

Does The Relationship between Unemployment and Economic Growth Follow Okun's Law in Nigeria?

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Abstract

Original Research Article

Unemployment is a persistent challenge in Nigeria for countries, especially the developing ones. Nigeria as a developing country faces a whole gamut of effort to reduce the increasing spate of joblessness amongst her citizens. Okun's law suggests that promoting economic growth is a potent strategy to reduce unemployment rate. This study investigated Okun's law in Nigeria through the error correction model dynamic model within the time frame of 1980 to 2017. The data used in the were registered unemployment and real GDP. The study concluded that the relationship between unemployment and economic growth follows Okun's law. Okun verified that the coefficient of unemployment was -0.3 in United States, but it was empirically discovered in this study that coefficient of unemployment was -0.2. Again, It was verified that the relationship between unemployment and economic growth was unilateral. It means that it was increased GDP that cause negative change to unemployment not the other way round. The problem that hinders economic growth in Nigeria is over population of which greater number of active labour-force lacks labour efficiency. Based on above stated findings, the study made the following recommendations: Nigeria Government should formulate monetary and fiscal policies that are channeled towards increased economic growth to reduce unemployment.

Keywords: Okun's law, registered unemployment, economic growth, Error Correction Model.

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INTRODUCTION

Economists have long known that the overall performance of the economy as measured by Gross Domestic Product (GDP) has a direct bearing on employment. In support of this view, classical school first stated that national income was a function of capital and labour and full employment can be achieved in long-run where every labour accept to do job at prevailing wage rate. The standard growth model represented by the Solow model predicts that the rate of growth is dependent on efficient of labour, number of labour and capital. In other words, economic growth and employment go in direct straight direction.

In economics, Okun's law (named after Arthur Melvin Okun, who proposed in 1962 the relationship between unemployment and losses in a country's production. His empirical study stated that increase in unemployment results to decrease in economic performance of a country (GDP). The discovery of Okun [1] on the US showed that there is a negative association between unemployment rate and economic growth. In other words, Okun found that unemployment and economic growth move in opposite direction (i.e. the higher the growth in the economy, the lesser the rate of unemployment and vice versa). Okun's law suggests that promoting economic growth is a potent strategy to reduce unemployment rate. This finding became what is popularly referred to as "Okun's law". Okun's law assumes that economic shocks affect output asymmetrically before influencing unemployment [2]. It posits that the behaviour of unemployment in the economy acts in the Keynesian manner to the point that it suggests that failure to utilise productive resources reduces the rate of economic growth in the future [3].

A nation regardless of its level of economic development faces a daunting task in achieving full employment (i.e. effective maximisation of labour resources). The International Labour Organisation (ILO) reported that unemployment exists and negatively affect virtually all countries. Hence, it is wise to state that the issue of unemployment is a phenomenon experienced in both advanced and emerging economies Adeyeye, *et al.* [4]. Unemployment is inability of some individuals in a country who are willing, able and permitted the law could not find job to do in exchange their

mental and physical efforts for financial gain or compensation. Okun's law verified that unemployment increase result to decline economic growth using United states' data. The central Bank of Nigeria statistical Bulletin [5] shows 256,623 registered unemployed low grade workers while real GDP mount to 31546.80 million in 1980, 89,752 registered unemployed low grade workers while real GDP mount to 267,550.10 million in 1990 and 85,368 registered unemployed low grade workers while real GDP mount to 433203.1 million in 2000. In the last three decades, it has been observed increasing position in unemployment and economic Growth in Nigeria. With the increasing difficulty of graduates in Nigeria seeking employment in the face of increase in output growth now result to an unanswered question; does the relationship between unemployment and economic growth in Nigeria follows Okun's law?

