on the Nigerian economy using situation reports from Nigeria Centre for Disease Control (NCDDC) for the period of 11thMarch to 19thMarch, 2020. The analysis shows that 91 people were screened for Covid-19 from 13 states and the result indicate that 63 people were tested negative and ruled out, 17 peoples result is pending and 11 people were confirmed positive. Again, using ARDL and VECM approaches, Musa et al. (2020) investigates the impact of Covid-19 pandemic on crude oil price and food prices using daily observation on total confirmed Covid-19 cases, crude oil prices and food prices for the sample period of 20th January to 31st March, 2020. The result revealed strong cointegration relationship among the variables. Crude oil price shows negative and significant relationship with Covid-19 while food prices have insignificant positive relation withCovid-19 in the long run. In the short run both crude oil and food prices have negative and significant relationship with Covid-19. The VECM result shows that there is long run causality in Covid-19 equation with short run unidirectional causality running from crude oil price to Covid-19 and from food price index to crude oil price. Furthermore, Alou et al. (2020) studied the impact of Covid-19 pandemic on crude oil and natural gas S&P GS Indexes using daily data from 2ndJanuary to 9th April, 2020 by means of structural VAR model to realize the impact of shocks due to Covid-19 on the future energy markets, specifically on crude oil and natural gas S&P GS Indexes and the outcomes revealed that shocks due to Covid-19 was responded by energy commodities S&P GS Indexes as a result of fundamental, psychological and behavioral factors.

concerning the relationship between Covid-19 and the insurance sector of an economy, the second strand of the literature consist of Sudha (2020) used India as a case study to investigate the impact of Covid-19 pandemic on the insurance sector and the numerous challenges faced by different insurers due to Covid-19 outbreak and the analysis revealed strong indication that the insurance sector must be proactive in redesigning the distribution channel, train the agents to adopt digital technologies for convincing and selling the insurance products, train the employees for remote working and develop the need based product in the market for business continuity. In the same line of work, Saraswathy (2020) indicates that insurance industry decided to reduce branches to cut costs to counter the impact of Covid-19 and insurers have prepared to sell the insurance products through the bank websites, company website and through video calls with customers. Also, Neal Baumann (2020) in his study revealed that the financial impact of

Covid-19 pandemic in the insurance sector, particularly in reinsurance will take time to assess. However, the insurer should be well prepared for all huge losses, including pandemic.

The third strand of the review of literatures on the relationship between Covid-19 pandemic and the cultural background of the society, Adom (2020) studied the cultural and educational implications of Covid-19 pandemic in the case of Ghana for the sample period of 3rd march to 16th April, 2020. The data were extracted through face-to face, video, telephone interviews and the news published reports on the pandemic. The data were analyzed using descriptive statistics and the outcomes revealed that misinformation and myth on the infection and prevention of the virus shrouded in the cultural beliefs of Ghanaians and there is weak execution of online classes in the country due to dearth of technical know-how, technological devices and high charge of internet infrastructure. Adepoju (2020) examined the prospect of traditional medicine fight for Covid-19 vaccine by adopting Marxist approach in providing explanation in the strained relationship between modern and traditional healthcare portioners. The examination further shows that the potentials of traditional medicine in overcoming the pandemic by identifying some traditional herbs and plants with proven antiviral and immune bosting potentials and recommend the need for genuine efforts to promote mutual understanding and corporation in connecting the equality gap that due exists.

To this end, this research article intends to contribute to the scanty existing literatures on the relationship between Covid-19 pandemic and the socioeconomic development of Nigeria for the periods of 23rd March to 23rd July, 2020 (5 days observations a week) through an application of Toda and Yamamoto (1995) for the possible existence of long run causality between the variables.

3. Research Methodology

This section is devoted entirely to the methodology employed in this study such as discussions on the test for non-stationary or unit root test, test for cointegration or long-run relationship and the Toda and Yamamoto causality procedure.

