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Energy use and Economic performance in Nigeria

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Abstract
This study examined the influence of energy resource, financial progress, trade on economic performance in Nigeria using ARDL technique from 1980 - 2017. The out come of the co-integration confirm the existence of long run link among the variables. Result of short-run analysis shows that energy, trade balance and economic performance increases the level of economic performance. The estimated long-run result indicates that energy use influence economic performance positively. Therefore the study suggested that policymakers should consider energy conservation policy for sustainable economic performance that will promote human welfare without harming the environment in Nigeria.

1. Introduction

The global economy in the last decade was full of financial crisis, however in the recent time regional economic growth performance ranging from US, Europe, Asia and Latin America is in good shape. In this regard, other nations of the economic progress increases at rate of 2 percent in the past decade. However, growth performance in Africa rises in dismal rate with in the same period and GDP growth falls below expectation. This has led to higher number of African population in to poverty (Artadi & Sala-i-martin, 2003) [1]. The annual growth rate in Nigeria for thes last two decade shows a positive improvement with sluggish impact to human development as almost over 40 % of the population living in extreme poverty and lack of basic standard of human life (The World Bank, 2016) [18]. For example, figure 1 shows that the GDP annual growth increases positively with a declined average growth from 8% to 3% from 2006-2014. In 2016 the GDP growth rate was as low as 2.6 % which could result to deterioration of basic standard of living, savings, investment and productivity in Nigeria.
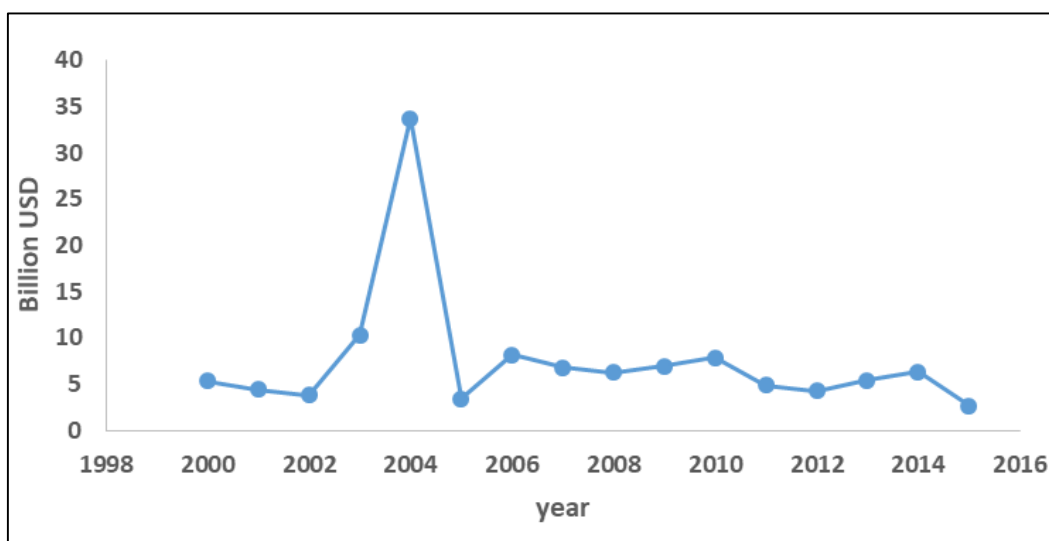

Fig 1: Trends of Economic performance in Nigeria

However, energy utilization for the last few decades in Nigeria has been in increasing. For instance, 676.3869-kilogram (kg) energy use of oil equivalence was recorded in 1980. Similarly in 2010 consumption of energy increased to 721.4534 kg and in 2014 rose to 763.3914 kg (WDI, 2017) [19]. Therefore this improvement could lead to increase in investment and productivity that have direct impact on the national economic performance. Despite this improvement, Nigerian economic progress has not impacted much in human development as people lack basics of human development and persistence level of poverty. Various studies have documented that energy utilization contributes positively to economic performance in industrialized economies. Nonetheless, limited studies used energy utilization in developing economies like Nigeria. In line with the above situations this study examine the impact of energy resources, financial progress, trade and on economic performance in Nigeria.

