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Examining The Interplay Of Nigeria's Exchange Rates, Inflation And Exports On Gdp (2008-2019)

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Abstract: *This paper is examining the interplay of money exchange rate, inflation rate, and export rate on gross domestic products in Nigeria. The data used covered a period of twelve (12) years. The model fitted for the data was* $Y = 599.911 + 0.517388\ X_1 - 25.5665\ X_2 + 0.734820\ X_3$*. Findings showed that both the P-P-Plot and Histogram were normally distributed. Analysis of coefficient of determination (R = 0.7730) showed that 77.3% of variation in predictors can be explained while the remaining 22.7% variation can be explained by other factors. The value of* R^2 *(0.597564) revealed that the model was 59.7% fit while the adjusted R squared (0.446650) showed that the additional predictor variable will be 44.7%. The test of overall relationship showed that* $F_c = 64.625 > F_\propto = 3.95964$*, therefore,* H_0 *was rejected. Also, there is no problem of multicollinearity since VIF < 10.*

Keywords: Domestic Gross Product, Export Rate, Money Exchange Rate, Inflation Rate, Economic Growth.

INTRODUCTION

The Gross Domestic Product (GDP) is one of the primary indicators used to measure the healthiness of a country's economy. It is also used to determine the standard of living of individuals in an economy. Gross Domestic Product takes into account the market value of each good or service rather than adding up the quantities of the goods and services directly. Gross Domestic Product is important in an economy because it is used to determine if an economy is growing more quickly or more slowly. The word inflation rings a bell in the market economics of the world. It is a monster that threatens all economies because of its undesirable effects. The problem of inflation surely is not a new phenomenon. It has been a major problem in Nigeria over the years. Inflation is defined as a generalized increase in the level of price sustained over a long period in an economy (Maddala, 2012).

Undoubtedly one of the macroeconomic goals which any government strives to achieve is the maintenance of stable domestic price level. This goal is pursued in order to avoid cost of inflation or deflation and the uncertainty that follows price instability (Salami et al, 2009). Perhaps it should be mentioned here that inflation is not incompatible with growth. Exchange rate, unemployment issues are at the heart of Nigerian economy. Exchange rate plays a very important role in a country's level of trade which is very critical element for every open market economy: That is why exchange rate is among the most observed, examined and government manipulated economic measures at a startling percentage is accounted for by factors that relates with labour migration from rural area to urban area.

According to CBN (2010), Nigeria is endowed with huge expanse of fertile land, rivers, streams, lakes, forests and grasslands, as well as a large active population which can sustain highly productive and profitable agricultural sector, which can ensure self-sufficiency in food and raw materials for the industrial sector and as well as provide gainful employment for the teeming population and generate foreign exchange for the economy.

In 2020 Nigeria was the number 26 economy in the world in terms of GDP (current US$), the number 50 in total exports, the number 48 in total imports, the number 148 economy in terms of GDP per capita (current US$) and the number 125 most complex economy according to the Economic Complexity Index (ECI). The top exports of Nigeria are N/A, exporting mostly to India ($6.27B), Spain ($4.8B), China ($2.54B), Netherlands ($2.24B), and South Africa ($2.17B). Likewise, Nigeria was the world's biggest exporter of Vessels and other floating structures in 2020 as well; for breaking up ($1.29B).

LITERATURE REVIEW

The most comprehensive measure of the total output or performance of an economy is the Gross Domestic Product. Although, GDP is the most widely used measure of national output of an economy, two other concepts are frequently cited, Net Domestic Product and Gross National Product (GNP). The relationship among these three concepts (GDP, GNP and Net Domestic Product) is that they measure an economy's output. Nnamocha (2002), pointed out that Gross Domestic Product is the total money value of all goods and services produced in the domestic economy by everybody in that economy no matter where he/she comes from, provided he/she resides within the economy.

