IMPACT OF CORONAVIRUS (COVID-19) PANDEMIC ON SOME SELECTED MACROECONOMIC VARIABLE PERFORMANCES IN NIGERIA

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Abstract: Since COVID-19 first made its appearance, the economy of the whole world has been facing unprecedented challenges. As a result of this, researchers investigated the effects of COVID-19 on a variety of important macroeconomic factors pertaining to the Nigerian economy between March 2020 and July 2022. The Nigeria Centre for Disease Control (NCDC) and the World Health Organization (WHO) were the sources of information regarding the number of cases of Covid-19. The Central Bank of Nigeria was the source of information regarding the value of the country's currency, the interest rate, and the inflation rate (CBN). After subjecting the data to a battery of econometric tests. The number of deaths caused by

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COVID-19 had a significant impact on interest rates, in contrast to the very little impact that confirmed cases of the virus had. There was a statistically and clinically significant association between COVID-19 validated cases and the inflation rate in Nigeria. This correlation was seen in the country. Additionally, the COVID-19 pandemic Granger was the cause of macroeconomic indices such as Nigeria's currency rate and interest rate respectively. According to the findings of this study, it is thus feasible to draw the conclusion that the COVID-19 outbreak had an effect on the naira as well as interest rates and inflation in Nigeria. According to the results of the investigation, the authors of the paper came to the conclusion that in order to keep prices stable despite the continuing pandemic, the government of Nigeria should adopt more stringent fiscal and monetary policies.

Keywords: Covid-19; Pandemic; Exchange rate; Interest rate; Inflation rate

1. Introduction

Nigeria's economy is still recovering from the Chinese coronavirus outbreak. Since 2020, Nigeria has had substantial socioeconomic problems, including high unemployment, weak growth, high inflation, currency instability, and high poverty (Saleh and Musa 2020; Bako *et al.,* 2021; Oko *et al.,* 2022; Aderemi *et al.,* 2020).

The present coronavirus epidemic is due to public health and economic decline. While public health has focused on infection control and vaccines, the worldwide lockdown has caused supply and demand increases and a rise in oil prices. Coronavirus' worldwide proliferation has hindered social and economic policymaking. Nigeria relies heavily on oil exports to produce nearly 70% of its GDP and 65% of all government revenue, making it vulnerable to swings in crude oil prices. Increased expenditure to alleviate COVID-19's effects worsened the country's economic imbalance, putting it susceptible to high government debt. Recent downturn and outflows in Nigeria's financial markets have weakened the country's macroeconomic stimulus, putting pressure on some critical macroeconomic variables such as foreign reserves, inflation and exchange rates (Faraiibi & Asongu, 2020; KPMG, 2020). The extent to which these macroeconomic variables are affected requires an empirical answer in the literature. Thus it's important to understand how Covid-19 has impacted Nigeria's macroeconomics. In view of the above, this study examines how the recent COVID-19 coronavirus epidemic in Nigeria affects the country's currency rate, interest rate, and inflation rate. The study aims to address the following research question: what is the Impact of COVID-19 pandemic on the exchange rate in Nigeria?

Therefore, this study is crucial at the present time in Nigeria because it will help establish the relationship between the movement of the exchange rate, interest rate, and inflation rate, and determine whether or not the outbreak of the corona virus disease has spillover effects on the country`s exchange rate, interest rate and inflation rate. Therefore, the study is broken down into an introduction, research questions and goals, literature review, research methods, data analysis, and policy suggestions.

2. Literature Review

2.1 Epidemic Theory

It is difficult to maintain order since most cases of coronavirus illness (COVID-19) are never diagnosed (Li *et al*.2020). Without a vaccine, the focus of the pandemic response has been on non-pharmaceutical therapies (Ferguson *et al*. 2020), such as limiting contact between individuals and isolating those who are afflicted or may be infected. As a result, it is crucial that political decision-makers have access to tools for foreseeing the outcomes of such initiatives. Disease transmission may be modeled using a number of different kinds of equations. Although social limitations cannot be addressed directly, simple compartmental models such as the widely used susceptible-infected-recovered (SIR) model (Kermack and McKendrick, 1927) may effectively account for them by altering the transmission rate. However, individual-based models are computationally costly and provide little in the way of analytical insight when applied to real-world problems (Willem, Verelst, Bilcke, and Beutels, 2017).

