
**THE IMPACT OF COVID – 19 ON SOME ECONOMIC INDICATORS
INFLUENCING NIGERIA’S ECONOMY: APPLICATION OF ECONOMETRICS
ANALYSIS**

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ABSTRACT

This paper explores the impact of the Covid-19 pandemic on the economic activities of Nigeria by first analysing the Economic growth indicators in Nigeria; discuss the current covid-19 situation and its economic effects on the nation and suggest remedial measures necessary to salvage the situation at hand. To investigate the impact of some economic indicators on the Nigerian economy using data from the archive of the Central Bank of Nigeria and the National Bureau of Statistics. The Durbin Watson test reveals that the data was free of autocorrelation. The Goldfield Quandt Test also indicates homoscedasticity. The Farrah Gluaber test shows multi-collinearity among the variables. Agricultural products, machinery, and transport have a positive linear relationship with the GDP while oil and inflation rate have a negative linear relationship with GDP. The research results showed that despite promising economic forecasts, with the force of the pandemic soaring universally, there is no doubt that the economic prosperity of Nigeria will be disrupted and major revenue margins shrink this year. The scientific contribution of the research lies in the fact that it will offer a new way of perceiving risks and uncertainties when policymakers are drafting budgets and economic policies in respect of major economic indicators going forward. In that capacity, they will not only adapt to practical and analytical methods but additionally consider some unforeseen circumstances beyond the control of humanity that may have a tormenting impact on economic outputs.

KEYWORDS: Covid-19, Economic Growth, gross domestic product, oil, Nigeria, regression.

1.0 INTRODUCTION

Economic growth is the increase of per capita Gross Domestic Product (GDP) or another measure of aggregate income, typically reported as the annual rate of change in real GDP. Economic growth is primarily driven by improvement in productivity which involves producing more goods and services with the same inputs of labour, capital, energy, and materials. A fundamental method to gauge a nation's economic development and prosperity is by following its GDP per capita performances year on year.

These figures by and large show how much the economic production value can be credited to every individual resident. Governments then again broadly use GDP per capita to understand how the economy is developing with its populace hence it is important for us to focus on this variable's contribution to understand how an economy is growing or contracting in terms of its people. Theoretically, if a country's GDP per capita is growing with a stable population level

it can conceivably be the consequence of innovative strategies that are producing more with the same population size. Some countries may have high GDP per capita but a small population and this may mean that they have built up a self-sufficient economy based on an abundance of special resources. Notwithstanding, a country may have predictable economic growth but if its population is growing faster than its GDP, then GDP per capita will be on a descending pattern. This is normally the situation of numerous African countries. There are many speculations concerning why African countries are so poor. One of the most credible reasons is essentially a direct result of the populace and economic size. Small economies in Africa mostly find it difficult to build economies of scale as compared to other advanced nations. Also, numerous African nations are landlocked, which means they don't have direct access to global exchanging partners. They depend on neighbouring nations to get their products to the global market. This move increases their operative cost and results in less competitive prices. Indeed, even African nations with ports face enormous transportation costs in getting their products to other foreign markets. The topic of economic growth is primarily concerned with the long term or long run. The long-run path of economic growth is one of the central questions around; despite some problems of measurement, an increase of GDP of a country greater than population growth is generally taken as an increase in the standard of living of its inhabitants over a long period, even small rates of annual growth can have a large effect through compounding. There are some factors that are believed to have an effect or impact on the economic growth or productivity of a nation such as; the exchange rate, interest rate, inflation rate, inputs and output of labour, foreign trade and a host of others. However, for this study, we shall be taking a look at the effect of the inflation rate and importation on the nation's economic growth.

The economy of Nigeria is a middle income, a mixed economy emerging market with well-developed financial, legal, communications, transports and entertainment sectors.

Nigeria's **GDP** at Purchasing Power Parity (PPP) more than double from \$374.3 Billion in 2010 to \$830.00 Billion in 2019. It is the largest economy in Africa with South Africa and Egypt following closely.

