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Output and Unemployment Relationship: How Applicable Is the Okun's Law to Nigeria?

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Abstract: Okun's Law is one of the most enduring stylistic facts in macroeconomics. The objective of this study is to investigate the existence of an Okun-type relationship for the Nigerian economy during the period 1970-2013. After a unit root check was carried out using the Augment Dickey Fuller and Philip Perron tests, the Johansen cointegration technique was employed to find out whether or not long run relationship exists. It was discovered that a long run inverse relationship exists between unemployment and GDP in Nigeria. The Okun coefficient was 1.75% indicating that a 1% decrease in unemployment rate is accompanied by a 1.75% increase in GDP. The coefficient in Okun's original work was 3% which is greater than the coefficient found in this study. This study supports the argument that the slope coefficient in the Okun's model is unstable, hence, it varies across economies and periods. Thus, every effort made towards reducing the level of unemployment in Nigeria impacts the level of output on an increasing scale.

Key words: Unemployment, Okun's Law, Okun Law coefficient, cointegration, Nigeria

INTRODUCTION

The subject of unemployment is a pervading challenge in developing economies. With the incidence of the global economic crisis, the increasing rate of unemployment extends even in developed nations of the world. The high incidence of unemployment connotes inefficient use of the labour resources available in the country/region under study. However, full employment, one of the primary macroeconomic goals of the government of a country, connotes effective maximization of its resources.

The Okun's Law was formulated for the United States by Arthur Okun in 1962 and has since, established itself as one of the most enduring stylised facts in macroeconomics and is now a basic rule of thumb. Okun found that "in post-war period, on the average, each extra percentage point in the unemployment rate above 1% has been associated with about 3% decrement in real GDP". The Okun's Law has established its prominence in the macroeconomic framework of analysis for over four decades. Basically, it asserts that a negative relationship ensues between unemployment rate and real Gross Domestic Product (real GDP). Several empirical studies have gone underway to establish the relationship proposed by the Okun's Law. Thus, Okun's Law is continually been viewed as an important macroeconomic building block. The Okun coefficient is the measure of responsiveness of unemployment to the growth in output. Consequently, the empirical estimates of this coefficient give an estimate of the cost of unemployment in terms of output (Gordon and Clark, 1984). The Nigerian economy is a unique one in the setting of developing countries laced with rising level of unemployment concomitant to the level of economic growth identified from the changes in the level of GDP from year to year. Since, full employment of resources is an important macroeconomic objective desirable by all countries-developed and developing, it is, therefore, pertinent to determine the level or rate of economic growth that is necessary to propel the country to full employment. The analysis before us will help determine the causal relationship between output and unemployment. From 1981-2007, the real GDP of Nigeria has grown at an average rate of 3.92% (Central Bank of Nigeria, 2002). The growth of unemployment is expected to have fallen due to the Okun's prediction. However, this is what we propose to examine in this study. We hope to establish the relevance of the Okun's Law to policymakers in the Nigerian economy and developing countries with similar growth trends. If the output has increased over the time and there is still a growth of unemployment (especially of labour resources) then there is a cause for concern. The enduring appeal of the Okun's Law is in its simplicity and its employment of two macroeconomic variables-gross domestic output and unemployment. Thus, the question is the Okun's Law a mere statistical relationship in the structure of the Nigerian economy.

The occurrence of jobless growth in any economy will go contrary to the proposition of the Okun's Law.

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Semmler *et al*. (2006) observed such in the US economy stating that even though, the US economy grew stronger, the output growth was not commensurate with the growth in employment. This contradicts the occurrence of economic growth being followed by a higher rate of job creation (and decrease in unemployment) than some other countries in earlier times. Thus, a jobless growth situation could be explained by a structural change (the cause of such a structural change may constitute the object of further research) which is independent of the business cycle.

The objective of this study is to investigate the existence an Okun-type relationship in the Nigerian economy. We propose to find the level of GDP growth rate that would translate to a favourable employment situation in the country. This study is organised as follows: first we discuss the unemployment trends observable in Nigeria, next we review empirical literature and the theoretical framework related to the Okun's Law.