Samuelson (2015), explained Gross Domestic Product as the name given to the total market value of the final goods and services produced within a nation during a given year. From his description, of Gross Domestic Product, GDP is used for many purposes but the most important one is to measure the overall performance of an economy and this overall performance could be measured as a flow of final products or as a flow of cost. Both approaches will yield the same total GDP since profit, is a residual. Kimberly (2016), said that Gross Domestic Product is everything produced by all the people and all the companies within an economy. The difference between Gross Domestic Product and Gross National Product is the fact that GDP is concerned with the region in which income is generated and focuses on where the output is produced rather than who produces it.

Ruffin (2014), emphasized that Gross Domestic Product is the broadcast measure of the total output of the economy. Only final goods and services are included to avoid double counting of products. GDP can be calculated by measuring the total value of income. Nominal GDP is the value of final goods and services in current market prices. Nominal GDP can rise because of either increasing output or rise in the price of products. Real GDP is the measure of the volume of real goods and services by removing the effect of rising prices. He also, said that non market goods, illegal goods and the value of leisure are not included in Gross Domestic Product because GDP is just a measure of the economic welfare and not a measure of economic "bads".

Abdulrasheed (2015), in his work titled "The effect of inflation on GDP" stated that Gross Domestic Product is used as a means of adjusting the assets location and to decide where the best opportunity of investors lies. Paul (2013), defines Gross Domestic Product as the dollar flow of total product for a nation. It could be measured using the flow-of-cost approach or the income approach. According to Paul, GDP is a measure of Net Economic Welfare (NEW). This is because the calculation of Net Economic Welfare adds to the GDP certain items such as value of leisure, homemakers services and do it yourself activities. It also subtracts from GDP unmet costs of pollution, other disamenities of modern urbanization and some other adjustments.

Kumar (2010), in his work titled "Macroeconomics theory, analysis and policy", said that use of this word "gross" along with "domestic product" indicates that we are calculating domestic product inclusive of the depreciation allowance or consumption fixed capital. Gross domestic product (GDP) measures the output made in the domestic economy, regardless of who owns the production input. It may also be defined as the income received by the residents of a country irrespective of their nationality. Agricultural product is one of the arms or contributors to the gross domestic product in Nigeria (Salami et al, 2009).

This section undertakes a brief literature review on factors affecting agriculture and its impact on economic growth. In the study of Lavorel et al. (2013), they addressed a question raised by Gardner (2005)) on whether agriculture is an engine of growth or not by investigating the casual relationship between agricultural values added per worker and income per capita for 85 countries. The study found a causal relationship between agricultural valued added and growth for the developing countries while that of developed countries remained unclear. This however, goes in line with the assumption that agriculture has been the backbone of developing countries. Matahir (2012) investigated the role of agriculture on economic growth and how it interplays with other sectors in Tunisia using time series Johansen co-integration techniques. The study suggested that agricultural sectors should be taken as vital tools of inter-sectorial growth policies.

Inflation is a rise in the general level of price of goods and services in an economy over a period of time. When the general price level rises, each unit of currency buys few goods and services. Consequently, inflation reflects a reduction in the purchasing power per unit of money – a loss of real value in the medium of exchange and unit of account within the economy.

Aim of the study

This paper is examining the interplay of money exchange rate, inflation rate, and export rate on gross domestic products in Nigeria.

Objectives of the study

The objectives of the paper are to;

(a) Write down the multiple regression model
(b) Estimation of the multiple regression parameters and fit the model
(c) Testing for the significance of parameters of the model.
(d) Testing for the presence of multicollinearity in the data.

METHODS AND MATERIALS

In order to achieve the stated aim and objectives of this research work, a multiple linear regression model will be fitted to the data, while the model parameters will be tested, as well as the overall model. Thereafter, the explanatory variables will be examined to test whether they are collinear.

The model for this study is;

$$Y_i = \beta_0 X_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + U_i$$

where:

Y_i = Gross domestic product; B_0 = Intercept; X_1 = exchange rate; X_2 = inflation rate; X_3 = export rate; Ui = Stochastic or error term

(a) Test of Significance of overall Regression: In testing the significance of the regression model, the following hypothesis will be tested:

H_0: Gross domestic product does not depend on money exchange rate, inflation rate, and export rate

H_1: Gross domestic product depends on money exchange rate, inflation rate, and export rate

Test statistic: F-test at $\alpha = 5\%$

(b) Coefficient of Determination (R^2): Coefficient of determination is defined as the proportion of the total variation in the dependent variable (Y) that can be attributed to the variation in the explanatory variables (X's).