Okun's law is a statistical relationship between unemployment and output in an economy and not a structural attribute of an economy because the relationship is subject to changes in an ever-dynamic economy [6]. It suggests that unemployment and output are inversely related and there is a bidirectional causal relationship between them. The responsiveness of unemployment to output has been regarded in literature as "Okun's coefficient". Okun [1] found a coefficient of -0.3 between unemployment and output, thus indicating that unemployment decreases by 3% when output increases by 1% in US. Moosa [4] estimated that Okun's coefficient is -0.38 in the US economy regardless of whether the model is static or dynamic and irrespective of the lag length in the dynamic model. Prachowny cited in Adeyeye, *et al.* [4] found that the contribution of 1% decrease in unemployment is about 2% to 3% increase in output in US. Ball, Leigh and Loungani [7] found that the effect of 1% increase in output differs largely across countries. The Okun's coefficient may vary across countries due to economic conditions [8].

As regards to empirical studies written by Nigeria scholars, the opinion of Levin and Wright [9] which states that unemployment level and output may not be negatively related. Arewa and Nwakanma [10], Babalola, Saka and Adenuga [11], Abraham [12] and Akeju & Olanipekun [13] have confirmed this opinion in Nigeria. The reason for these diverse findings are not unconnected to the difference in methodology adopted, diversity in the choice of data used to capture the variables of study, variation in the time period which the study focused on. Based on the above this paper attempts to investigate Okun's law in Nigeria. The specific objectives are to:

- Ascertain the casual relationship between unemployment and economics growth in Nigeria.
- Investigate Okun's -0.3 unemployment coefficient in Nigeria.

LITERATURE REVIEW

Theoretical Literature

Okun [1] built three versions of models to establish the interaction between unemployment and output. These include: the difference model, the gap model and the dynamic model. The difference model shows the effect of movements in output on change in unemployment rate. It reflects the relationship between unemployment and economic growth. The model is specified as:

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

U_t is unemployment rate at current period; U_{t-1} is unemployment rate at previous period; Y_t is output at current period; Y_{t-1} is output at previous period; $U_t - U_{t-1}$ is change in unemployment rate; $Y_t - Y_{t-1}$ is change in output; β is Okun's coefficient or estimate of change in output; σ is intercept; μ is error term.

Equation (1) in a simpler form becomes:

$$\Delta U = \sigma + \beta \Delta Y + \mu_t$$

ΔU is change in unemployment; ΔY is change in output.

The gap model shows how the difference between potential output and actual output affects current unemployment rate. Okun [1] used the gap model to explain the output the economy can produce when there is full employment and no inflationary pressure. The model assumes that the economy attains full employment when unemployment is 40% [14]. The gap model is specified as:

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

U_t is unemployment rate at current period; Y is potential output; Y_t is actual output; $Y_t - Y_{t-1}$ is output gap. The dynamic model assumes that current rate of unemployment is determined by current output, previous output and previous changes in unemployment. Knotek [6] opines that the model is distinctive because it does not reveal only the relationship between changes in unemployment and output growth but also how past unemployment level affects present unemployment level. The model is specified as:

$$U_t = \sigma + \beta_1 Y_t + B_2 Y_{t-1} + \alpha U_{t-1} - \mu$$

U_t is unemployment rate at current period; Y_t is output at current period; Y_{t-1} is output at previous period; U_{t-1} is unemployment rate at previous period; β_1 and B_2 are Okun's coefficients.

Okun's law was propounded in 1962 from a study which discovered an inverse relationship between unemployment level and economic growth of the US between 1947Q2 and 1961Q1 and later studies such as Weber [3]; Knotek [6]; Kitov [15]; Ball, Leigh and Loungani [3]; Ekner [16] and Ball, Jalles and Loungani [17] provide similar evidence for the US economy. However, Daly and Hobijn [18] and Gordon [14] showed that Okun's law is not a norm in US. This implies that Okun's law has generated controversy in the US economy. Similarly, findings not related to US have produced mixed results. Sadiku, Ibraimi and Sadiku [19], utilizing quarterly data from 2000 to 2010, observed the relationship between economic growth and unemployment rate in Macedonia. The findings suggest that Okun's law is not tenable.