Theoretical issues and brief survey of literature

Theoretical issues and unemployment in Nigeria: In his analysis of unemployment in developing countries, Edwards identified several categorization of labour underutilization. These include open unemployment (both voluntary and involuntary), underemployment (the predominant form of contemporary labour underutilisation), the visibly active but underutilized (which include disguised underemployment, hidden unemployment and premature retirement), the impaired and the unproductive (people who can provide the human resources necessary for productive purposes but who struggle for long hours with inadequate complementing resources to make their inputs yield even the essentials of life). The unemployment situation in Nigeria is urban and rural in character. A notable recent characteristic is the increasing number of educated unemployed. In the 1960s and 1970s, the problem of unemployment was prevalent among primary school-leavers. However, in the post SAP period, one of the key social problems is on how to tackle the issue of unemployed graduates (Oladeji, 1994).

The relevance of the government in reducing the rate of resource (natural and human) unemployment is rooted in Keynesian propositions. In a developing economy whose markets are laden with operational inefficiencies, the role of the government cannot be overemphasised. On the other hand, the classicals are of the opinion that the competitive forces of demand and supply should be allowed to allocate resources (given its efficiency) with government playing a minimal role. However, given the failure of the market system in efficient resource allocation the Keynesians advocated for the crucial role government plays in the economy in the bid to raise the level of aggregate demand, promote growth and ipso facto employment. In effect, the Keynesian advocations significantly influence the International Labour Organisation (ILO) in its employment generation projects in developing countries (NISER, 2005). They also influence the employment and programmes in the developing economies.

Although, private sector employment in Nigeria has been based on productivity, market demand and profitability, the government at some points have influenced the employment decisions of the private sector. On the other hand, employment in the public sector is influenced largely by policy regimes and development strategies. As a rescue remedy, several employment generation policies have been implemented so far in the Nigerian economy. Actions in form of policy, programmes and laws have been taken and executed by successive governments to deal with the problems of employment and poverty. These include the post-independence National Development Plans (NDP), the national rolling plans and the NEEDS (Nigerian Economic Empowerment and Development Strategy) programmes.

A synopsis of the National Development Plans reveals that they have had employment generation as a crucial focus over the years (Obadan, 2004). The first NDP had its main objective and target on the expansion and provision of opportunities for improved health, education and employment for citizens (with special priority given to agriculture and industry as the custodians of great employment potentials) and training of high level intermediate manpower. The second NDP targeted making Nigeria a land with bright and full opportunities for all citizens giving priority to agriculture, transportation, manpower development in issues of resource allocation. The third NDP aimed at a drastic reduction in the level of unemployment and an increase in the supply of high level manpower which also, found expression in the programmes and policies implemented under the fourth NDP.

Also of worthy mention is the SAP intervention as proposed by the Bretton Woods institutions which was adopted in 1986 after which rolling plans were executed via annual budget. In addition, several programmes have been designed for promoting human resource development and utilisation and poverty eradication in Nigeria. They include DFRRI (Directorate of Food Roads and Rural Infrastructure), NDE (National Directorate of Employment), BLP (Better Life for Rural Women Programme), FSP (Family Support Programme) and FEAP (Family Economic Advancement Programme). Amongst others, the NDE was specifically charged with the responsibility for the design and execution of programmes to deal with the mass unemployment problem; articulating policies aimed at developing work programmes with labour-intensive potential; maintaining a data bank on employment and vacancies in the economy. All these

were with a view to providing a link between jobseekers and existing recorded vacancies (Ogwumike, 2002; Iwayemi, 2006; Oni, 2006).

In recent times, efforts have been made towards the prevailing problems of unemployment and poverty with a drive towards poverty alleviation and employment promotions. Poverty eradication programmes have laced recent economic policies. Under such programmes, infrastructural development projects have also been implemented. Under the auspices of the NEEDS (National Economic Empowerment and Development Strategy) for instance, the deregulation of the telecommunications sector was employment-promoting with the down-sizing of the public sector having a counter effect on employment (Adebayo and Ogunrinola, 2006).

