

# Modelling The Impact of Foreign Direct Investment on employment creation in Nigeria, 1981 – 2021

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DOI: <https://doi.org/10.5281/zenodo.8262838>

Published Date: 18-August-2023

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**Abstract:** The paper modelled the impact of employment creation on the independent variables' Foreign direct investment, GDP Per Capita, GDP growth, GNI and Government revenue. The study used secondary data obtained from world bank and the CBN bulletin between 1981 to 2021. The study employed the use of the Johansen cointegration test and the vector error correction model to examine the causality among the variables. The model was also subjected to various diagnostics and stability test to ascertain the model's adequacy and stability. The study indicated that there is a positive long-term association between foreign direct investment and employment creation. This implied that FDI has a significant role on employment creation in Nigeria and this should not be minimized. The study therefore recommended that policies should be formulated to exploit the role of FDI on employment in Nigeria, in an attempt to reduce the unemployment rate.

**Keywords:** Foreign direct investment, employment creation, unemployment, government revenue, GDP growth, GNI, GDP Capita.

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## 1. INTRODUCTION

According to Ogunlela and Mukhtar (2009, as cited in Babasanya, 2018) Nigeria is the most populous country in Africa with an estimated population of about 221,059,209 people. The United Nations estimates as at July 1, 2022 estimates Nigeria to have a population of 218,541,212 people. They project that the overall population of Nigeria will reach about 401.31 million by the end of the year 2050. Hence, Nigeria is blessed with a large pool of surplus labor. Data from National Bureau of statistics reveals that Nigeria has a labor force of about 80 million people as at 2020. Nigerians between the age bracket of 25 years to 34 years represented the highest age bracket of the labor force in the country. However, while current data from National Bureau of statistics is showing an increase in the number of labor force, not so can be said with the rate of employment. The number of unemployable Nigerians have continued to be on a daily rise.

This dilemma has resulted in responsible government across the world trying to strive for full employment as a major macroeconomic goal (Babasanya, 2018).

Nigeria has experienced a great spike in the level of unemployment. In Nigeria, the unemployment rate measures the number of people actively looking for a job as a percentage of the labor force (National Bureau of statistic, 2018). Data from the National Bureau of Statistics (2022), reveals that the unemployment rate in Nigeria increased to 33.30% in the fourth quarter of 2020 from 27.10% in the second quarter of 2020. This projection is expected to grow higher by the year 2023. Such worrying development has further led to a need to further strengthen and maximize the benefits and opportunities that foreign direct investment provides. Among such opportunities is the stimulation of economic development, an increase in employment opportunities, development of human resources, enhancement of the country's finance and technology sector, etc.

According to Hayes (2022) foreign direct investment (FDI) is an ownership stake in a foreign company or project made by an investor, company or government from another country. Foreign direct investment is explained when a foreign company, individual or entity decides to invest in another country besides its country of residence.

Wikipedia defines foreign direct investment as an investment in the form of a controlling ownership in a business, real estate or in productive assets such as factories in one country by an entity based in another country.

The encouragement of cross-border investments is one of the attributes of globalization drive. This has encouraged countries to require FDI to complement the capacity of domestic investment in creating employment and also to achieve economic growth... (Osabohien et. al, 2020 as cited in Aladelusi & Olayiwola, 2020).

One of the major positives with foreign direct investment is its ability to attract FDI inflows into its host communities. This has led countries across the globe to maximize this advantage and many more of FDI.

However, third world nations in Africa have not been able to be at the proportion in attracting FDI inflows as her fellow countries in the Asian continent. In 2017, a total FDI inflow of \$42 billion came into Africa, which is a 21% decrease from 2016 inflows. (Ayomitunde, Ganiyu, Matthew, & Adebola, 2020).

Given that poverty levels are frequently high, domestic savings and income are consistently reducing, and income is largely allocated to consumption, West African countries must learn how to attract more of this precious resource. Else, her citizens will continue to struggle with employment-related concerns. (Solomon, Yan, Clement, Juliana, & Funmilayo, 2021).

