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INCLUSIVENESS AND GROWTH: RE-VISITING OKUN'S LAW IN NIGERIA: A THRESHOLD ANALYSIS

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Abstract

The paper investigates inclusiveness and growth in Nigeria by re-examining Okun's law using Threshold Regression Analysis. We found an inverted U-shaped relationship between unemployment rate and growth rate in Nigeria. A threshold figure of 4.2 percent of growth rate was established. The result shows that below growth rate 4.2 percent in the country, growth rate becomes non inclusive, as increase in growth rate increases unemployment rate. However, growth rate at and above 4.2 % reduces unemployment rate in the country, an indication of inclusiveness. This would mean that the desired quest for inclusiveness can be achieved with sustained high growth rate in the economy. It is therefore recommended that the government should target a growth rate of at least 4.2 percent to achieve inclusiveness in the economy. Factors like good governance, infrastructural development, heavy investment in human capital development, financial development and strong institutions will be important in achieving improved and sustained growth (Ayeni and Afolabi (2020)).

Jel classification: O1, O11, O15, E24

Key words: Inclusiveness, Economic Growth, Threshold regression, Okun's law

1.0. Background to the study

Attainment of full employment and economic growth are some of the pillars of macroeconomic objectives of nations. This includes the desire to maintain a sustained increase in national productivity along with efficient and effective utilization of economic resources. These two objectives have been empirically linked together in literature. In the findings of Okun (1962), there is a trade-off between economic growth and unemployment rate, citing for every 3 percent point increase in economic growth, unemployment reduces by 1 percent point. This finding intimates a positive relationship between economic growth and employment rate. In fact, Okun (1962) suggests a bi-directional causality between economic growth and unemployment rate, meaning both are effective in predicting changes in the other.

This linkage indirectly suggests an inclusive potential in economic growth. This is because, economic growth generates more employments, signifying more people are empowered to contribute to national outputs, and consequently reduce poverty and inequality (Jencora et al. 2015). Empirical findings have been put forward to either assert or refute this claim. Findings from the works of Bankole and Basiru (2013), Babalola et al. (2013), Adenomon and Tela (2017) refute the inclusive potential of economic growth, claiming Okun's law is not applicable, all in the case of Nigeria, as unemployment was found to positively correlate with

economic growth. Contrarily, Nurudeen (2016), Oluyomi, et al. (2016) reported somewhat different findings. Their results established the validity of Okun's law in Nigeria, affirming an inverse relationship between economic growth and unemployment. Similar findings are reported by Soylu et al. (2018) for Eastern European countries.

The rising case of poverty and inequality in Nigeria has called for concern amidst uninterrupted economic growth, except for the slump of 2016 occasioned by fall in international commodity prices and the economy has since gradually recovered until the global pandemic of COVID-19. This has led to lots of social vices like kidnapping, terrorism and the treat of civil war, which has further hampered the progress of the nation. These social vices are mostly perpetuated by the excluded inform of unemployment and poverty. Literature have linked cases of rising poverty and inequality to cases of unemployment and economic growth (Dagdeviren, et al (2002); McKay (1997); Dollar and Kraay (2002)). This would mean understanding how economic growth affects unemployment in Nigeria might assist in informed policy formulation by the government of the country and concerned international bodies on poverty and inequality and inclusiveness policy measures. This therefore makes this study germane.

Although, some studies have been conducted on this issue in Nigeria (see Bankole and Basiru (2013), Babalola et al. (2013), Nurudeen (2016), Oluyomi, et al. (2016)) non have attempted to consider the effect of regime switching on growth-

unemployment nexus in Nigeria. This will allow us to understand how economic growth at different levels affects unemployment, hence, inclusiveness[1] and ascertain whether or not there is asymmetric relationship between the two variables.

This study will therefore contribute to literature by attempting to establish a non-linearity of relationship between Unemployment and economic growth in Nigeria and establish a threshold at which economic growth becomes inclusive in the country. To the best of knowledge, no study has looked into the nonlinear effect of economic growth on unemployment in Nigerian economy. It is on this note that this study seeks to investigate Inclusiveness and Growth in Nigeria, with Okun's laws framework, using threshold analysis.