Unemployment is seen as a great problem to global economic development. In recent years, both developed and developing countries have witnessed this problem, though, the developed countries have been curtailing the rate of their unemployment. However, in developing countries, especially in Africa, unemployment has been on a continuously accelerating rise in the economy, culminating in reduction of household income and living standards and concomitant rise in the level and incidence of poverty (Kareem, 2006). For instance, the unemployment in Africa was 9.7% as at 2005. This means about 10 in every hundred people fit to be in the labour market are unemployed. Unemployment is one of the developmental problems that face every developing economy in the 21st century. International statistics portray industrial and service workers living in developing regions account for about two-thirds of the unemployed. Citing a World Bank study, Pianta and Vivarelli substantiated that while in the developed world most workers have jobs in the formal sector, the share of workers with wage contracts is only 15% in middle-income developing countries. This is indicative that the rate of open unemployment as observed in most developing countries is a limited indicator of the employment conditions.

Employment generation has been seen as a vehicle for increasing the level of economic activity which ultimately translates to economic growth. The situation of employment in Africa has become critical and labour absorption capacity knotty. Employment has been defined to mean a situation whereby an individual in the labour force bracket willing to work is engaged in a satisfactory economic activity while if otherwise are said to be unemployed. There are many types of unemployment identified in the literature, ranging from frictional, seasonal and cyclical to structural unemployment. ILO (2001) consented to the stance that, the problem of unemployment among youths in Africa and Nigeria is a current and major socio-economic problem.

In Nigeria, the record of registered unemployment is very low owing to the lack of incentives such as unemployment benefits cum job loss benefits (such as is obtainable in developed countries) to prompt individuals to report for job loss. The registration is also, low because individuals have lost confidence in the government's ability to provide the required employment. Consequently, majority of unemployed find employment in the informal sector of the economy where adverse employment conditions rather take the form of increased underemployment, casual employment or informal self employment which are scarcely registered. The data on employment or unemployment are grossly inadequate.

Brief survey of literature on okun relationship: Okun's Law postulates the existence of a specific empirical relationship between economic growth and the change in the rate of unemployment. Several cross-country studies on the convergence of the Okun's Law Coefficient (OLC) have gone underway. The importance of the Okun's Law to public policy was identified by Perman and Tareva (2007) in this statement: "The Okun's Law relationship has important implications for macro policy as the size of the OLC is an important indicator of the degree of interdependence of output and labour movements around their long-run paths and is regarded as a benchmark for policy-makers to measure the cost of higher unemployment".

Employing post war data for 16 OECD countries, Lee (2000) evaluate the robustness of the Okun relationship. Though, the Okun's Law was statistically valid for most of the countries, the quantitative as opposed to qualitative estimates were far from uniform. The estimates were found to be sensitive to the choice of models. The study found mixed evidence of asymmetric behaviour but strong evidence of structural breaks occurring around the 1970s after which time most countries began to experience a smaller output loss associated with higher unemployment.

Adanu (2005), had it that Okun formalized the hitherto observed inverse relationship between unemployment rate and real output growth into a statistical relationship. Employing US GDP data, Okun observed and explicated that for every percentage point that unemployment rate falls (increases) in excess of the natural unemployment rate, real output rises (falls) by approximately 3% per year. Though, the negative relationship between unemployment rate gap and the growth of real output has remained quite stable, the absolute value of the Okun's coefficient seem to vary from country to country. As observed by Kwani estimates of Okun coefficient tend to be sensitive to the model specification and the method of estimation.

Freeman (2000), Okun's Law is identified as one of the most enduring facts in macroeconomics. Employing

new developments in trend/cycle decomposition to test Okun's Law for ten industrial economies, the study found that the original Okun estimate for the United States (i.e., 3 points of real GDP growth for each 1% reduction in unemployment rate) was an average of 2 points of real GDP growth rate for the countries under observation. Further, the study showed that the pooled estimates for Europe were smaller than the estimates for the remaining elements in the sample. In order to ascertain the growth necessary to reduce unemployment or even eradicate it, a stability test of the Okun's Law provides information on whether with an indirect check or external shock result in an unstable unemployment-GDP relationship. In a more recent study Freeman (2007) conducted panel tests of Okun's Law for ten Industrial Countries.