2.2 Empirical Review

Aderemi *et al*. (2020) explore how coronavirus and globalization have changed China-Africa connections. Globalization spread the coronavirus throughout Africa, say scientists. Chen, Jang, and Kim (2007) studied SARS's impact on Taiwan's hotel and tourism industries. The epidemic lowered mean surplus spillovers for Taiwanese hotel stocks, studies said.

Baker evaluated COVID-19's impact on the stock market (2020). The research alleges that government limits on firm activity and purposeful social isolation created COVID-19's detrimental impact on the US stock market. The COVID-19 pandemic had a greater influence on US financial markets than the Spanish Flu (1918–19), the

Asian Flu (1957–1989), or the Hong Kong Flu (1968–1971). (1968). (1957–1958). (1968).

Boissay and Rungcharoenkitkul compared Covid-19 to past outbreaks using US data (2020). The current Covid-19 pandemic, like the 1918–19 flu, SARS in 2003, H5N1 avian flu from 2003–present, and Ebola from 2014–2016, has had macroeconomic effects, such as slower economic growth and lowered industrial production rates. To analyze the pandemic's economic effect, they compared current GDP statistics to the Covid-19 forecast and found that unproduced GDP may be used. Covid-19 will harm the global economy by 4% and the US economy by 5%, according to April 8 data. According to the paper, increased awareness with the Covid-19 shock's economic transmission medium, the link between economic activities and the pandemic, and the exchange of policy information may help attenuate the pandemic's macroeconomic effect.

Adenuga et al. (2010) cites Chuku et al., Akpan, Aliyu, and others (2010). (2009). Olomola and Adejumo (2006). (2006). Akpan (2009) studied how the Nigerian economy responds to economic shocks. She found that when oil prices rose, government spending increased. Oil price shocks had little influence on industrial output growth due to actual exchange rate gains. Price shocks in Nigeria lead to Dutch disease, according to Olomola, Adejumo (2006) and Ayadi (2005).

Fornaro and Wolf (2020) established a model to examine Covid-19's influence on macroeconomic policy. Covid-19 would force enterprises to close and disrupt global supply chains, they said, sending the world economy into a spiral (OECD, 2020). Epidemic lowered worldwide demand. They found that the coronavirus increased voluntary unemployment and decreased demand. Estranged family members may spend less money. As the coronavirus outbreak expanded, supplies declined. Economic participants expressed reduced expectations for growth, employment, and activity. Coronavirus caused a brief supply shock. A negative supply shock might affect the labor market and economic output, requiring fast monetary and fiscal policy responses from the government.

Loayza and Pennings (2020) studied macroeconomic policies in poor countries during Covid-19. They said the outbreak paralleled the global public health issue and presented an economic challenge on par with or worse than the Great Recession of 2008–2009. First, the Covid-19's human and economic ramifications are expected to be larger in developing countries because to the nature of their economies, which exacerbates the effect of closures and decreased economic activity. Inadequate health care access, a strong private sector, lack of fiscal independence, weak financial

markets, and bad governance might undermine the efficacy of limiting tactics. To reduce pandemic susceptibility, a macroeconomic strategy that increases monetary transmission and fiscal space is needed. If so, the macroeconomy will remain steady.

Osagie, Maijamaa, and John studied COVID-19's influence on Nigeria's stock market (2020). Researchers analyzed COVID-19's impact on the Nigerian stock market using daily data from January 2, 2020 to April 16, 2020. UNCTAD studied COVID-19's worldwide effect (2020). This research examined the consequences of the COVID-19 epidemic in Asia on numerous countries and sectors. According to this study, the COVID-19 outbreak would mostly affect China's neighbors. Many overseas firms rely on Chinese exports. As the paper notes, the implications of a Chinese supply slowdown on different economic sectors would depend on the spread of COVID-19 and China's efforts to restrict it.

Shive investigated peer effect on Finnish private investors' stock trading and outcomes (2010). From 1995 to 2003, 20 of the most-traded stocks were analyzed. A social-contact based measure of the spread of disease and rumor predicted individual investors' trading behavior, according to the research. Individual investor trading has a large societal impact, and socially motivated trading may predict stock outcomes. Several microeconomic indices improved because to the covid-19 epidemic, decreasing their differences.