Krugman, et al. (1987) logically examined the effects of currency exchange rates on international trade. Currency exchange rates that promote lower prices for imports lessen inflationary pressures in the economy and have a downward push on interest rates in that country. Barro (1995) explores the inflation–economic growth relationship using a large sample covering more than 100 countries from 1960 to 1990. His empirical findings indicate that there exists a statistically significant negative relationship between inflation and economic growth if a certain number of the country characteristics (e.g., fertility rate, education, etc.) are held constant. Bruno and Easterly (1995) examine the determinants of economic growth using annual CPI inflation of 26 countries which experienced inflation crises during the period between 1961 and 1992. In their empirical analysis, inflation rate of 40 percent and over is considered as the threshold level for an inflation crisis. They find inconsistent or somewhat inconclusive relationship between inflation and economic

More importantly, global forecast of per capita GDP helps provide comparable insight on economic prosperity and economic developments across the globe. Both GDP and population are factors in the per capita equation. The IMF therefore provides a regular outlook on global growth with insights on both GDP and GDP per capita. As per the estimates, it expects little

change in the rankings of the best ten (10) nations as drowsy growth data is trending across the globe. The IMF expects GDP growth worldwide of 3.2% in 2019 to marginally pickup in 2020 to 3.5%. The IMF’s 2019 and 2020 per capita GDP expected rankings include the following:

TABLE 1. GDP per Capita forecast by IMF for top 10 GDP per capita countries

Country	GDP Per Capita (USD, 2019)	GDP Per Capita (USD, 2020)
Luxembourg	\$113,200	\$116,730
Switzerland	\$83,720	\$86,670
Macao SAR	\$81,150	\$80,070
Norway	\$77,980	\$78,330
Ireland	\$77,770	\$80,260
Qatar	\$69,690	\$70,740
Iceland	\$67,040	\$66,600
United States	\$65,110	\$67,430
Singapore	\$63,990	\$64,830
Denmark	\$59,800	\$61,730

This research mainly seeks to employ Econometrics techniques to first predict the economic growth trend of Nigeria, discuss the current economic situation of Nigeria and how the Covid-19 pandemic will take its toll on the economy and lastly put across some mitigating strategies planned out by the Government to tone down the effects of the pandemic and also add some few policy suggestions. The outcome of the study will have a long-term effect on the economy even after the pandemic is long gone since policy makers will be more guided henceforth to put into consideration certain uncontrolled risks factors when making economic policies and drafting budgets for the years ahead.

2.0 METHODOLOGY

Econometrics is a branch of science which applies the tools of statistics and mathematics to analyse economic phenomenon. After formulating economics theory, econometric gives the numerical or qualitative expression to it. For the purpose of this research, we shall be taking a look at the Ordinary Least Square (OLS) method for estimating the parameters and also considering multi-collinearity, heteroskedasticity, and autocorrelation as the statistical tool in analysing the economic phenomenon. Multiple linear regression involves an extension of the regression model form the two-variable model to the K-variable ($K > 2$) model. This type of model is determined by two or more independent variable. Assume that a linear relationship exists between a dependent variable Y and K independent variable then, the model is given by:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + e_i \tag{1}$$

Where: $i = 1, 2, 3, \dots, n$

Y = Dependent Variable

X_1, \dots, X_k = Explanatory / Independent variables

$\beta_0 \dots \beta_k$ = Parameters to be estimated

e_i = Error or disturbance terms.

Testing for Significance of Regression Coefficients

The aim is to determine whether at least one of the independent variables contribute significantly to the model.

Given the model:

$$\hat{Y} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_p \tag{2}$$

then

$$H_0 : \beta_1 = 0$$

$$H_1 : \beta_1 \neq 0 \quad \text{for at least one } i$$

The test procedure requires:

$$F_0 = MSR / MSE \quad F_{\alpha, k-1, n-k}$$

Where MSR = Mean Square due to regression and MSE = Mean Square due to Error.

This procedure can be summarized using the analysis of variance table (Table 1).

Table 2: Analysis of Variance Table.

Source of Variance	Degree of Freedom	Sum of Squares	Mean Squares	F
Regression	k-1	$\beta' X' Y - nY^2$	$\beta' X' Y - nY^2 / (k - 1)$	MSR/MSE
Error	n-k	$Y' Y - \beta' X' Y$	$Y' Y - \beta' X' Y / (n - k)$	
Total	n-1	$Y' Y - nY^2$		

Decision

Reject H_0 if $F_0 > F_{\alpha, k-1, n-k}$ and conclude that the at least one of the explanatory variables contribute to the model.