With the increasing and unprecedented wave of globalization, many countries (including Nigeria) strive to derive optimum benefits from exports and foreign direct investment as well as to achieve the highest possible economic growth given various constraints. This study seeks to investigate if there exist a causality between the independent variables Foreign Direct investment, Gross Domestic Product per capita, Gross Domestic product growth, GNI and Government revenue with the dependent variable employment rate. The application of these research findings will serve as a guide on the need to appropriately channel these variables especially the foreign direct inflows received to ease or close the unemployment gap in Nigeria. The findings of these work will translate to a roadmap that can guide decision makers on policy formulation. This is a means of boosting the economic growth and prosperity of the nation

## 2. METHODS

In this study, several tests were taken to empirically examine the impact of foreign direct investment in employment creation. The dependent variable was employment while the independent variables were FDI, GDP per Capita, GDP Growth, GNI and Government Revenue. To achieve this, the Unit root analysis, ADF test, Johansen Co-integration test, and Vector Error Correction Model (VECM) were used. Additionally, diagnostic Checking tests and model stability test were also performed to check the reliability and robustness of the study. The study was carried out using EViews version 10 with a total of 31 observations investigated.

### Source of Data

Annual time series data of FDI, employment, GDP per Capita, GDP Growth, GNI and Government revenue in Nigeria were used in this study. The data was obtained from the Central Bank of Nigeria Statistical Bulletin and the World Bank Indicators for the period 1981 – 2021.

### Model Specification

$$EMP = f(FDI, GDPCAP, GDPGROW, GNI, TGR) \quad 1$$

In econometric term

$$EMP = \beta_0 + \beta_1 FDI + \beta_2 GDPCAP + \beta_3 GNI + \beta_4 TGR + \beta_5 GDPGROW + \mu \quad 2$$

The model is further transform into logarithms form:

$$LGEMP = \beta_0 + \beta_1 LGFDI + \beta_2 LGGDPCAP + \beta_3 LGGNI + \beta_4 LGTGR + \beta_5 LGDPGROW + \mu \quad 3$$

Were:

EMP = Employment; FDI = Foreign direct investment; GDPCAP = GDP per capita, GdpGrow = GDP Growth; GNI = GNI per capita; TGR = Government Revenue.

$\beta_0$  means Constant term,  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$  implies the coefficient of the regressors, and  $\mu$  indicates Error term. We take the log transform of the model to curtail the problem of heteroskedasticity.

#### Definition of Key terms:

**GNI Per Capita:** GNI per capita is gross national income divided by midyear population. GNI (formerly GNP) is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in current local currency.

**GDP Per Capita:** GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.

**Employment:** Employment to population ratio is the proportion of a country's population that is employed. Employment is defined as persons of working age who, during a short reference period, were engaged in any activity to produce goods or provide services for pay or profit, whether at work during the reference period (i.e. who worked in a job for at least one hour) or not at work due to temporary absence from a job, or to working-time arrangements. Ages 15 and older are generally considered the working-age population.

**Foreign Direct Investment:** Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.

**Government Revenue:** This is the total federal Government revenue in Billion Naira.

#### Stationary (ADF Test)

We examine the data's stationarity by using the Augmented Dicky fuller test. If the data is not stationarity at Level, then first-order differencing should be carried out to achieve the variables' stationarity. If the data is stationary after differencing it we perform the cointegration test to test the long run relationship amongst the variables.

#### Cointegration Test

Johansen cointegration test is a multivariate extension where it allows the model to have more than a cointegration vector, it determines if the model is cointegrated using the maximum likelihood approach. The purpose of the cointegration test is to study the long-term association of the dependent and independent variables. The cointegration test is conducted if the variables are stationary at the first difference I(1) and not at Level I(0).

#### Vector Error Correction Model

An error correction model (ECM) according to Wikipedia belongs to a category of multiple time series models most commonly used for data where the underlying variables have a long- run common stochastic trend, also known as cointegration. ECM are theoretically driven approach used in estimating both the short-term and long-term effects of one time series on another.

$$\Delta Y_t = \sigma + \sum_{i=1}^{k-1} Y_i \Delta Y_t - 1 + \sum_{i=1}^{k-1} \eta_j \Delta x_t - 1 + \sum_{m=1}^{k-1} \xi_m \Delta R_t - m + \lambda ECT_{t-1} + u_t \quad 4$$

Were

$ECT_{t-1}$  = the lagged OLS residual obtained from the long run cointegration equation

$$Y_t = \sigma + \eta X_t + \xi_m R_t + u_t$$

and expressed as  $ECT_{t-1} = [y_{t-1} - \eta_1 X_{t-1} - R_{t-1}]$ , the cointegration equation.

