

Unemployment and Economic Growth: Evidence from Low-Income Countries in Sub-Saharan Africa

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Abstract

The paper examines the relationship between total unemployment rate and economic growth rate in low-income countries in Sub-Saharan Africa. Specifically, the paper adopted the use of Panel Least Squares and Ordinary Least Squares techniques to estimate the model based on annual data from 1991 to 2013. The paper found that the average GDP growth rate for low-income countries in SSA within the period of the study was 3.8 % while that of the unemployment rate was 5.9%. The results indicated the existence of negative relationships between unemployment rate with that of economic growth rate in panel data model while in the individual countries cases some countries were found to have positive relationship between the two variables of unemployment and economic growth rates indicating a case of non-inclusive growth. Therefore, the negative coefficients observed revealed the existence of Okun's law in some low-income countries in SSA. The findings, therefore recommends that the challenges of unemployment could resolved on regional and individual basis by initiating effective policy measures to reduce total unemployment rate by the creation of more jobs based on labour intensive industries in low-income countries in SSA, that the ratio of output growth needed to maintain stable level of unemployment rate could be sustained when there are boost in economic activities, Countries that exhibited positive relationship between unemployment rate and economic growth rate should focused more on how to increase the level of economic growth rate through the boost in economic activities.

Key Words: Panel Least Squares, Low-income countries, Total unemployment, Economic growth Non-inclusive growth.

1.0 Introduction

The Sub-Saharan Africa (SSA) population is estimated at 936.1 million people. The SSA population below the age of 15 years grew by 150 percent between 1970 and 2005 and about 170 percent in 2011(United Nations, Population Division, 2011).. Sub-Saharan Africa is made up of all African countries that are partially or fully located South of the Sahara Desert. The SSA consists of forty eight countries. (United Nations, 2011 and World Bank, 2013). Unemployment has been found to be linked with structural changes and subsequent fall in aggregate demand and private investment in both physical and human capital that can lead to the decline in economic growth of a country. Unemployment not only represents a high social cost for a household, it also represents a high economic cost for the general public (Sanchis-i-Marco, 2011). Madito & Khumalo (2014) described the high unemployment rate and slow growth as the two challenges facing every nation regardless of the state of their economic and social development. The rate of unemployment has comparatively been high since the 1980s, as a result of the periods of unsteady economic growth which has been acknowledged as the major driver that had led to an increase in the rate of unemployment especially in SSA countries over the years. The high rate of unemployment has been found to affect the rate of GDP growth rate negatively; hence it also serves as a sign of the country's state of the economy as it determines how well the economy utilizes her human resource as well as other resources in the long-run.

Abel, Bernanke & Croushore (2008) stated that the problem of high unemployment and slow economic growth is not only faced by developing countries but the difference between the developed countries and developing countries is that the developed countries have at some point in their past experienced extended periods of rapid economic growth but the poorer countries have never experienced continuous economic growth due to many factors which are political as well as economic in nature. ILO (2011) reported that the consequences of high and persistent

unemployment rate are increasing social dissatisfaction and the risk of social conflict, which is largely motivated by the long-term inequality that exist among the people in some countries.

In the Sub-Saharan Africa economic growth rates are still not high enough to make true impact in the pervasive unemployment rates that will enable these countries of the Sub-Saharan Africa region to catch up with other developing countries (Nkurunziza and Bates, 2004). According to the World Bank Development Indicators (2014), low-income countries in SSA are: Burundi, Burkina Faso, Chad, Congo Democratic Republic, Gambia, Guinea-Bissau, Guinea, Ethiopia, Liberia, Mali, Malawi, Niger, Sierra-Leone, Tanzania, Uganda, Kenya, Benin, Central African Republic, Mozambique, Togo, Madagascar, Comoros and Zimbabwe. To examine how economic cycle influences unemployment, there is a need to have an understanding of the relationship between unemployment and economic growth as empirically examined by the American economist Arthur Okun in a seminal paper in 1962. He found out that there exist a negative relationship between unemployment and economic growth. This inverse relationship between unemployment and economic growth is identified as the Okun's law. Okun's analysis was on United States data for the period 1947-1957. He postulated that a one percent increase in unemployment would result in more than three percent loss in economic growth. The present economic circumstances of the Sub-Saharan Africa region is marred with high and continual unemployment rate owing to the activities of political leaders as a result of mismanagement of resources and adverse macro-economic policies of various governments, by not channeling human and natural resources into profitable investment that are needed to yield the maximum economic growth. Although the empirical study of Okun's law has indeed blossomed, especially in most studies of the developed countries, little attention has been paid to study whether Okun's type relationship is applicable within low income countries in Sub-Saharan Africa.