3. Methodology

The research methodology used in this analysis was retrospective. The ex-post facto design is a kind of semi-experimental study in which the influence of an explanatory variable on a dependent variable has already been established in the participants. In a quasi-experimental design, research subjects are not selected at random. Studies conducted after the fact may best make use of explanatory factors that anticipate changes in the dependent variable. However, secondary sources were used for this analysis. Starting in March 2020 and ending in July 2022. The CBN Statistical Bulletin was consulted for information on the exchange rate, interest rate, and inflation rate; the NCDC and WHO provided the statistics on Covid-19.

3.1 Model Specification

This research makes use of a model derived from Puaschunder (2020) and Maijamaa *et al*. (2019). By adapting this model, we were able to tailor the model to the purpose of our investigation as follows:

Responding to the study's primary aim:

$$\text{Exchange rate } = \text{ F (COVID} - 19) \qquad\qquad (1)$$

Equation (1) could be re-written in econometric term to form equation (2)

$$\text{LogER}_t = \alpha 0 + \alpha 1\text{LogCOV19CA}_t + \alpha 2\text{LogCOV19RO}_t + \alpha 3\text{LogCOV19DE}_t + E_t \quad (2)$$

In addressing the second objective of the study:

$$\text{Interest rate } = \text{ F (COVID} - 19) \qquad\qquad (3)$$

Equation (3) could be re-written in econometric term to form equation (4)

$$\text{LogIR}_t = \beta 0 + \beta 1\text{LogCOV19CA}_t + \beta 2\text{LogCOV19RO}_t + \beta 3\text{LogCOV19DE}_t + E_t \quad (4)$$

In addressing the third objective of the study:

$$\text{Inflation rate } = \text{ F (COVID} - 19) \qquad\qquad (5)$$

Equation (5) could be re-written in econometric term to form equation (6)

$$\text{LogINF}_t = \beta 0 + \beta 1\text{LogCOV19CA}_t + \beta 2\text{LogCOV19RO}_t + \beta 3\text{LogCOV19DE}_t + E_t \quad (6)$$

Where,

ER = Exchange Rate

COV19CA = Covid-19 Confirmed Cases

COV19RO = Covid-19 Recoveries

COV19DE = Covid-19 Deaths

INF = Inflation

IR = Interest Rate

E = Stochastic Error Term

From the above model $\beta_{1\ldots}\ \beta_3$ refers to

B_1 = Coefficient of Covid-19 Confirmed Cases (COVCA)

B_2 = Coefficient of Covid-19 Recoveries (COVRO)

B_3 = Coefficient of Covid-19 Deaths (COV19DE)

t= time; is used to describe the timing of observations, and in the context of the current study t = March 2020 – July 2022.

3. Results and Discussion

Table 1 provides concise descriptive data for the major research variables. Based on the data in the table above, the median ER is N409.9775 whereas the mean ER is N401.2559. The current standard deviation of the conversion rate from its mean is N14.11427, indicating that the value of the switching scale is very volatile and constantly decreasing. Interest Rate (IR) has a mean of 11.91071, a median of 11.50000, a minimum of 11.50000, and a maximum of 14.000000, all of which reflect an increase in interest rate. However, the CBN's efforts to curb the inflation that has been wreaking havoc on the economy are responsible for this rise. The median inflation rate (INF) is quite similar to the mean inflation rate (INF). Inflation peaked at $18,600,000 and has fluctuated between $12,34000 and that figure since then. Covid-19 confirmed cases (COV19CA) have a mean value of 11.62130, a median value of 12.02532, a range of values from 7.566311 to 12.47763, and a maximum value of 12.47763. There is little difference between the mean and median for Covid-19 death cases (COV19DE). The number of fatalities in Covid-19 peaked at 8.054205 and dropped to 4.060443, indicating an upward trend. The mean and median values for instances of Covid-19 recovery (COV19RO) are also very similar.

Table 1. Descriptive Statistics

Descriptive Statistics	ER	IR	INF	LCOV19CA	LCOV19DE	LCOV19RO
Mean	401.2559	11.91071	15.88143	11.62130	7.402139	11.37681
Median	409.9775	11.50000	15.95500	12.02532	7.654194	11.99219
Maximum	422.1600	14.00000	18.60000	12.47763	8.054205	12.45296
Minimum	380.4864	11.50000	12.34000	7.566311	4.060443	5.765191
Std. Deviation	14.11427	0.720771	1.967135	1.137116	0.887568	1.552515
Skewness	-0.221155	1.526212	-0.459585	-2.055401	-2.256395	-2.245421
Kurtosis	1.359875	4.169923	2.076816	7.249318	8.548387	7.831076
Jargue-Bera	3.366588	12.46701	1.980001	40.78130	59.67486	50.75812
Probability	0.185761	0.001963	0.371576	0.000000	0.000000	0.000000
Sum	11235.17	333.5000	444.6800	325.3965	207.2599	318.5508
Sum. Sq. Deviation	5378.744	14.02679	104.4797	34.91188	21.27000	65.07817
Observation	28	28	28	28	28	28