$\lambda$  = coefficient of the ECT and the speed of adjustment. It measures the speed at which y returns to equilibrium after changes in X and R (Cruncheconometrix, 7:31)

### Residual Diagnostics

Diagnostic tests such as the Heteroscedasticity, Serial Correlation and arch Effect tests are applied to check the model adequacy.

### Stability Tests

The cumulative sum (CUSUM) of recursive residuals and the CUSUM of square (CUSUMSQ) tests are applied to assess the parameter stability. The cumulative sum test identifies systematic changes in the regression coefficients, while the cumulative sum of squares test detects sudden changes from the constancy of the regression coefficients. (Ravinthirakumaran, Selvanathan, Selvanathan, & Singh, 2015)

The Cumulative sum (CUSUM) test for recursive estimates (ordinary least square) and the CUSUM square test shall be used to determine the stability of the model at 5% significance level.

## 3. RESULTS AND DISCUSSION

This part will mainly cover the results of the econometric tests used in this research. The tests employed for this study are as follow; The Dickey Augmented unit root test, Johansen Cointegration Test, and the VECM model. Also, diagnostics tests were performed to check the model's reliability. These tests were performed through statistical software called E-views version 10.

### ADF unit root testing

The Augmented Dickey-Fuller test statistic was carried out to test if the data is stationary at level 0. The following results were obtained and grouped into a table as shown in table 1

Augmented Dickey-Fuller test statistic

**Table 1: ADF test at level 0**

Variable	T statistics	Prob*
Employment	-1.600680	0.4695
FDI	-2.968248	0.0495
GDP Per Capita	-0.912133	0.7703
GDP Growth	-2.874224	0.0603
GNI	5.539444	1.0000
Government revenue	-0.852836	0.7890

From table 1 we observed from the probability test statistics that the variables are non-stationary at 5% significance level except for FDI which has a value of 0.0495. Hence, there is a need to difference them at level one to make them stationary

**Table 2: ADF Test at 1<sup>st</sup> Difference**

Variable	T statistics	Prob*
Employment	-3.574246	0.0128
FDI	-5.789344	0.0003
GDP Per Capita	-3.734904	0.0358
GDP Growth	-7.434742	0.0000
GNI	-6.523486	0.0000
Government revenue	-5.218502	0.0011

From table 2 we perform the Augmented Dickey-Fuller test at 1<sup>st</sup> Difference and obtained the results in Table 2. The results showed that the variables are stationary. Therefore, we proceed to the Johanson cointegration test.

### JOHANSEN COINTEGRATION TEST

After performing the Johanson cointegration test at 5% confidence interval, the following was obtained as shown in table 3

**Table 3: Johanson Cointegration test**

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.993625	141.5489	40.07757	0.0001
At most 1 *	0.930497	74.65862	33.87687	0.0000
At most 2	0.592548	25.13930	27.58434	0.0996
At most 3	0.452053	16.84417	21.13162	0.1795
At most 4	0.268545	8.756156	14.26460	0.3070
At most 5 *	0.247253	7.952742	3.841466	0.0048

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

From the Maximum Eigenvalue statistics, we observe the presence of at least two cointegration equations at the 0.05 level of significance. From the test, it was concluded that there is a long-time relationship or association amongst variables.

The normalized cointegration equation was examined taking employment as the dependent variable as shown in table 4

### Normalized cointegration Equation

**Table 4: Normalized cointegration Equation**

1 Cointegrating Equation(s):						
		Log likelihood	171.5436			
Normalized cointegrating coefficients (standard error in parentheses)						
LGEMP	LGFDI	LGGDPCAP	LGGNI	LGTGR	GDPGROW	
1.000000	-0.099248 (0.00187)	0.102455 (0.00362)	-0.129682 (0.00479)	0.075480 (0.00392)	0.002663 (0.00023)	

From the normalized cointegration equation (long run) it was observed that FDI positively affects Employment generation in Nigeria by 0.099248, and GNI by 0.129682. While government revenue negatively affects employment by 0.075480, GDP growth negatively affect employment by 0.002663, and GDP per capita by 0.102455.