Single country studies on the Okun relationship are replete in the literature. Some single country studies are those of, Gordon and Clark (1984), Knoester (1986), Prachowny (1993), Weber (1995), Moosa (1997, 1999), Attfield and Silverstone (1998), Lee (2000), Soegner and Stiassny (2002). They provide empirical evidences that validate the relationship proposed by the Okun's Law. However, the estimates of the coefficient tend to vary among countries over time.

As regards structural changes that may account for a structural break in the Okun's relationship, Lee (2000) adduced this to corporate restructuring, changes caused by rising female labour force participation; productivity and wage slowdown. The issue of asymmetry in the output-unemployment relationship examined by Okun in 1962 has been a subject of recent considerations. By asymmetry we mean that that the response of unemployment to output growth is different when the economy is expanding from that when the economy is contracting. This is as contrary to the conventional specification which encompasses symmetry in the sense that expansions and contractions in output have the same absolute.

Dornbusch *et al*. (2001) posited that forgone output is the major cost of unemployment and if the loss is very high it could lead to recession. Watts and Mitchell (1991) found long term relationship between unemployment and capacity utilization is not stable. Factors such as increasing labour resource utilization weakened the estimations of Okun's Law. The empirical results of Prachowny (1993) show that changes in output will lead to changes in efficiency of production. It identified other determinants of output as the amount of time worked and exploitation of facility space. Prachowny thus concluded that the Okun's Law is but a partial measure of the relationship and GDP. There are some studies that identified the shortcomings of Okun's Law they include Blinder (1997) and Lee (2000). For instance, Altig, etc., argue that Okun's Law does not generally capture the shape of the time series of output; showing several instances in which the direction of GDP growth is inconsistent with the model's predictions. They conclude that GDP growth depends on the level and rate of change of labour resource utilization. It is pertinent, however to note that the stability of the relationship establishes its usefulness as a forecasting tool. There is a dearth of studies in Africa testing the existence and stability of the Okun relationship, thus making this present study apt.

MATERIALS AND METHODS

Data: We employ time series data on unemployment and gross domestic product on Nigeria (1970-2013) from Publications of the Central Bank of Nigeria and Nigerian Institute of Social and Economic Research, NISER. We estimate the relationship of unemployment rate on the GDP data to examine the relationship of unemployment rate with the growth rate of GDP in Nigeria.

Model and method of analysis

Standard specification of the Okun's Law: In Okun's original study, the estimation is done using the gap method as in Eq. 1 where unemployment is related to deviations of output from potential GDP Noor *et al*. (2007):

$$U = a + b(gap) \tag{1}$$

The equation was further simplified into Eq. 2:

$$\Delta U = a - b\left(\Delta Y / Y\right) \tag{2}$$

Where:

U = The unemployment rate and
Y = Output (GDP)

The second alternative is to use Okun's first difference method as shown in Eq. 3 which will test the relative sensitivity of output to unemployment changes:

$$\left(\Delta Y / Y\right)_t = a - b\Delta U_t + \varepsilon_t \tag{3}$$

$$\log Y_t = a - b\log U_t + \varepsilon_t \tag{4}$$

Method of analysis: For this study, we employ the cointegration technique and identify the Okun's Law coefficient for the Nigerian economy. The analysis begins by testing for the order of integration of series after which a cointegration representation is carried out. We test for the order of integration using the Augmented Dickey Fuller and Phillip Perron tests. Having determined the order of cointegration, we find the cointegrating vector and test the null hypothesis that unemployment rate and real GDP growth rate are not cointegrated.