Source: Authors` Computation (2022)

Averages across the board are higher than individual variables' standard deviations. This indicates that the information is significantly out of line with the mean. The skewness numbers shown in the table also indicated that all of the variables were favorably skewed. Since values less than 3 indicate a normal distribution, the kurtosis statistics demonstrate that certain variables are play-kurtic in nature, while others have a peaked distribution. All variables did not have a normal distribution, hence the Jarque-Bera statistics proved the null hypothesis wrong. IR, COV19CA, COV19DE, and COV19RO all pass the 5% significance test and have non-normal distributions. Only inflation and currency rates pass the test (INF). Exchange rate (ER) and inflation rate (INF) data failed Jarque-Bera tests at 5%.

Table 2 shows stationarity tests from Augmented Dickey-Fuller and Phillips Perron. Findings show that all dataset variables were steady throughout all three levels of analysis (level, 1st differencing, and 2nd differencing). All of the information analyzed here is a composite of three different types of I data: I (0), I (1), and I. (2).

Table 2. Unit Root Test

Variables	ADF Test				
	Level	Prob.	1st Dif.	Prob.	Decision
ER	-3.689194	0.7253	-3.711457	0.0001	I(1)
IR	-3.689194	0.6983	-3.711457	0.1738	I(2)
INF	-3.699871	0.1657	-3.699871	0.3408	I(2)
LCOV19CA	-3.737853	0.0463	-3.711457	0.0081	I(0)
LCOV19DE	-3.737853	0.0934	-3.711457	0.0298	I(1)
LCOV19RO	-3.752946	0.0000	-	-	I(0)
	PP Test				
	Level	Prob.	1st Dif.	Prob.	
ER	-3.689194	0.8595	-3.699871	0.0000	I(1)
IR	-3.689194	0.5844	-3.699871	0.0011	I(1)
INF	-3.689194	0.6036	-3.699871	0.3067	I(2)
LCOV19CA	-3.689194	0.0000	-	-	I(0)
LCOV19DE	-3.689194	0.0000	-	-	I(0)
LCOV19RO	-3.699871	0.0000	-	-	I(0)

Source: Authors` Computation (2022)

From table 3, firstly, we detect a positive and statistically significant link between the naira/dollar exchange rate and COV19 cases in Nigeria. Exchange rate is predicted to climb by 0.13% for every COV19 case. Meanwhile, exchange rate and COV19 fatalities in Nigeria had an insignificant positive relationship in the country. And, COV19 case recovery was inversely impacted the exchange rate. This suggests that a unit change in Nigeria's COVID-19 recovery, exchange rate will drop by 0.10%.

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The R-squared value of 0.699 indicates that explanatory variables explain 69.9% of the dependent variable's variation, with the remaining 30.1% likely attributed to unmeasured factors. The aforesaid information led researchers to conclude that the spread of the COVID-19 pandemic had a complicated effect on the value of the Nigerian naira.

Table 3. Impact of COVID-19 pandemic on the exchange rate in Nigeria

Dependent Variable: LogER

Method: FMOLS

Regressors	Coefficient	T-statistics	Prob. Value
LCOV19CA	0.135000	2.005362	0.0181
LCOV19DE	0.048574	0.656419	0.7313
LCOV19RO	-0.107362	3.666667	0.0000
R-Squared	0.699295		

Source: Authors` Computation (2022)

The table 4 shows a positive but non-significant relationship between Nigerian interest rates and COV19 confirmed cases. Similarly, COVID-19 death cases had a considerable direct influence on interest rates. Whereas, COVID-19 recovery cases had a significant negative relationship with interest rate in Nigeria. A unit change in COVID-19 recovery cases would cause interest rate to drop by 16%. R^2 reveals that the model accurately captures the connection between the independent and dependent variables by explaining 74% of the dependent variable's variation.