3.1. Unit Root and Cointegration Tests

The Augmented Dickey Fuller (1981) and Philip Perron (1988) unit root test are employed to determine the order of integration of the variables even though the application of Toda and Yamamoto (1995) causality does not require formal unit root test to be conducted before it is apply but to be sure of the order of integration of our variables, unit root tests is conducted using the aforementioned unit root tests. After knowing the order of integration of the variables, the test for the existence of long run relationship between the variables is also utilized using the Johansen and Juselius (1990) test for cointegration relationship using both the trace statistic and max-eigen value models respectively.

3.2. Granger Non-causality Test

For us to carry out the estimation of this model, we have engaged Granger non-causality test by means of Toda and Yamamoto (1995) procedure. The Toda and Yamamoto approach for testing granger causality is suitable and valid in no matter the level of integration of the variables and cointegrated or not cointegrated. Meaning whether the variables are purely I (0), I (1), I (2) or combination of the three order of integration and having long run equilibrium relationship or not. The important feature of Toda and Yamamoto causality is that pre-testing for cointegrating properties of the system is not needed and this make the avoidance of potential bias that is connected with both unit root and cointegration tests since it is applicable regardless of whether the variables are integrated of order I(0), I(1) and (2) with the existence of cointegration or without cointegration of the random order (Rambaldi and Doran, 1996; Menyah and Wolde-Rufael, 2010; and Chindo, 2014). The procedure of Toda and Yamamoto design based on the augmented VAR modelling approach together with Wald test statistic and the Wald statistic is associated with asymptotic chi-square (χ^2) distribution which is irrespective of integration order of the variables and their cointegrating properties. This make it suitable for VAR model on levels of the series and most importantly provision of long run causality among the variables which is not captured in other approach that use first differencing. As mentioned earlier, Toda and Yamamoto method engaged modified wald test for parameter limitations of VAR (i.e.k is the lag length of the system). In this procedure, the lag order (k) is artificially augmented by the maximun order of integration given as "d_{max}" and it will become $(k+d_{max})^{th}$ by the Toda and Yamamoto procedure. In our own situation, to test for non-granger causality using Toda and Yamamoto, we utilized VAR with 10 lags (k=8 and d_{max}=2). Therefore, the following system of equations given matrix form were calculated:

$$\begin{bmatrix}\ln CC_t\\ \ln OP_t\\ \ln EX_t\end{bmatrix} = \chi_0 + \chi_1\begin{bmatrix}\ln CC_{t-1}\\ \ln OP_{t-1}\\ \ln EX_{t-1}\end{bmatrix} + \chi_2\begin{bmatrix}\ln CC_{t-2}\\ \ln OP_{t-2}\\ \ln EX_{t-2}\end{bmatrix} + \chi_3\begin{bmatrix}\ln CC_{t-3}\\ \ln OP_{t-3}\\ \ln EX_{t-3}\end{bmatrix} +$$

$$\chi_4\begin{bmatrix}\ln CC_{t-4}\\ \ln OP_{t-4}\\ \ln EX_{t-4}\end{bmatrix} + \chi_5\begin{bmatrix}\ln CC_{t-5}\\ \ln OP_{t-5}\\ \ln EX_{t-5}\end{bmatrix} + \chi_6\begin{bmatrix}\ln CC_{t-6}\\ \ln OP_{t-6}\\ \ln EX_{t-6}\end{bmatrix} + \chi_7\begin{bmatrix}\ln CC_{t-7}\\ \ln OP_{t-7}\\ \ln EX_{t-7}\end{bmatrix} + \quad (1)$$

$$\chi_8\begin{bmatrix}\ln CC_{t-8}\\ \ln OP_{t-8}\\ \ln EX_{t-8}\end{bmatrix} + \chi_9\begin{bmatrix}\ln CC_{t-9}\\ \ln OP_{t-9}\\ \ln EX_{t-9}\end{bmatrix} + \chi_{10}\begin{bmatrix}\ln CC_{t-10}\\ \ln OP_{t-10}\\ \ln EX_{t-10}\end{bmatrix} + \begin{bmatrix}\psi_{\ln CC_t}\\ \psi_{\ln OP_t}\\ \psi_{\ln EX_t}\end{bmatrix}$$