Empirical Review

The link between unemployment and economy growth has attracted the attention of the researchers and scholars. The approaches of the examination of this topic have been taking several dimensions by different scholars. Many scholars examined the discussion on the basis of the unemployment. The issue under review is a vital subject that should be subjected to painstaking empirical review in order to keep abreast with the positions of the concerned researchers and scholars on this subject and to determine the gap inherent in the earlier related studies.

Adeyeye, *et al.* [4] conducted a study to investigating Okun's Law in Nigeria through the Dynamic Model between 1985 and 2015. The generalized method of moments estimation result reveals that that present and past output growth are negatively related to unemployment rate. The Toda-Yamamoto Granger non-causality test finds that there is no causality between unemployment and economic growth.

Geldenhuis and Marinkov [20] found that unemployment is inversely related to output in the South African economy over the 1970 to 2005 period and there was evidence of asymmetry in the Okun's relationship. But, Moroke, Leballo and Mello [17] explored the relationship between unemployment and economic growth of South Africa from 1990Q1 to 2013Q4. The study showed that Okun's coefficient did not conform to the expected sign; thus, affirming that Okun's law is irrelevant in South Africa. Akram, Hussain and Raza [21], applying ordinary least square method, found that Okun's law does not exist in Pakistan. Noor, Nor and Ghani [22] evaluated how growth interacts with unemployment in Malaysia from 1970 to 2010. The regression results indicated that the responsiveness of unemployment to growth behaviour is in line with Okun's law. Dritsaki and Dritsaki [23] estimated Okun's coefficient between 1961 and 2002 for 4 Mediterranean countries of the EU consisting of Italy, Spain, Portugal and Greece between 1961 and 2002 and found the coefficient to be -0.024 , -0.017 , -0.016 and -0.007 respectively. Kitov [15] estimated Okun's law for 6 developed countries comprising United States, Spain, United Kingdom, Australia, Canada and France. Using real GDP per capita in place of overall GDP, Okun's law exhibits an astounding predictive power in all the countries. The study showed that the high unemployment rates in these countries would be impossible to reduce if their growth rate does not exceed 2% per annum.

Arshad [14] observed that Okun's law is evident in Sweden between 1993Q1 to 2009Q2. Elshamy [24] evaluated the relationship between unemployment rate and output in Egypt between 1970 and 2010. It discovered that Okun's coefficient is negative and statistically significant in both the short and long run. The study of Central Bank of Malta [25] found that GDP growth above 1.5% - 2.0% reduces the rate of unemployment. However, the influence of GDP growth on unemployment is weak when compared with other European Union (EU) countries. For Spain, Loría and Salas [3] estimated a quadratic version of the first- difference of Okun's law model for the period between 1995Q1 and 2012Q2. The study disagreed that Okun's law is not stable over time and observed that 7.38% growth rate reduces changes in unemployment. Kargi [26], in a study of 23 Organisation for Economic and Cooperation Development (OECD) countries, found that unemployment and growth do not move in the same direction. Similarly, Dixon, Lim and van [27] found that increase in economic growth would reduce unemployment rate as well as have a distributional effect of reducing unemployment among youths in 20 OECD countries. Ball, Jalles and Loungani [7] found that real GDP growth forecasts and changes in unemployment are inversely related in 9 developed countries. Christopolous [28] investigated the Okun's law in Greece on regional basis and found that the law is evident in 6 out of the 13 regions reviewed. Similarly, Binet and Francois [5] found Okun's law to be valid in 14 out of 22 regions in France.

For Nigeria, Sodipe and Ogunrinola [14] examined the link between employment and Nigerian economic growth with the ordinary least squares (OLS) method. The empirical results suggest that the relatively low influence of GDP growth to promote employment is responsible for the high level of unemployment and that Okun's law does not hold. Arewa and Nwakanma [10] adopted vector autoregressive (VAR) approach to evaluate the relationship between output and unemployment in Nigeria from 1981 to 2011.