2. Literature review
The relationship between energy utilization, financial progress, trade and economic performance has been discussed in the economic literature. For example, Ouedraogo (2013) [7] uses panel data analysis to analyze the effect of energy use on GDP in ECOWAS nations from 1980 – 2008. The study finds the existence of long run association among energy use and GDP. Azam *et al*. (2015) examine the link between energy resources and GDP in 5- ASEAN economies from 1980-2019. Their finding confirm positive link among the variables. Similarly, Tang *et al*. (2016) [17] emphasize that energy use influences economic performance positively in Vietnam. Streimikiene and Kasperowicz (2016) [16] investigate the effect of energy resources on economic progress in 18 EU nations. The study finds positive association among the variables. Shahbaz *et al*. (2015) [14] employ ARDL technique to examine the influence of energy utilization on economic progress in Pakistan from 1972-2011. The finding of the study reveals the long run connection. Yıldırım *et al*. (2014) [20] stress that energy use does not influences economic performance in Turkey.
In another development, Satyanarayana *et al*. (2014) [12] use VECM technique to examine the influence of trade, financial resources on GDP in India for the period 1970-2012. The result indicates that the variables have long run linkage. Salahuddin, Gow and Ozturk (2015) [11] apply FMOLS method to analyze the connection between energy, financial sector progress and GDP in GCC economies from 1980-2012. The result of the study shows that energy increases economic performance. Onuonga (2014) [6] stresses that financial sector performance influences GDP positively in Kenya. Moreover, Musila and Yiheyis (2015) [3] study the influence of trade and investment on GDP in Kenya. The finding of the study reveals that trade has positive impact on GDP. Shahbaz and Mafizur Rahman (2014) [15] reveal positive connection among export, financial progress and GDP growth in Pakistan. Study by Sehrawat and Giri (2015) [13] emphasizes that financial sector performance influences GDP growth positively in India. Many studies investigate the link among consumption of energy, financial progress, trade and economic performance in developed economies. Nonetheless, limited studies used energy utilization in Nigeria. The inclusion of energy utilization was due to the role it plays in influencing economic progress in Nigeria.

3.1 Data and Methodology
3.2 Data
Annual based data was used on energy utilization (kg of oil equivalent), domestic credit % of GDP (financial progress), Trade (total exports and imports), Trade balance (exports-imports) and economic performance (current USD) from 1980 –2017. WDI used as the data sources.

3.3 Specification of the model
A changed model by Shahbaz and Mafizur Rahman (2014) [15] was used for the estimation and it is shown in equation 1

$$GDP_t = \propto + \beta_1 EC_t + \beta_2 FD_i + \beta_3 TO_t + \beta_4 TB_t + \varepsilon_t \ (1)$$

GDP, EC, FD, TO, TB represents economic performance, energy utilization, financial progress, trade and trade balance, α and β are the parameter, t is time and ε is the disturbance term. The apriori expectation $(\beta_1 \ \beta_2 \ \beta_3 \ \beta_4 > 0)$ that is the expected sign of the coeffients or hypothesis is positive. This study employed ARDL technique for the model estimation and it is illustrated in the following equation.

$$\Delta LGDP = \beta_0 + \sum_{j=1}^{n} \beta_1 \, LGDP_{t-j} + \sum_{j=0}^{n} \beta_2 \, EC_{t-j} + \sum_{j=0}^{n} \beta_3 \, FD_{t-j}$$
$$+ \sum_{j=0}^{n} \beta_4 \, TO_{t-j} + \sum_{j=0}^{n} \beta_5 \, TB_{t-j} + \alpha_1 LGDP$$
$$+ \alpha_2 EC_t + \alpha_3 FD_t + \alpha_4 TO_t + \alpha_5 TB_t + \varepsilon_t \ (2)$$

Where ε illustrates the disturbance error, t designates the period and Δ denotes the change. The descriptive statistic is shown in Tables 1.The highest mean value among the variables is EC with about 717 units and about 798.3, 671.5 maximum and minimum values. While Variable TB has the lowest mean value with about 0.18, 0.43, 0.003 units of maximum and minimum values.

Table 1: Statistical nature of variables

Variables	Mean	SD	Min	Max
LGDP	6.3	0.87	5.035	8.08
EC	717	35.66	671.5	798.3
FD	15.10	6.26	8.71	38.4
TO	51.1	15.1	23.6	81.8
TB	0.18	0.11	0.003	0.43

4. Result
Table 2 illustrates the statinarity result and it shows that the variables obtained a mix stationarity level that is some variables are stationary at level while others at first difference. Hence, ARDL model is applicable.

Table 2: Stationarity test outcome

-	ADF	ADF
Variables	Level	1st Difference
LGDP	-2.351861 (0.3963)	-6.664580* (0.0000)
LEC	-1.134901 (0.6900)	-5.178620* (0.0000)
LFD	-2.637972 (0.0958)	-5.159267* (0.0002)
LTB	-4.772567 (0.0005)*	-

Notes: * represents statistically significant at 1 percent level.