Since there is a long run association amongst the variable, the vector error correction model is performed to test the causality among the variables taking employment as the dependent variable.

### The VECM Equation

Taking employment as the dependent variable the following equation below was obtained with the value of C(1) as the speed of adjustment and c(14) as the constant.

$$\begin{aligned}
 D(LGEMP) = & C(1)*( LGEMP(-1) - 0.0992475155722*LGFDI(-1) + 0.102454626208*LGGDPCAP(-1) - \\
 & 0.129681833641*LGGNI(-1) + 0.0754798684761*LGTGR(-1) + 0.00266302721733*GDPGROW(-1) - 3.81071927769 ) \\
 & + C(2)*D(LGEMP(-1)) + C(3)*D(LGEMP(-2)) + C(4)*D(LGFDI(-1)) + C(5)*D(LGFDI(-2)) + C(6)*D(LGGDPCAP(-1)) \\
 & + C(7)*D(LGGDPCAP(-2)) + C(8)*D(LGGNI(-1)) + C(9)*D(LGGNI(-2)) + C(10)*D(LGTGR(-1)) + C(11)*D(LGTGR(-2)) \\
 & + C(12)*D(GDPGROW(-1)) + C(13)*D(GDPGROW(-2)) + C(14)
 \end{aligned}$$

### Short Run Causality

The short run causality was investigated with the results displayed below:

**Table 5: VECM short run Causality**

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.012425	0.175427	0.070825	0.9445
C(2)	0.480691	0.244878	1.962985	0.0698
C(3)	-0.324326	0.245883	-1.319029	0.2083
C(4)	-0.001562	0.010017	-0.155901	0.8783
C(5)	0.005922	0.006817	0.868720	0.3996
C(6)	-0.021978	0.029573	-0.743173	0.4697
C(7)	0.000603	0.028009	0.021516	0.9831
C(8)	-0.012059	0.043797	-0.275344	0.7871
C(9)	0.033189	0.050073	0.662816	0.5182
C(10)	-0.001792	0.011658	-0.153689	0.8800
C(11)	-0.015937	0.013867	-1.149256	0.2697
C(12)	0.001325	0.001098	1.207150	0.2474
C(13)	8.81E-05	0.001082	0.081407	0.9363
C(14)	-0.000863	0.007737	-0.111476	0.9128

From table 5 the value of the speed of adjustment towards the long run equilibrium which is the vector correction model is a positive sign (0.012425) and ( $p = 0.9445$ ) which is not significant. This possible indicates a lack of short run relationship amongst variables.

### Wald Test

We perform a Wald test to test the short run causality amongst variables to verify this claim. The results of the Wald test are displayed in a tabular form.

**Table 6: Wald Test**

Variable	Value	df	Chi-square
FDI	1.886012	2	0.3895
GDP Per Capita	0.586658	2	0.7458
GDP Growth	1.459573	2	0.4820
GNI	0.555135	2	0.7576
Government revenue	1.324397	2	0.5157

Taking the null hypothesis  $C(4) = C(5) = 0$  for FDI, the chi-square value of (0.3895) was obtained. Taking  $C(6) = C(7) = 0$  for GDP per Capita, the chi-square value of (0.7458) was obtained.  $C(8) = C(9) = 0$  was used for GNI, the chi-square value of (0.7576) was obtained.  $C(10) = C(11) = 0$  was used for Government revenue, the chi-square value of (0.5157) was obtained.  $C(12) = C(13) = 0$  was used for GDP Growth, the chi-square value of (0.4820) was obtained. Hence, we reject the null hypothesis and conclude that there is no short run causality among the variables.

Results from the Wald test in table 6 indicates that there is no short run causality between employment and the independent variables which is consistent with the results of the earlier assumptions in table 5

### Diagnostic Test

The residual diagnostics test is performed to determine the robustness of the model. The Breusch-Godfrey Serial Correlation LM Test is performed to test if the model is free from serial correlation. The Heteroskedasticity Test: Breusch-Pagan-Godfrey is performed to test if the model is free from the effect of heteroskedasticity. The model is also tested to examine the presence of Arch effect as well as the normality of the model. The following results were obtained as indicated in a tabular form.