(c) Test for Multicollinearity: This is a situation that arises when the explanatory variables are highly linearly correlated, thereby making it impossible to estimate their individual effect on the dependent variable. To detect the presence of multicollinearity in the data, the Variance Inflation Factor will be computed using SPSS. It is mathematically defined as:

VIF = $\frac{1}{(1-R_i^2)}$ (reciprocal of tolerance), where Tolerance = $(1 - R_i^2)$; and

^{2} is the variance of the population error term ei. The OLS estimator of this unknown variance is $\hat{\sigma}^2 = \frac{\sum e_i^2}{n-k}$ where R_i^2 the coefficient of determination is obtained from the regression of X_i on the other explanatory variables.

Assumption of Multicollinearity: If the value of Tolerance Value ($1\text{-}R^2$) is less than 0.1 and, simultaneously, the value of Variance Inflation Factor (VIF= $(1\text{-}R^2)^{-1} \geq 15$, then the multicollinearity is very severe. It is obvious that the **VIF** will inflate or increase the variance and the standard error of the coefficients as R^2 increases. In the extreme, when this coefficient of determination is 1 (i.e. perfect multicollinearity), these variances and standard errors are undefined and if R^2 is zero (no collinearity), the VIF will be 1 and we do not have to worry about the large variances and standard errors that plague the collinearity situations. A high R^2 obtained from an auxiliary regression (regression of one X_i on others) is only a surface indicator of multicollinearity and may not necessarily inflate the standard errors of the estimators.

DISCUSSION OF RESULTS

Test For Normality Assumption of the Model

Figure 1: shows the P-P Plot

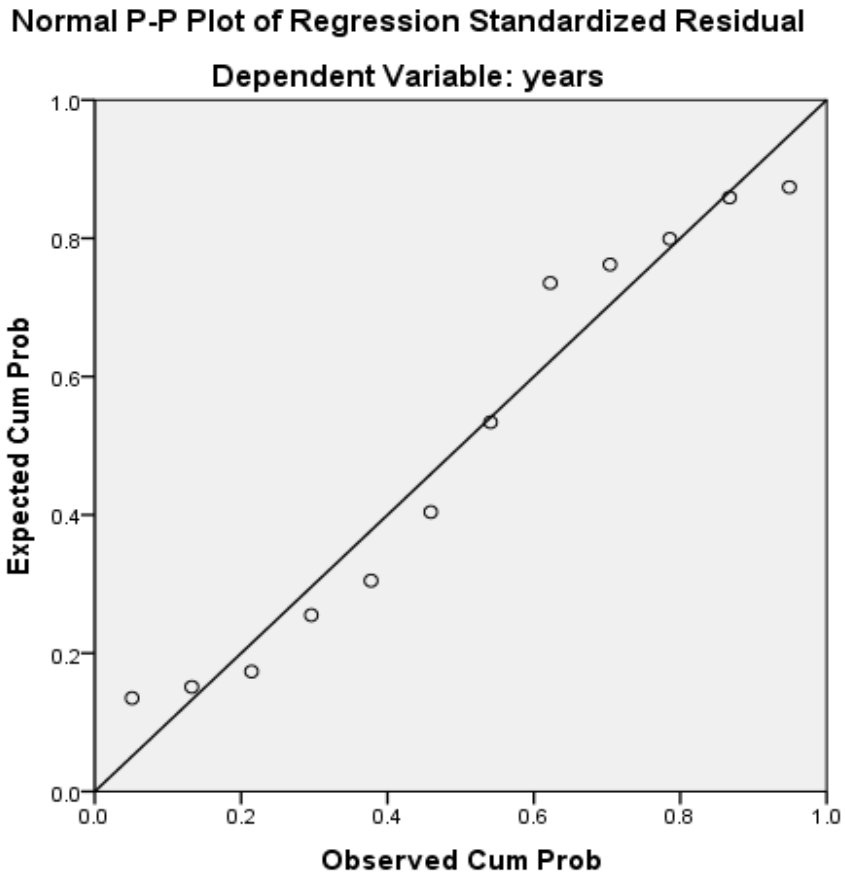

Figure 2: Shows the Normality of the data.