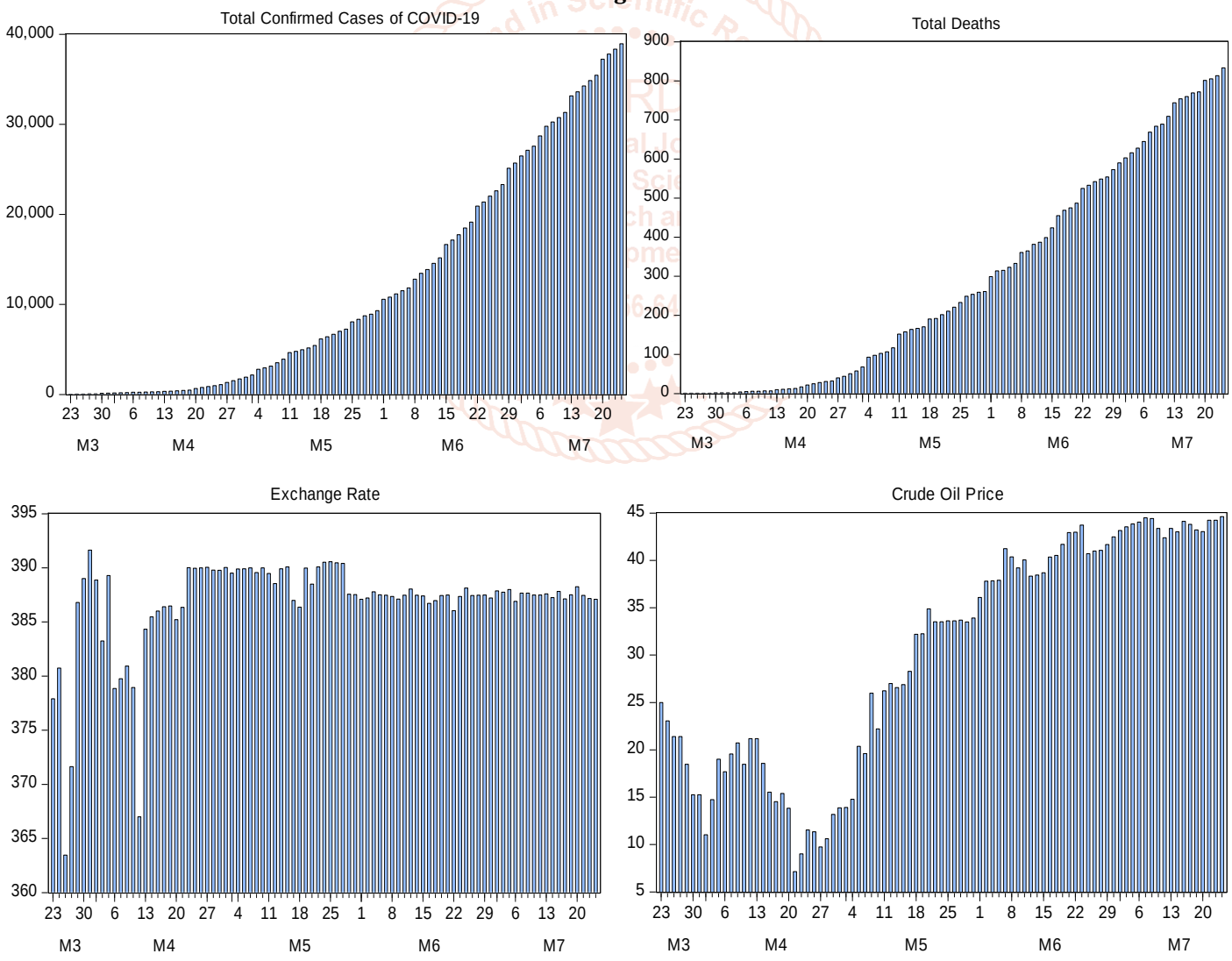
where ln is the natural log sign, $\ln CC_t$ is the natural log of confirmed cases of COVID-19, $\ln OP_t$ is the natural log of crude oil price, $\ln EX_t$ is the natural log of exchange rate, $\chi_1 \ldots\ldots \chi_{10}$ are 10 x 10 matrices of quantities with χ_0 being 9x1 identity matrix and ψ_s are the white noises which are assumed to have zero mean with constant variance. To test the hypothesis that confirmed cases of COVID-19($\ln CC_t$) does not granger cause crude oil price ($\ln OP_t$), we employed the following hypothesis: $H_0 = \chi_{ik}^1 = \chi_{ik}^2 = \chi_{ik}^3 = \chi_{ik}^4 = \chi_{ik}^5 = \chi_{ik}^6 = \chi_{ik}^7 = \chi_{ik}^8 = \chi_{ik}^9 = \chi_{ik}^{10} = 0$. Where $\chi_{ik's}^i$ are the coefficients of confirmed cases of COVID-19 ($\ln CC_t$) in Equation 1