The study found that Okun’s law does not fit to the Nigerian economy. Babalola, Saka and Adenuga [11] tested the authenticity of Okun’s law in Nigeria from 1980 to 2010. Employing causality test and error-correction model, the findings indicated that causality flow in a unidirectional manner from unemployment to real output growth and the coefficient of Okun is not negative. The study suggests that unemployment rate does not respond to output growth in a manner consistent with Okun’s law.

Abraham [12] examined the effect of output on unemployment rate in Nigeria between 1985 and 2013. Using autoregressive distributed lag (ARDL) bounds-test; it was revealed that output variations have no significant impact on unemployment. The study adduced that Okun’s law is not applicable to Nigeria. Also, Akeju and Olanipekun [13] employing the error-correction modelling approach, did not validate Okun’s law in Nigeria.

METHODOLOGY

This study made use of ex-post-facto research design which enables us to measure the effect or relationship between dependence variable and explanatory variables using time-series secondary data from 1980 to 2017. To empirically examine the impact of unemployment on the economic growth in Nigeria, the researcher subjected the data collected to Unit Root, Pairwise Granger Causality Tests and Error Correction test and Durbin-watson test. The ADF test is used to test whether the variables are non-stationary (unit root). The unit root was carried out to avoid non-sense regression and to void violation of ordinary least square assumption. An Error Correction Mechanism is employed to ascertain the speed of adjustment from the short run equilibrium to the long run equilibrium state. The Durbin-watson test was used to identify whether the model suffer from autocorrelation problem. The autocorrelation problem violates of ordinary least square assumption that stated error term of different observation is different from any explanatory variable.

Data Sources

To investigate how unemployment could affect economic growth in Nigeria, a number of variables have been taken into consideration in this study. These variables consist of Real Gross Domestic Product (RGDP), registered unemployment for Professional and Executive and registered unemployment for lower Grade workers for the period of 1980-2017 and are defined in our model specification. All the variables were sourced from Central Bank of Nigeria’s (CBN) statistical bulletin for various years.

Model Specification

This study is anchored on the Okun’s Law [1] states that there is a negative association between unemployment rate and economic growth. In other words, Okun found that unemployment and economic growth move in opposite direction and identified that coefficient of unemployment is -0.3 (meaning that 1% decrease in unemployment result to 3% increase in economic growth. Thus, the model is represented in a functional form of the model was shown below:

RGDP = F (Registered unemployment) (eqn1)

Where

RGDP = Real Gross Domestic Product (Dependent variable)

Registered Unemployment = Registered unemployment (Independent variable)

In a linear econometric function, it is represented as follows:

RGDP = $\beta_0 + \beta_1$ Unemployment + U_t (eqn 2)

Where: β_0 = Constant term, β_1 = Regression coefficient of unemployment and U_t = Error Term.

RESULTS AND DISCUSSION

Table-1: Results of Stationarity (unit root) test

Variables	ADF- Statistics	Critical Value	Order of integration
RGDP	-6.042212	1% level = -3.632900 5% level = -2.948404 10% level = -2.612874	Stationary first difference
Unemployment	-5.989966	1% level = -3.621023 5% level = -2.943427 10% level = -2.610263	Stationary at Level

The results of the stationarity (unit root) test indicate that Real Gross Domestic Product (RGDP) was stationary at first difference while unemployment was stationary at level.

Data Analysis

Table-2: Empirical Results of the Multi-regression Error correction model

Dependent Variable: D(RGDP,1)				
Method: Least Squares				
Date: 12/13/18 Time: 05:09				
Sample (adjusted): 1981 2017				
Included observations: 37 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12512.92	19377.32	0.645751	0.5228
D(unemployment,0)	-0.205868	0.045271	-4.547458	0.0001
ECM(-1)	-0.601575	0.097716	-6.156361	0.0000
R-squared	0.720983	Mean dependent var	1034.120	
Adjusted R-squared	0.709276	S.D. dependent var	89028.32	
S.E. of regression	85889.21	Akaike info criterion	25.63711	
Sum squared resid	2.51E+11	Schwarz criterion	25.76772	
Log likelihood	-471.2865	Hannan-Quinn criter.	25.68316	
F-statistic	11.39782	Durbin-Watson stat	2.009546	
Prob(F-statistic)	0.000000			