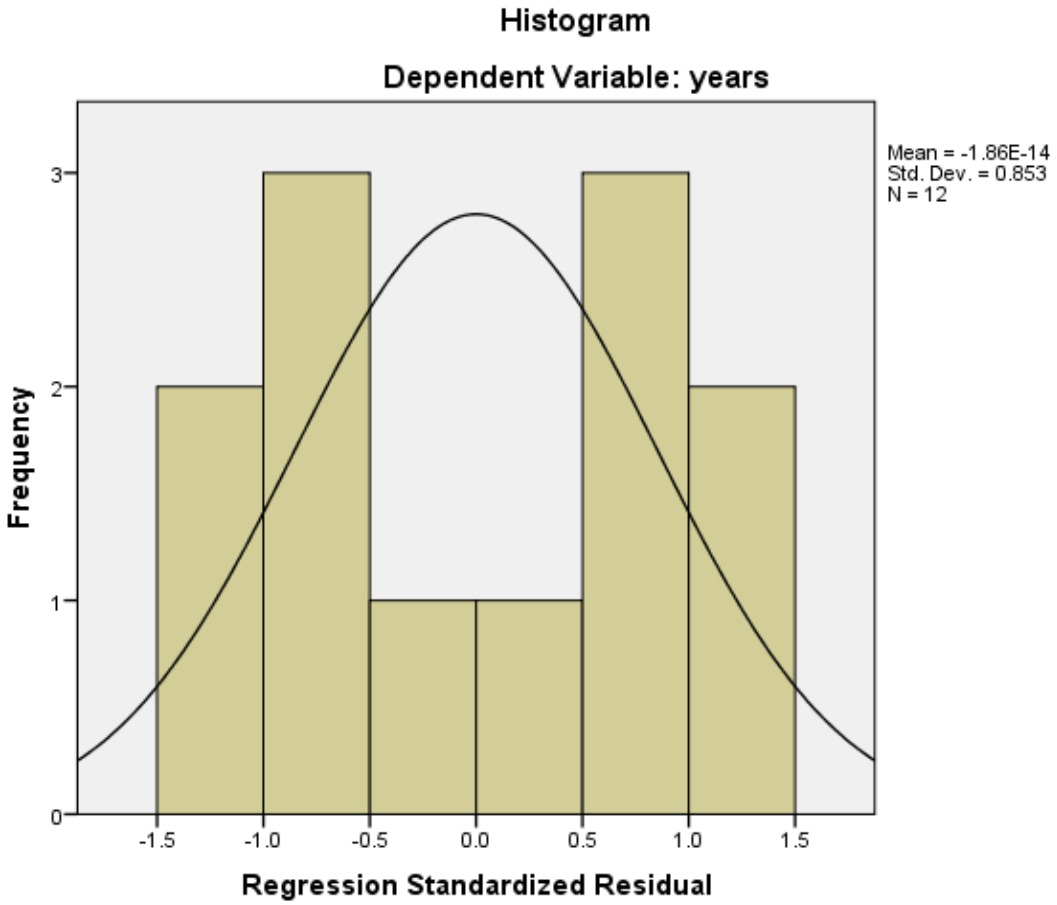

Table 1: **Descriptive Statistics**

	Mean	Std. Deviation	n
Years	2013.50	3.606	12
Money Exchange Rate ($1)	206.604517	75.4534967	12
Inflation Rate (%)	11.8458	2.62403	12
Export Rate (%)	19.4333	7.61551	12

Table 2: **Coefficient Correlations[a]**

		Years	Money Exchange Rate ($1)	Inflation Rate (%)	Export Rate (%)
Pearson Correlation	Years	1.000	.908	.133	-.690