Also, to test for the reverse non causality from crude oil price ($\ln OP_t$)to confirmed cases of COVID-19 ($\ln CC_t$), we utilized the following null hypothesis: $H_0 = \chi_{ik}^1 = \chi_{ik}^2 = \chi_{ik}^3 = \chi_{ik}^4 = \chi_{ik}^5 = \chi_{ik}^6 = \chi_{ik}^7 = \chi_{ik}^8 = \chi_{ik}^9 = \chi_{ik}^{10} = 0$. Where $\phi_{ik's}^i$ are the coefficients of crude oil price ($\ln OP_t$) variables in equation 1. Again, the same procedures are applied for testing causality between other series in the Equation 1

4. Data and Empirical Results Discussion

The data on the total laboratory confirmed cases of Covid-19 and total number of deaths were extracted from the Nigeria Centre for Disease Control (NCDC) daily situation reports while daily Brent crude oil price data was sourced from Central Bank of Nigeria and Organization of Petroleum Exporting countries (OPEC) websites respectively. Daily exchange rate data was extracted from UK exchange rate website all for the periods of 23rd March to 23rd July, 2020 (5 days observations a week). All the data on the variables were transformed into natural logarithmic form for easy interpretation in terms of elasticity coefficients and avoidance of regression problems (Musa et al., 2019). The Bar illustration and trends of the variables are represented in Figure 1 and the trends of all the variables indicates positive and increasing movement for the entire periods under investigation.

Figure 1. Bar presentation of the total confirmed cases, total discharged, total deaths, Brent crude oil price and exchange rate.



Descriptive Statistics

The descriptive statistics is illustrated in Table 1 with the mean, median, maximum values, minimum values, standard deviation, skewness, kurtosis, Jarque-Bera and the number of observations respectively. Comparatively, the standard deviation coefficients of all the series are far below their corresponding mean and median values and this implies the variability

distribution of these series. The skewness coefficients indicated that all the series are negatively skewed as shown by the skewness coefficients. Confirmed cases of Covid-19 and crude oil price kurtosis values are less than 3 hence these variables are platykurtic. while, exchange rateisleptokurtic as indicated by the kurtosis value of more than 3. The Jarque-Bera probability values are for all the variables are significant and this implies that all the variables are not normally distributed within the sample periods.

Table 1: Descriptive Statistics.

	$lnCC_t$	$lnEX_t$	$lnOP_t$
Mean	8.278863	5.957799	3.304563
Median	8.890273	5.959716	3.511844
Maximum	10.56998	5.970343	3.798182
Minimum	3.583519	5.895697	1.967112
SD	1.993492	0.011948	0.484974
Skewness	-0.744935	-3.183445	-0.772444
Kurtosis	2.341296	14.65546	2.441185
Jarque-Bera	9.840453	654.1018	10.00862
Probability	0.007297	0.000000	0.006709
Observations	89	89	89

Note: Jarque-Bera shows that all the series are normally distributed.