MULTICOLLINEARITY

One of the assumptions of this OLS technique is that there is no linear relationship between the explanatory variables (i.e., they are independent or $Cov(X_i, X_j) = 0$ for $i \neq j$) when this assumption fails then we have a problem of multi-collinearity. This will be tested using the Farrah Gluaber method to test for the presence and severity of multi-collinearity in a data.

This test involves three stages:

1. Chi Square: To determine existence and severity
2. F-test: Which variable are intercorrelated, if Chi Square is positive.
3. T-tests: Which variables are responsible for multi-collinearity, if F-test is positive.

HETEROSKEDASTICITY

The assumption that the variance of the disturbance term are constant (*i.e.*, $E(U_i) = \sigma_i^2 \forall_i$) must be valid when this assumption fails then we have a problem of heteroskedasticity. For this research work, we shall be using the Goldfield Quandt. This method is applicable when $T > 2k$ (*i.e.*, the number of observations is twice the number of explanatory variable).

AUTOCORRELATION

Autocorrelation is said to occur when the assumption that for the estimability of parameter of the general linear regression equation $Y = X\beta + U$ (via the least square estimation the disturbance term U_i 's must be independent (*i.e.*, $E(U_i, U_j) = 0, \forall_i \neq j$) fails. Durbin Watson test will be employed to check for autocorrelation.

$$DW = \frac{\sum_{t=2}^T (U_{t-2} - U_{t-1})^2}{\sum_{t=1}^T U_i}$$

It is given by:

Where $DW =$ Durbin Watson Statistic

U_t, U_{t-1} = Residual error for period t and $t-1$

$U_i = Y - \hat{Y}$

Where $Y =$ Observed values

$\hat{Y} =$ Expected values

3.0 DATA ANALYSIS AND INTERPRETATION

Using SPSS (Statistical Package for Social Science) for the analysis, the following results were obtained (Table 2). The Durbin Watson statistic gives a value of 1.880, which indicates absence of autocorrelation in the data at 5% significance level. Since R-value is 0.987, there exists a very strong positive correlation between the predictors and the GDP. The correlation coefficient matrix reveals that chi squared value is $\chi^2 = 81.701$ which is greater than the critical value of $\chi^2(0.05, 6) = 12.59$. This indicates there is a need to reject the null hypothesis and conclude that there is multi-collinearity in the data. F-test which was employed to identify the variables which are intercorrelated exposed the fact that Oil, Agricultural Products, Machinery and Transport are each intercorrelated with other variables but Inflation Rate is not intercorrelated with other variables. Goldfield Quandt's Test gives us a F-value of 0.0218, so we accept the null hypothesis, since $F_{0.05}(4,4) = 6.39 > F_{\text{calculated}} = 0.0218$ and therefore conclude that the disturbance terms are homoscedastic.

Table 3: Model Summary.

Model	R	R Square	Adjusted R Square	Std.Error of the Estimate	Durbin Watson
1	0.987	0.974	0.967	1.1433E6	1.880

Table 4: ANOVA Table

Model	Sum of Squares	d.f	Mean Squares	F	Sig.
Regression	7.307E14	4	1.827E14	139.753	.000
Residual	1.961E13	15	1.307E12		
Total	7.503E14	19			

Table 5: Regression Coefficients.

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std.Error	Beta	t	Sig.
Constant	324072.893	585075.12	-.103	.554	.588
Oil	-2.109	0	.531	-.272	.789
Agricultural Product	17.997	7.743	.571	2.97	.009
Machinery and Transportation	8.953	6.043	-.033	8	.040
Inflation	-9364.295	3.988		2.24	.505
		13725.892		5	
				-.682	

When testing hypothesis about regression co-efficient, the calculated F-value gives 139.785 which is greater than $F_{0.05}(4)(15) = 3.06$. We therefore reject the null hypothesis (H_0) and conclude that the independent variables (Oil, Agricultural products, Machinery and Transport and Inflation Rate) contributes significantly to the Gross Domestic Product (Y) which is the dependent variable.

$$\beta_1, t_{cal} = -0.272,$$

$$\beta_2, t_{cal} = 2.978$$

$$\beta_3, t_{cal} = 2.245$$

$$\beta_4, t_{cal} = -0.6822$$

$$t_{0.05(15)} = 2.131$$

This shows that the independent variables (oil, agricultural products, machinery, transport, and inflation rate) jointly contributes to the Gross Domestic Product (GDP) but when tested individually, oil and inflation rate do not really contribute significantly to the GDP but agricultural products and machinery and transport have a significant contribution to the GDP.