**Table 7: Model Diagnostic Check.**

<b>Serial Correlation</b>			
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.417521	Prob. F(2,12)	0.6679
Obs*R-squared	1.821666	Prob. Chi-Square(2)	0.4022
<b>Heteroskedasticity Test: Breusch-Pagan-Godfrey</b>			
F-statistic	0.572402	Prob. F(18,9)	0.8501
Obs*R-squared	14.94520	Prob. Chi-Square(18)	0.6657
Scaled explained SS	8.106499	Prob. Chi-Square(18)	0.9770
<b>Heteroskedasticity Test: ARCH</b>			
F-statistic	1.575417	Prob. F(1,25)	0.2210
Obs*R-squared	1.600587	Prob. Chi-Square(1)	0.2058
Histogram Normality Test			
Jarque-Bera Probability			0.001261

From table 7 The observed  $R^2$  value (40.22%) for the Breusch-Godfrey Serial Correlation LM Test is greater than 5% significance hence, it was concluded the model is free from serial correlation. That is to say the model has no serial correlation.

The observed  $R^2$  value (66.57%) for the Heteroskedasticity Test: Breusch-Pagan-Godfrey is greater than 5% hence it was concluded the model is free from Heteroscedasticity. That is to say the model has no Heteroscedasticity.

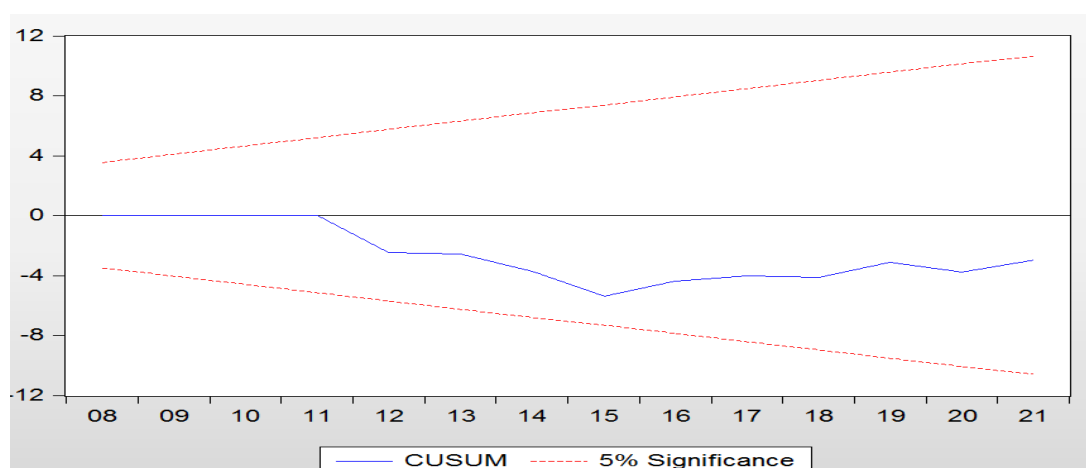
The observed  $R^2$  value (20.58%) for the Heteroskedasticity Test (ARCH) is greater than 5% hence it was concluded the model is free from ARCH effect. That is to say the model has no ARCH effect.

The Jarque-Bera Probability value is less (1.3%) which is less than the 5% confidence interval. We therefore conclude that the model is not normally distributed.