The paper is divided into five (5) sections. Section 1.0 captures the background to the study, section 2.0, contains the literature review of the study, section 3.0, the theoretical framework and methodology, section 4.0, result and interpretation and section 5.0, shows conclusion and recommendation of the study.

2.0. Literature review

The genesis of unemployment – growth nexus can be traced back to the empirical findings of Okun's law in 1962 where he empirically demonstrated a trade-off between economic performance and unemployment rate. These

[1] Increase in opportunities and increasing access to these opportunities to contribute to national output for majority of the labour force.

findings have since been supported or refuted by empirical findings. Some of these empirical findings are presented below:

Adeyeye et al. (2017) investigated the validity of Okun's law in Nigeria through a dynamic panel model and found a negative relationship between unemployment and economic growth. This corroborate the work of Abu (2016) who examined if Okun's law exist in Nigeria using evidence from ARDL bounds testing approach and established that Okun's law is only valid only in the long-run and does not hold in the short-run. In the same vein Oluyomi et al (2016) looked into output and employment relationship and how applicable is Okun's law to Nigeria. He established that a 1 percent point decrease in Unemployment rate is accompanied by a 1.75 percent point increase in real output. In some Asian countries, Lal et al (2010) test for Okun's law using Engel cointegration and Fully Modified OLS (FMOLS) approach found Okun's law application not to be applicable on the region.

Babalola et al (2013) conducted a study on the validity of Okun's law in Nigeria, using a difference model approach and found a unidirectional causality running unemployment to real output and established Okun's law breaks down in Nigeria. In the same period, Bankole and Basiru (2013) empirically test Okun's law in Nigeria between 1980 and 2008, using Engel granger cointegration test and fully modified OLS and a direct relationship between unemployment and real output, implying Okun's law is not applicable in Nigeria. About four years later,

Adenomon and Tela (2017) on the application of Okun's law to developing economies, using Nigeria as a case study and adopted the simple OLS estimation technique observed a positive relationship between unemployment and growth

Rahman and Mustafa (2017) investigated Okun's law and gathered evidence from 13 selected developed countries between 1970 and 2013 using the dynamic least square approach. It was gathered that a long run relationship exists between unemployment and GDP growth in all country, except for Germany. Evidence, however, suggest a relatively weaker relationship for countries like Canada, Finland, France, Japan, Italy, The Netherlands, New Zealand, Sweden, UK, Australia, but strong relationship is recorded for USA and South Korea.

Soylu et al (2018) analyzed economic growth and unemployment issue, adopting a panel data analysis in eastern European countries between 1992 and 2014, using panel OLS. They reported a one percent point rise in GDP reduces unemployment rate in the region by 0.08 percent point.

Julien (2008) looked into the Threshold effect of Okun's law for 20 OECD countries in a panel data analysis, accounting for structural and time instability of Okun's coefficients. He confirmed asymmetry of relationship between unemployment and GDP growth and found that at lower level of cyclical unemployment, there is a relatively strong negative correlation, however, at intermediate level, the relationship weakens.

Zizzamia (2020) empirically enquired if employment is a panacea for poverty in South Africa, using a mixed method and reported unemployment is a key determinant of poverty and labour market inequalities reflect deep-rooted socio-economic inequalities. Five years prior, Jencova et al (2015) on phenomenon of poverty and economic inequality in the Slovak republic, using a described regression and correlation analysis found unemployment to be a key determinant of poverty and migration of population.

From various literature reviewed, it was found that most focus on the linear relationship between unemployment and economic growth (except for the work of Julien (2008) who look into the threshold effect of Okun's law in 20 OECD countries), while paying no attention to the possibility of asymmetry relationship between unemployment and economic growth. This study will therefore fill in the gap by attempting to establish a non-linearity of relationship between Unemployment and economic growth in Nigeria and establish a threshold at which economic growth becomes inclusive in the country.