Table 1: Unit root test

	Levels			1st difference		
Series	ADF	PP	Remark	ADF	PP	Remark
Y	0.044499	-0.069534	NS	-3.590301*	-3.567174*	I(1)
U	-0.153537	-0.153537	NS	-3.987123*	-3.987967*	I(1)
Critical values at 5% level of significance						
	-2.967767	-2.967767		-2.971853	-2.971853	

*Denotes statistical significance at 0.05 level

Table 2: Cointegration test among series

Hypothesized no. of CE (s)	Eigen value	Trace statistics	Critical value (0.05)	Prob**	Max-Eigen statistics	Critical value (0.05)	Prob**
None	0.433486	20.632820*	20.261840	0.0445	15.342860	15.892100	0.0608
At most 1	0.177926	5.289957	9.164546	0.2531	5.289957	9.164546	0.2531

Trace test indicates 1 cointegrating equation while Max Eigen test indicates no cointegrating equation; both at 0.05 level; *denotes rejection of the hypothesis at the 0.05 level; **MacKinnon Haug Michelis p-values

RESULTS AND DISCUSSION

The Augmented Dickey Fuller (ADF) and the Phillip Perron (PP) unit root test were applied to test for the stationarity of the time series. The result is presented in Table 1.

At levels, the result shows that none of the variables is stationary. Hence, both variables were tested at first difference. The result of the first difference as shown in Table 1 shows that both are stationary. Thus, our cointegration test was conducted at first difference.

To find out the existence of a long run relationship between unemployment and gross domestic output and the kind of relationship that exists between them, the Johansen Cointegration test was conducted. The results presented in Table 2-3.

From Table 2, the trace statistics, Max-Eigen value and MacKinnon Haug Michelis p values show that the null hypothesis of no cointegration was rejected in favour of the alternative hypothesis at 0.05 level. The trace statistics indicates one cointegrating equation while the Max-Eigen test indicates no cointegration equation. The trace statistics shows that the null hypothesis of no cointegrating equation was rejected in favour of the alternative hypothesis at 0.05 level. Its value as indicated is greater than the critical value at 0.05 level. Hence, there exists a long run relationship between the variables. Thus, the one cointegrating equation of the trace statistics is presented in Table 3.

From the result, an inverse relationship exists between unemployment and GDP. This confirms the Okun's Law. The Okun coefficient is 1.75% and it is statistically significant at 0.05 level. This postulates that 1% decrease in unemployment rate will increase GDP in Nigeria by 1.75%. The coefficient in Okun's original research was 3% which is greater than the one in this study. This supports the argument that the slope coefficient in the Okun's model is unstable, hence, it varies across economies and periods.

Table 3: Long run normalized cointegration estimates

Y	U	C
Normalized cointegrating coefficients (standard error in parentheses)		
1.000000	1.746112* (-0.480340)	-0.312366* (-0.036280)

*Denote statistical significance at 5%; log likelihood 35.81199

CONCLUSION

From this study, it is discovered that a long run relationship exists between unemployment and GDP and an inverse relationship exists between them in Nigeria. This is a confirmation that the Okun's Law exists in the Nigerian situation. Thus, the Okun's Law can be used to explain the Nigerian situation. This means that every effort to decrease the level of unemployment is an effort towards increasing the level of output in Nigeria. And from the result from this study, a reduction in unemployment by 1% will increase GDP by 1.75%.

As this study has revealed that the Okun's Law exists in the Nigerian situation, Nigeria can therefore be on the right road to development by investing in activities that reduce the level of unemployment. These activities include job creation and entrepreneurial development efforts that are aimed towards employment generation. These are the activities we recommend that policy makers focus on. In addition, education system in Nigeria needs a revolution. Unemployment in Nigeria may be due to the reluctance of employers to employ Nigerian graduates because of their unbelief in the Nigerian education system and their experience.

Dabalen *et al.* (2001), in their study postulated that employers complain that graduates are poorly prepared for work and academic standards have fallen considerably making University degree void of technical competence. From their postulation, the current education system equips Nigerian students will skills set that may not match the needs of employers in the world of work. Addressing this challenge may contribute to the reduction of unemployment which will ultimately increase the level of output.

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