Long run test confirms the variables linkage as F- value 4.5 is higher than the critical value.
Table 3 illustrates the estimation outcome. The analysis in the short run shows that EC and TB increase the capacity of

economic performance in the nation. This implies that a 1 kg increase in energy consumption lead 1.1 percent increase in GDP, while a 1USD increase in Trade balance leads to 1.2 percent increase in GDP. The outcome also shows that FD and TO are not significant in explaining economic growth. The adjustment in the long-run equilibrium is almost 60 percent, and it is significant at five percent. Only EC is significant in determining GDP in the long run. It implies that

A 1kg increase in the energy consumption in Nigeria lead to about 3.4 percent increase in economic growth.. Moreover, the positive link among energy resources and GDP obtained in this study is not surprising as policymakers in Nigeria intensify their effort towards implementation of economy diversification policy. This outcome is consistence with the reported by Tang *et al.* (2016) [17].

Table 3: Model estimation outcome

S.R Regressors	Coefficients	SD Errors	t-Statistics	Prob
ΔEC	0.011013**	0.0293	2.503356	0.0293
ΔFD	-0.016766	0.0649	-2.050498	0.0649
ΔTO	-0.001543	0.7188	-0.369433	0.7188
ΔTB	1.223582*	0.347925	3.516795	0.0048
ECT(-1)	-0.586966	0.212095	-2.767462	0.0183
L.R Regressors				
EC	0.034956*	0.003647	9.585669	0.0000
FD	-0.001556	0.012570	-0.123780	0.9037
TO	-0.011574	0.008227	-1.406804	0.1871
TB	-3.207886	0.0782	-1.941990	0.0782
C				

Notes: * and ** represents significant at 1 and 5 percent levels

Table 4 illustrates the model validation tests. The outcome shows that the model is free from econometric issues and as well the model is stable based on the CUSUM test.

Table 4: Model validation test

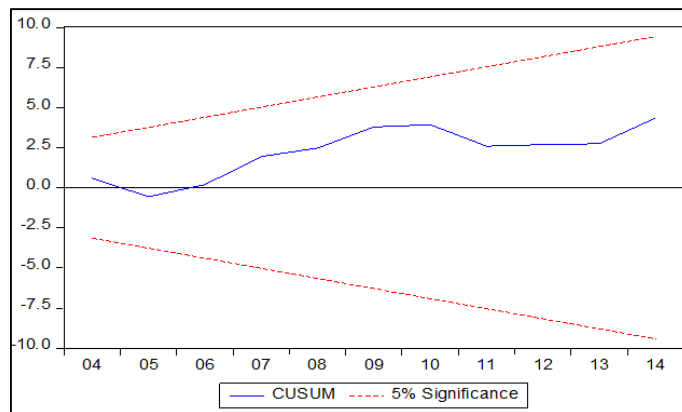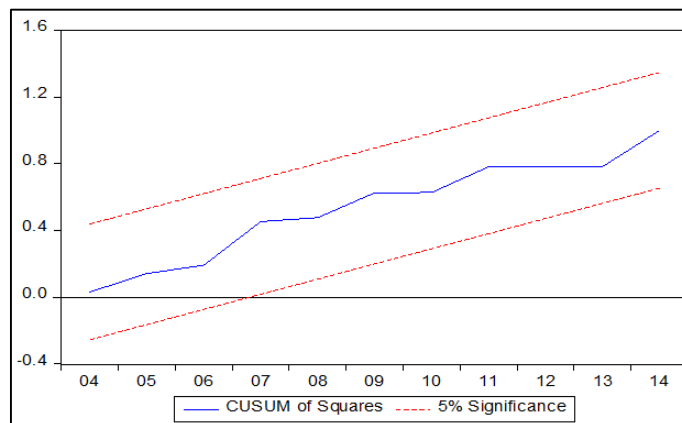| Test Type	F-statistics	Probability	Result
Breusch-Pagan Test.	0.943904	0.5592	No Heteroskedasticity
Breusch-Godfrey Test	0.834333	0.4652	No Serial Correlation
Jarque-Bera	1.354824	0.5079	Normally Distributed

Fig 2: CUSUM statistics stability test

Fig 4: CUSUM square statistics stability test

5. Conclusion

The study examined the influence of energy resources, financial progress, trade, trade balance economic performance by employing ARDL approach from 1980 to 2017. Outcome of the short-run analysis of the study shows a positive link among energy use, trade balance and economic performance. The long-run estimates reveals that energy utilization is positively associated with economic performance. This implies that policymakers should consider energy conservation policy for sustainable economic growth that will promote social and human development without harming the environment in Nigeria (Omri, 2014; Salahuddin & Gow, 2014) [4, 10]. Other factors such as disaggregate forms of energy resources should be use in future studies to enable enhencemnt of policy analysis.

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