3.0. Theoretical Framework and Methodology

3.1. Theoretical Framework

The study adopts Okun's differenced model to reflect the relationship between inflation and unemployment. The model as specified by Okun (1962) is as follows:

$$U_t - U_{t-1} = \propto + \beta(Y_t - Y_{t-1}) + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

From equation (1) above, U_t denotes the current rate of Unemployment, U_{t-1} is a year Unemployment lag, representing the Unemployment rate for previous year, while $U_t - U_{t-1}$ represents the change in Unemployment rate from the current to previous years (ΔU). Y_t stands output level at current period, and Y_{t-1}, output level at the previous period. ($Y_t - Y_{t-1}$) symbolizes the difference in national output level between the current and the previous period (ΔY) $\propto$ *is the intercept and* β , the slope coefficient of (ΔY). μ_t captures the error term in the model.

Replacing $U_t - U_{t-1}$ with ΔU and $(Y_t - Y_{t-1})$ with (ΔY) in equation 1, the model becomes as follows:

$$\Delta U = \propto + \beta(\Delta Y) + \mu_t \quad \ldots\ldots\ldots\ldots (2)$$

Equation 2 expresses the effect of change in output level in the economy on changes in the rate of unemployment

3.2. Model Specification

Follow the framework of Okun (1962), the following model is specified to achieve the objective of the study

Unemployment rate= F (real GDP growth)

3.3. Methodology

3.3.1. Threshold Regression Model

This study adopts the threshold regression approach by Hansen (1999) to time series analysis. It is an estimation technique that allows for regime switching and

account for non-linearity in a model. It is adopted to investigate Unemployment – Growth nexus in Nigeria.

Given linear regression model as specified below:

$$y_t = \propto_0 + \propto_1 x_t + \beta' Z + \varepsilon_t \quad (1)$$

Where y_t is the explained variable, x_t, the threshold variable, Z, a vector of controlled variable and ε_t, the error term in the model. $\propto_0, \propto_1$ and β are regression parameters on the model.

Referring to the framework of Hansen (1999), equation 1 can be re-specified to accommodate threshold components as follow;

$$y_t = \propto_0 + \propto_1 x_t I(\leq \lambda) + \propto_2 x_t I(\geq \lambda) + \beta' Z + \varepsilon_t \quad (2)$$

Where λ the threshold parameter[2], and I(.) denotes the function that assumes the value of 1 if the threshold variable is below the determined threshold value and 0 if otherwise.

Equation 2, can further be separated into two regimes, relying on whether the threshold variable is below or above the estimated threshold. These regimes are distinguished by different regression parameters in $\propto_1 \ and \ \propto_2$ as follows:

$$y_t = \propto_0 + \propto_1 x_t \beta' Z + \varepsilon_t, if \ x_t \leq \lambda \quad (3)$$

$$y_t = \propto_0 + \propto_2 x_t + \beta' Z + \varepsilon_t, if \ x_t \geq \lambda \quad (4)$$

[2] The threshold parameter measures the turning point or point of change of the threshold variable (see Hansen, 1999). Where there are no turning points, a threshold parameter cannot be established.

Equation 3 represents the regime below the threshold and 4 above the threshold. In order to identify the threshold in equation 2, the ordinary least square is estimated, and then, the sum of squared errors (S_1) is computed for all possible values of the threshold variables. S_1 is computed as $\dot{e}$ (λ') $\dot{e}(\lambda)$. Next is the threshold parameter is obtained by minimizing (S_1), such that $\bar{Y}$=argminY S_1 (Y). Once the endogenous threshold is ascertained, it is important to test if the threshold is statistically significant. The null hypothesis is that there is no threshold effect (H_0: $\beta_1 = \beta_2$). This implies that the slope coefficients are similar in the two regimes. Hence, under the H_0, equation 2 is similar to linear model in equation 1. The likelihood ratio test of the null hypothesis is based on the F-statistic:

$$F_1 = \frac{(S_0 - S_1(\bar{Y}))}{\dot{\alpha}^2}$$

Where s_0 and s_1 represent the sum of squared errors under the null hypotheses, and $\dot{a}$ is the estimate of the regression error variance (a^2). Given that the threshold value is not identified under the null hypotheses, the asymptotic distribution of F_1 is not standard. To address this, Hansen (1999) suggests a bootstrap method to simulate the probability value for the F-statistic (F_1). For threshold to exist, it is expected that from equation 2, $\propto_1 > 0$ and $\propto_2 < 0$, or otherwise.