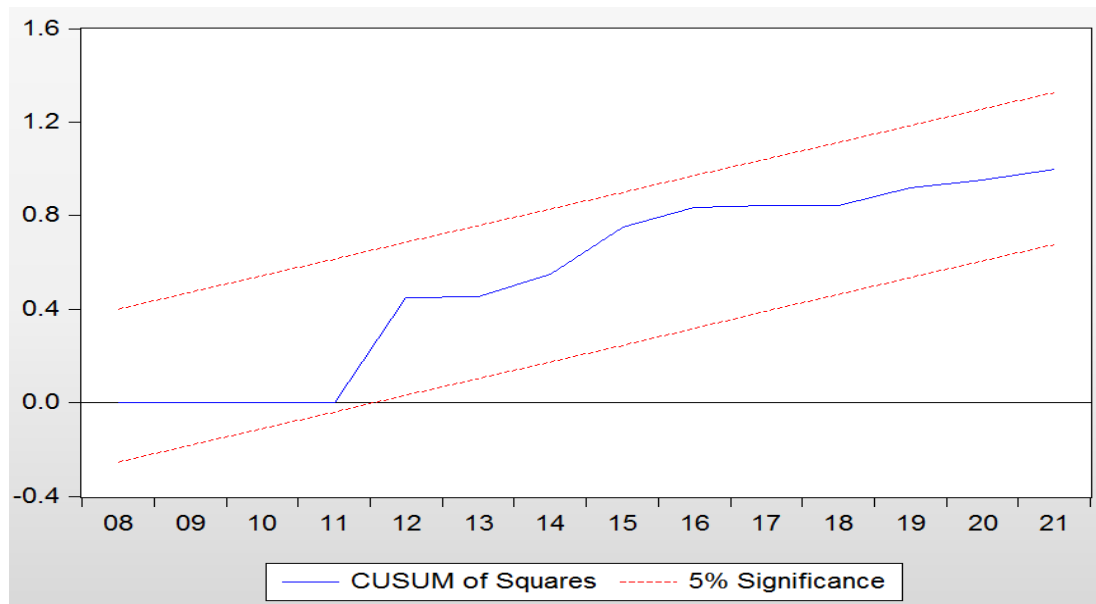
It was observed that while the model passed the test for serial correlation, heteroskedasticity and ARCH effect it failed to pass the test for normality. This could have happened due to some reasons and hence there is a need for more research to investigate this phenomenon.

### Stability Diagnostics

The CUSUM test and the CUSUM of square test were performed with the results displayed the figures below



**Figure 1: CUSUM Test**



**Figure 2: CUSUM of Squares Test**

Figure 1 and figure 2 plots the results for CUSUM and CUSUMSQ tests. The results indicate the absence of any instability of the coefficients because the plots of the CUSUM and CUSUMSQ statistics fall inside the critical bands of the 5 per cent confidence intervals of parameter stability. Therefore, there exists stability in the coefficients over the sample period.

From Figure 1 and Figure 2, it was concluded that the model is stable at 5% level of significance. Therefore, the model is said to be stable.

#### 4. CONCLUSIONS

The objective of this study was to empirically investigate the impact of foreign direct investment on employment creation in Nigeria by using time series data for the period 1981-2021. The independent variables were FDI, GDP per capita, GDP Growth, GNI and government variables while the dependent variable is employment creation.

The result of the analysis showed that FDI positively affects employment creation which indicates that an increase in FDI will translate into high employment creation. This finding is consistent with (Babasanya, 2018), (Aladelusi & Olayiwola, 2020) & (Romanus Osabohien, Awolola, Matthew, Itua , & Elomien, 2020).

The result of the findings also indicated that employment positively affects GNI. However, it negatively affects GDP Per capita, GDP growth and Government revenue. This indicates that an increase in GNI will eventually translate to an increase in employment creation. Contrarily, the analysis reveals that an increase in GDP per capita, GDP growth and government revenue those not lead to an increase in employment in Nigeria. This may have been as a result of so many factors such as waste, poor implementation etc.

Therefore, there is a need for the government and policy makers to effectively evaluate and channel her energy and policies in such a way that it can maximize employment creation so as to mitigate the growing concerns of unemployment in Nigeria.

#### ACKNOWLEDGEMENTS

I will like to acknowledge the help and contributions of Prof. Ahmed Abdulkadir who had been more of a guide in helping to ensure that this paper follows all the due process. In addition, I will also acknowledge the timeless and useful input of Prof. Kassem A. Lasisi both of whom are from the department of Mathematical Sciences, Abubakar Tafawa Balewa University Bauchi. I must confess your contributions to this work is immeasurable. In addition, I will also like to also recognize the huge contributions of Mr. Domven Lohcwat.

#### Conflicts of Interest

The authors declare no conflict of interest.



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