Table 4. Impact of COVID-19 Pandemic on Interest Rate in Nigeria

Dependent Variable: IR
Method: FMOLS

Regressors	Coefficient	T-statistics	Prob. Value
LCOV19CA	0.147519	0.761196	0.7482
LCOV19DE	0.069198	1.924835	0.0687
LCOV19RO	-0.160987	2.909872	0.0022
R-Squared	0.741298		

Source: Authors` Computation (2022)

Table 5 reveals a statistically significant and positive link between COV19 confirmed cases and Nigerian inflation rate. If COVID-19 cases increase by one unit, inflation

rises by 70%. On the other hand, the number of deaths attributed to COV-19 was inversely and significantly related to inflation rate. If the mortality toll from COVID-19 were to rise by one unit, inflation would fall by 89%. COVID-19 recovery instances, on the other hand, were positively but insignificantly related to inflation rate. The model's R-squared value of 0.837 indicates that the independent variables adequately explain 83.7% of the variation in the dependent variable, while the remaining 16.3% may be accounted for by others, unaccounted-for factors.

Table 5. Impact of COVID-19 Pandemic on Inflation Rate in Nigeria

Dependent Variable: INF
Method: FMOLS

Regressors	Coefficient	T-statistics	Prob. Value
LCOV19CA	0.700392	4.043460	0.0001
LCOV19DE	-0.895430	4.702859	0.0000
LCOV19RO	0.060175	0.798721	0.1826
R-Squared	0.837722		

Source: Authors` Computation (2022)

The researchers made an attempt to use the study's significant variables in a causal analysis by using the Pairwise Granger Causality method, in addition to examining the co-integrating connections between the many variables of interest. The primary finding indicates that exchange rate is the endpoint of a unidirectional causation flowing from COVID-19 cases. A unidirectional causal relationship between COVID-19 cases and interest rate existed in the study as shown in table 6. However, there is no link between Covid-19 and inflation. This implies that the COVID-19 epidemic affected several macroeconomic indices, such as the currency rate and interest rate in Nigeria.

Table 6. Pairwise Granger Causality Test between Covid-19 confirmed cases and exchange rate, interest rate and inflation rate

Null hypothesis	F-statistic	Prob.	Decision	Causality
LCOV19CA does not Granger Cause ER	3.75093	0.0397	Reject	Unidirectional
ER does not Granger Cause LCOV19CA	0.18877	0.8293	Accept	No Causality
LCOV19CA does not Granger Cause IR	5.58903	0.0109	Reject	Unidirectional
IR does not Granger Cause LCOV19CA	1.09848	0.3510	Accept	No Causality
LCOV19CA does not Granger Cause INF	2.32913	0.1209	Accept	No Causality
INF does not Granger Cause LCOV19CA	0.56021	0.5790	Accept	No Causality

Source: Authors` Computation (2022)

5. Conclusion and Recommendations

Using Fully Modified Ordinary Least Square analysis and Granger causality, this study assessed the effect of the Coronavirus (Covid-19) pandemic on some selected crucial macroeconomic variables in Nigeria between March 2020 and July 2022. The first tests focused on unit roots and cointegration. The summary of the pertinent findings from the estimated models are enunciated as follow; the study detected a positive and statistically significant link between the naira/dollar exchange rate and COV19 cases in Nigeria. Meanwhile, exchange rate and COV19 fatalities in Nigeria had an insignificant positive relationship in the country. And, COV19 case recovery was inversely impacted the exchange rate. The study shows a positive but non-significant relationship between Nigerian interest rates and COV19 confirmed cases. Similarly, COVID-19 death cases had a considerable direct influence on interest rates. Whereas, COVID-19 recovery cases had a significant negative relationship with interest rate in Nigeria. In addition, a statistically significant and positive link exists between COV19 confirmed cases and Nigerian inflation rate. On the other hand, the number of deaths attributed to COV-19 was inversely and significantly related to inflation rate. COVID-19 recovery instances, on the other hand, were positively but insignificantly related to inflation rate

Furthermore, the Granger effect of the COVID-19 pandemic affected Nigeria's interest rate and currency exchange rate. Inflation, interest rates, and the value of the naira all seem to have been impacted by the COVID-19 epidemic in Nigeria,

according to the results of this research. In the light of the above findings, the study recommends that the policymakers in Nigeria should tighten monetary measures to keep the country's exchange rate, interest rate, and inflation rate stable despite the ongoing COVID19 pandemic.

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