From the analysis in table 4:

$$GDP = \beta_1(Oil) + \beta_2(AGR) + \beta_3(MAT) + \beta_4(INR) + U_t$$

Where:

GDP = Y = Gross Domestic Product

OIL = X₁=Oil

AGR = X₂= Agricultural Products

MAT = X₃= Machinery and Transport

INR = X₄= Inflation Rate.

Therefore:

$$GDP = 324072.893 - 2.109(OIL) + 17.997(AGR) + 8.953(MAT) - 9364.259(INF)$$

This can be interpreted as that each unit increase in the importation of oil will bring about 2.109 units fall in the GDP when other variables are fixed. For a unit increase in agricultural products (AGR), we expect a 17.997 increase in the GDP keeping other variables fixed. A unit increase in machinery and transport (MAT) will bring about an 8.953 increase in the GDP with other predictors kept constant. A unit increase in the Inflation rate will bring about an alarming 9364.259 decrease in the GDP.

4.0 CONCLUSION

With Econometrics analysis proving beneficial to the scientific literature in estimating trends, this year, Covid -19 has added an alternate curve to these expectations. From the analysis, we can deduce that the effect of predictors is sole because Nigeria with her abundant natural resources still imports and pays international prices for natural resources, she has in abundance, due to mismanagement. Taking everything into account the GDP and economic growth of Nigeria was expected to be on an upward trend quite similar to trends witnessed in 2019 if not better. However, with current developments especially with the increase in the number of Covid-19 cases worldwide, a lot of pragmatic measures have to be in place if the adverse effects of the pandemic are to be contained and mitigated

There is no gain in saying that Nigeria relies so much on revenue from oil exports because the proceeds from exportation are used to import refined fuel for local consumption which can be greatly averted if proper measures are taken. A 1% increase in the importation of agricultural products and machinery tends to affect the GDP positively. It is still advisable to encourage agriculture even in the homeland. Notably, in an open economy like Nigeria, which relies heavily on imports, a 1% increase in the inflation rate will cause a fall in the GDP and this is inevitable because Nigeria depends on importation. Nigeria unavoidable faces the transmission of inflation being experienced by the country's trading partners. Given the relationship that exists between the inflation rate and oil and agriculture, these economic variables tend to move together. A few arrangements being set up by the Nigerian Government worth complimenting to facilitate economic recovery are the establishing a fund to support the country's economy (of 50 billion Naira; i.e. EUR 121 million), targeted at households and micro and small enterprises. The interest rate has also been cut, a moratorium has been announced on principal repayments for CBN intervention facilities and tax measures are being taken. The crude oil benchmark price was also reduced from USD 57 to USD 30. The Central Bank pledged to pump NGN 1.1 trillion (USD 3 billion) into critical sectors of the economy. Commencement of a three-month repayment moratorium for all TraderMoni, MarketMoni and FarmerMoni

loans. Similar moratorium to be given to all Federal Government funded loans issued by the Bank of Industry, Bank of Agriculture and the Nigeria Export-Import Bank. On the strength of the findings in this study, the following policy suggestions are given for consideration by the relevant authorities. The government should endeavour to take a meaningful look at the various refineries located in the country. The nation's refineries' "Turn-Around-Maintenance" (TAM) should be consolidated with transparency and accountability. New modular refineries should also be built and sustained around the country. If existing refineries are functioning at full capacity, they can meet Nigeria's internal fuel needs and produce some excess for export. The government should pay more attention to agriculture by providing technical input and financial support. They should also pay attention to the non-oil sector of the economy. Local sourcing of materials for the productive sector should be embarked upon and supported by the concerned authorities.

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