	Money Exchange Rate ($1)	.908	1.000	.498	-.696
	Inflation Rate (%)	.133	.498	1.000	-.158
	Export Rate (%)	-.690	-.696	-.158	1.000
	Years	.	.000	.340	.007
Sig. (1-tailed)	Money Exchange Rate ($1)	.000	.	.050	.006
	Inflation Rate (%)	.340	.050	.	.312
	Export Rate (%)	.007	.006	.312	.
	Years	12	12	12	12
N	Money Exchange Rate ($1)	12	12	12	12
	Inflation Rate (%)	12	12	12	12
	Export Rate (%)	12	12	12	12

Table 3 **Model Summary[b]**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.980[a]	.960	.946	.842	.960	64.625	3	8	.000

a. Predictors: (Constant), Export Rate (%), Inflation Rate (%), Money Exchange Rate ($1)
b. Dependent Variable: years

Table 4 **ANOVA[a]**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	137.333	3	45.778	64.625	.000[b]
	Residual	5.667	8	.708		
	Total	143.000	11			

a. Dependent Variable: years
b. Predictors: (Constant), Export Rate (%), Inflation Rate (%), Money Exchange Rate ($1)

Table 5: model fitting Coefficients

	coefficient	std. error	t-ratio	p-value	
const	599.911	117.558	5.103	0.0009	***
X1	0.517388	0.365292	1.416	0.1944	
X2	−25.5665	7.64035	−3.346	0.0101	**
X3	0.734820	3.17857	0.2312	0.8230	

Mean dependent var = 418.2292 , S.D. dependent var = 73.88729

Sum squared resid = 24167.36 , S.E. of regression = 54.96290

R-squared = 0.597564, Adjusted R-squared = 0.446650

F(3, 8) = 3.959641, P-value(F) = 0.053092

Log-likelihood = −62.67437, Akaike criterion = 133.3487

Schwarz criterion = 135.2884 , Hannan-Quinn = 132.6306

rho = 0.260642, Durbin-Watson = 1.369860

The required model is given as:
Gross Domestic Products = 599.911 + 0.517388 Money Exchange Rate – 25.5665 Inflation Rate + 0.734820 Export Rate

Test for Multicollinearity

$$VIF = \frac{1}{1-R^2}$$

where Tolerance Value is $1 - R^2$, and $R^2 = 0.597564$

$$VIF = \frac{1}{1-0.597564}$$

$$\text{VIF} = \frac{1}{0.402436} = 2.484867$$

Since Tolerance Value = 0.402436 which is > 0.1, and VIP = 2.484867 which is < 10, hence, there is no problem of multicollinearity.

SUMMARY OF RESULTS

So far from the above discussion of result, the model fitted was given as;

$Y = 599.911 + 0.517388\ X_1 – 25.5665\ X_2 + 0.734820\ X_3$.

However, the following summary were deduced from the analysis;

(a) Both the P-P-Plot in figure 1 and that of figure.2 (a Mesokurtic graph with mean -1.86E-14 and variance 0.853), implied that the data is normally distributed; and
(b) Table 1 showed that; (i) the Average Money Exchange Rate was within \$206.60± 75.45, (ii) the average Inflation Rate was approximately within 11.85%± 2.6, (iii) and the average Export Rate was approximately 19.43% ± 7.62% for the whole studied (twelve) years.

CONCLUSION

Based on the above findings, we hereby conclude that the Money Exchange Rate, Inflation Rate and Export (goods and services) Rate determined the Gross Domestic Products and affected it positively in Nigeria from 2008 to 2019.

RECOMMENDATIONS

As regarding to the research area of this study the following recommendations are necessary:

(a) The Federal Government of Nigeria should promote our domestic products such as goods and services to increase the GDP.
(b) The Central Bank of Nigeria and all concern body should rescue Nigeria on inflation regulatory issue.
(c) The body of Corruption Regulatory Agencies such as EFCC, ICPC and others should fight more on money laundry, floating of excess hard currency and others in Nigeria.

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