Table 2 reported the result of correlation analysis. The result of analysis indicates that there is exist are positive correlation between the total confirmed laboratory cases of Covid-19 and exchange rate of Naira. This implies that increasing total confirmed laboratory cases of the virus has results in increase in the exchange rate of Naira/US dollar for the period under study. The total confirmed laboratory cases of Covid-19 have negative correlation with crude oil price. This implies that increasing cases of Covid-19 has led to the fall in Brent crude oil price in Nigeria within the study period. Most importantly all the correlation coefficients for all the variables are within the benchmark of 0.80 and this signifies that there is no problem of multicollinearity among the independent variables (Prodan, 2013).

Table 2: Correlation Analysis

	$lnCC_t$	$lnEX_t$	$lnOP_t$
$lnCC_t$	1.000	0.362	-0.148
$lnEX_t$		1.000	0.049
$lnOP_t$			1.000

Unit Root Test Results

The application of Toda and Yamamoto approach does not properly need pre-testing of the series for unit root as it does not matter whether all the series are I (0), I (1) and I (2) or combination. Nevertheless, for the determination of the series' order of integration, we utilized Augmented Dickey Fuller (1981) and Phillips Perron (1988) unit root tests to identify each of the series' order of integration. The outcomes of these unit root tests are reported in Table 3 and the outcomes revealed that $lnCC_t$ is purely I (0) under ADF and PP tests. ln OP_t is purely I (1) under both ADF and PP tests. but $lnEX_t$ is I (2) under ADF and I (0) under PP unit root test results. In light of this results of ADF and PP tests which shows mixture of I (0), I (1) and I (2) order of integrations among the variables, Toda and Yamamoto approach is the most efficient method to be apply than any other approaches of testing for the causality among the series.

Table 3: ADF and PP unit root test results

Series	At Level				At First Difference				At Second Difference	
	ADF		PP		ADF		PP		ADF	
	Const.	Const & Tre.	Const.	Const & Tre.	Const.	Const. & Tre.	Const.	Const. & Tre.	Const.	Const. & Tre.
$lnCC_t$	-3.138** (0.027)	-0.649 (0.973)	-7.403*** (0.000)	-2.337 (0.409)	-3.122** (0.028)	-3.863** (0.018)	-9.079*** (0.000)	-11.714*** (0.000)	-------	-------
$lnOP_t$	-0.995 (0.752)	-2.628 (0.269)	-0.964 (0.762)	-2.676 (0.249)	-9.815*** (0.000)	-9.785*** (0.000)	-9.815*** (0.000)	-9.785*** (0.000)	--------	-------
$lnEX_t$	-2.753* (0.069)	-1.950 (0.618)	-4.583*** (0.000)	-4.897*** (0.000)	-2.426 (0.138)	-2.937*** (0.157)	-17.801*** (0.000)	-18.495*** (0.000)	-9.761*** (0.000)	-9.699*** (0.000)

Note: ***, **, and * denote 1%, 5% and 10% levels of significant respectively.

In order to get the optimum lag that is free from serial correlation and other regression problems, we engaged a mixture of Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), and Hannan Quinn (HQ) lag selection criterions and they suggested that lag 8 is the best lag while Schwarz Bayesian Criterion (SBC)suggest lag 1. Therefore, in line with the suggestion made by the majority of the criterions, lag 8 is the optimal lag.