3.3.2. Data, Scope, and Source

The study adopts a secondary data extracted from the World Development Indicators (2019). The WDI is the World Bank's premier compilation of cross-country data on development. It covers the periods of 1991 to 2018. The variables

adopted for the study include the Unemployment rate (measured in percentage) and the Gross Domestic Product growth rate (gdpg) (measured in percentage).

4.0. Result and Interpretation

Table i: Threshold regression estimate

Dependent variable: Unemployment rate

Regime 1: ($GDPG_t < \lambda$)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$Gdpg_t$	0.0731	0.1245	0.5868	0.5626
C	4.4386***	0.2106	21.0751	0.0000

Regime 2: ($GDPG_t \geq \lambda$)

$Gdpg_t$	-0.0751***	0.0364	-2.0625	0.0497
C	4.4386***	0.2106	21.0751	0.0000

Threshold Value

λ	4.2
R-squared	0.18
F-statistic	2.68[0.08]

Table i above shows empirical findings of the relationship between unemployment rate and economic growth in Nigeria. From findings, the relationship between unemployment rate and economic growth is non-linear and demonstrates an inverted U-shape relationship. The threshold at which GDP growth influences changes in unemployment rate is 4.2 percent. The threshold value depicts the turning point of GDPG and above or below it exerts different effect on unemployment. Hence, the result demonstrates two regimes of the effect of GDP growth on unemployment in Nigeria. At a regime less than 4.2 percent, GDP growth exerts a positive influence on unemployment rate in Nigeria. This intimates the breakdown of OKUN's law in Nigeria and suggests a non-

inclusive GDP growth in the economy. On the other hand, GDP growth at 4.2 percent and above negatively and significantly affects the level of unemployment in Nigeria. From findings, at this regime, a percent point increase in GDP growth reduces unemployment rate by 0.08 percent. This result shows that Okun's law is only valid in Nigeria at certain level of growth, below which the law breaks down. This perhaps settles the conflicting result in literature where some found a positive relationship between Unemployment rate and GDP growth rate (see Babalola (2013), Bankole and Basiru (2013), Adenomon and Tela (2017)) and some confirms the validity of Okun's law in the country (see Nurudeen (2016), Oluyomi, et al. (2016))

5.0. Conclusion and Recommendation

The paper investigates inclusiveness and growth in Nigeria by re-examining Okun's law using threshold regression analysis. We found an inverted U-shaped relationship between unemployment rate and growth rate in the country. This indicate that, below certain growth rate (4.2 %) in the country, growth rate becomes non inclusive, as increase in growth rate increases unemployment rate. However, growth rate at and above 4.2 % reduces unemployment rate in the country, an indication of inclusiveness. Economic inclusiveness has been adjudged as one that reduces poverty and inequality, and some literature have linked unemployment to sources of poverty and inequality (Jencova et al (2015), Zizzamia (2020)). This would mean that reduction in unemployment level could

potentially reduce the level of poverty and inequality and foster inclusiveness. Findings from this study suggest that unemployment rate can be reduces if growth can be sustained at 4.2 percent and above. This would mean that the desired quest for inclusiveness can be achieved with high growth rate in the economy. It is therefore recommended that the government should target a growth rate of at least 4.2 percent to achieve inclusiveness in the economy. Factors like good governance, infrastructural development, heavy investment in human capital development, financial development and strong institutions will be important in achieving improved and sustained growth (Ayeni and Afolabi (2020)).

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