In testing this hypothesis, registered unemployment was regressed against Real Gross Domestic Product (RGDP). The result of the regression analysis was summarized and it shows the model for the effect of unemployment on real GDP. The empirical result shows that the coefficient of unemployment has negative 20 percent effect on Real Gross Domestic Product (RGDP). The error correction model statistic showed that the model has 60% of the error is corrected every year from short-run to long-run. The results of the t – statistics denotes that registered unemployment (-0.205868) was statistically significance. This is because observed values of t – statistics are greater than its P-values. The results of the F – statistical test show that the overall regression of the variable was statistically significance. This is because observed values of the F – statistics (11.39782) was greater than its P-value. Again, our empirical result shows that the adjusted R-squared (R^2) is 0.709276. Explanatory power of the variable was very high.

Table-3: Causality Tests

Pairwise Granger Causality Tests			
Date: 12/13/18 Time: 05:20			
Sample: 1980 2017			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
Unemployment does not Granger Cause RGDP	36	0.24278	0.7859
RGDP does not Granger Cause unemployment		6.11545	0.0003

The pairwise Granger Causality test was carried out test whether the relationship between registered unemployment and real GDP were unilateral or bilateral. It was verified that the relationship was unilateral. It means that it was increased GDP that cause negative change to unemployment not the other way round. Pairwise Granger Causality F-statistic test attest to it when F-statistic test (6.11545) was greater than the P-value (0.0003). Hence, we rejected the null hypothesis and accept real GDP granger cause change to unemployment.

Econometric Test

Table-4.3: Result of Durbin-watson Autocorrelation Test

Model	Observed value of Durbin – Watson (Dw)	Critical value of Durbin – Watson Du(4 – du)	Test Result
Model 1	2.00946	1.58	AA

AA = Autocorrelation Absent

Durbin- Watson statistics (d^*) was carried to test randomness of the residuals and the assumption of ordinary least square was not violated. The assumption that explanatory variable has no correlation with error term. The result of Durbin–Watson test (2.00946) carried out at five percent level of significance showed that the model was free from Autocorrelation problem. This is because the Durbin–Watson test (2.00946) was greater than upper critical value of Durbin-watson (1.58). This denotes that prediction base of the Ordinary Least Square estimates were efficient and unbiased.

CONCLUSION

The study concluded that the relationship between unemployment and economic growth follows Okun's law. Okun's law suggests that promoting economic growth is a potent strategy to reduce unemployment rate. This study investigated Okun's law in Nigeria through the static error correction model. It was empirically discovered in this study that increase in unemployment results to decrease in economic performance of a country (GDP). There is a negative association between unemployment rate and economic growth. In other words, it was found that unemployment and economic growth move in opposite direction. Okun verified that the coefficient of unemployment was -0.3 in United States, but it was empirically discovered in this study that coefficient of unemployment was -0.2. Again, it was established in the study that promoting economic growth is a potent strategy to reduce unemployment rate in Nigeria. It was verified that the relationship between unemployment and economic growth was unilateral. It means that it was increased GDP that cause negative (decline) change in unemployment not the other way round. The problem that hinders economic growth in Nigeria is over population of which greater number of active labour-force lacks labour efficiency.

Recommendations

Based on above stated findings, the study made the following recommendations:

- Nigeria Government should formulate monetary and fiscal policies that are channeled towards increased economic growth to reduce unemployment.
- Nigeria government should formulated public policy that focus on labour-force skill-coaching and labour training to boost creativity of labour-force by so doing reduce employment through self-employment.
- Nigeria government should promote programmes for population control. It will help to reduce unemployment.

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