Table 4: VAR Lag Order Selection Criteria Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	286.9828	NA	1.93e-07	-6.949571	-6.681593	-6.842131
1	497.5566	389.5614	1.25e-09	-11.98891	-11.45296*	-11.77403
2	514.9771	30.92147	1.01e-09	-12.19943	-11.39549	-11.87711
3	536.4005	36.41974	7.46e-10	-12.51001	-11.43810	-12.08025
4	541.7347	8.668018	8.23e-10	-12.41837	-11.07848	-11.88117
5	546.8483	7.926156	9.16e-10	-12.32121	-10.71334	-11.67657
6	592.4025	67.19240	3.72e-10	-13.23506	-11.35922	-12.48298
7	609.7915	24.34466	3.08e-10	-13.44479	-11.30096	-12.58527
8	626.1602	21.68847*	2.63e-10*	-13.62900*	-11.21720	-12.66204*

Note: * denotes the optimum lag selected by different criterion.

To examine whether the variables are cointegrated or not although Toda and Yamamoto procedure does not require the variables to be cointegrated, but to be at the safer side, we have utilized Johansen and Juseliu (1990) test for cointegration and the result is reported in Table 7. The outcome of the test revealed that all the variables are cointegrated as shown by three consecutive cointegrating equation in both the trace statistic and max-eigen value models. Therefore, based on this result we have come to a conclusion that all the variables have long run equilibrium relationship and they moved together in the long run.

Table 5: Johaansen and Juselius Test for Cointegration

Hypothesized		Trace	0.05	Max-Eigen	0.05
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Statistic	Critical Value
None	0.400	81.787 [0.000] ***	29.797	44.008 [0.000] ***	21.131
At most 1	0.302	37.778 [0.000] ***	15.494	30.952 [0.000] ***	14.264
At most 2	0.076	6.826 [0.009] ***	3.841	6.826 [0.009] ***	3.841

Note: Values in [] are the probability values

The result of Toda and Yamamoto granger non-causality is presented in Table 6 and the result revealed that there is bidirectional causality at 5% level of significant running from exchange rate to the total confirmed laboratory cases of Covid-19 pandemic. This implies that the exchange rate of naira has appreciated in the midst of Covid-19 pandemic and this finding contract the result of Maijama'a et al. (2020) who shows that exchange rate was not affected by the pandemic in China. Also, another bidirectional relationship is revealed running from crude oil price and Covid-19 pandemic at 1% level of significant. This means that crude oil is which is the major exports commodity in Nigeria is been affected by the pandemic at the international market and this supports the empirical findings of Maijama'a et al. (2020) in the case of China and Musa et al. (2020).The result also depicted a unidirectional causality running from exchange rate to crude oil price and this implies that the price of the Brent crude oil can be affected by both appreciation or depreciation in the international currencies most especially US dollar.

Table 6: Toda and Yamamoto Granger Non-causality Test Results.

Null hypothesis	Chi-Square (χ^2)	P-value
Exchange rate does not cause Covid-19 cases	105.464***	0.000
Covid-19 cases does not cause Exchange rate	23.082***	0.006
Oil price does not cause Covid-19 cases	31.874**	0.000
Covid-19 cases does not cause oil price	63.010**	0.000
Covid-19 cases does not cause exchange rate	5.385	0.370
Exchange rate does not cause oil price	23.521***	0.005
Oil price does not cause exchange rate	14.337	0.110

Note: ** stands for the 5% level of significant.

5. Conclusion and policy recommendation

This paper investigates the impact of Covid-19 pandemic on the socioeconomic development of Nigeria over the period 1982-2018 using Toda and Yamamoto (1995) modified version of granger non-causality. The empirical outcomes from Johansen and Juselius test for cointegration revealed that the variables have strong long run equilibrium relationship while the Toda and Yamamoto causality test shows a bidirectional causality running from Covid-19 pandemic to exchange rate and from Covid-19 pandemic to crude oil price. While unidirectional causality exists between exchange rate to crude oil price.

In view of the outcomes of this paper, it is recommended that Nigerian government should continue struggling for the diversification of the economy from a monocultural economy to more diversified economy in order to avoid revenue generated issues associated with fluctuation in crude oil price from the international energy market. Again, government should continue enlightening the general public on the strict compliance to the safety guidelines given by the Nigeria Centre for Disease Control (NCDC) in order to lessen the fast spread of the virus in the country.

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