These previous studies before now did not capture the impact of the unemployment and economic growth relationship at low income countries in Sub-Saharan Africa based on the World Bank classification of countries into different income groups. Hence, there appears to be a serious knowledge gap that calls for research studies in Sub-Saharan Africa region based on low income countries. This discussion on the statement of the problem and the identified research gap, therefore, raised the objectives, specifically; the objectives of the paper are to examine relationship between unemployment rate and economic growth rate, also to determine the minimum economic growth needed to maintain minimum level of unemployment rate among the low income countries in SSA. According, the paper is organized into the following sections: introductory section, literature review in section two, section three contains the theoretical framework and methodology, while section four presents the empirical results and its analyses. Section five contains the summary, conclusion and recommendations of the paper.

2.0 Literature Review

2.1 Conceptual Issues

The unemployment rate in an economy is the number of people unemployed and is expressed as the percentage of the total labour force. The term unemployment is a stock concept measured at a point in time. Its level rises when inflow that is, the newly unemployed exceed outflows, that is people getting new jobs or quitting the labour force altogether. Unemployment is the difference between the quantity of labour employed at the going wage levels and working conditions at a given period and the quantity of labour not hired at these levels. The International Labour Organization (ILO, 2010) defines unemployed workers as those people who currently do not work but who are willing to work, hence, looking for a job. Gbosi (1993) defined unemployment as a condition in which people who are willing to work at the current wage rate are unable to find jobs in a given economic environment. The International Labour Organization (1985) sees the issue of unemployment as a situation where people without a job and available to start work within the next two weeks and who had either looked for work in the four weeks prior to an interview or who were waiting to start a job. Traditionally unemployment can be identified by types due to it cause. Therefore, economists often classified unemployment into frictional, structural, classical and demand-deficiency (Keynesian). Frictional unemployment occurs from the time it takes an individual to move between jobs; this also results from a normal turnover of labour. People who are unemployed while searching for jobs are referred to be frictionally unemployed. This situation is widespread in the Sub-Saharan Africa region due to low wage rates and the problems associated with the issues of better- working conditions.

The concept of economic growth according to Todaro (1985) is seen as a long -term rise in capacity to supply increasingly diverse economic goods to its population; this growing capacity is based on advancing technology and ideological adjustments that it demands. It is highly believed that economic growth leads a given population of a country to enjoy a better standard of living and improved life expectancy. Therefore, economic growth refers to rising per-capita income and part of this increased income is translated into the consumption of higher quantity and

better quality nutrients. Through nutrition, health is measured by life expectancy responds to increases in income, reduction in unemployment level that will help reduced poverty in the long-run (Fogel, 1997). Another prerequisite of economic growth is that the national output is composed of such goods and services which satisfy the maximum wants of the greatest number of people. For economic growth to be genuine, the increase in output must be sustained over a long period. The short-run increase followed by a similar decrease in output does not mean economic growth (Dwivedi, 2008). The issue of economic growth and unemployment can be traced to the seminal paper of Okun (1962) which suggested that an inverse relationship exists between unemployment and economic growth.

2.2 Okun's Law

The discovery of a strong empirical relationship between output growth (economic growth rate) and changes in the unemployment rate as postulated by Okun's seminal paper of 1962 has become one of the most consistent relationship in macroeconomics (Adachi, 2007). While Blinder (1997), during the 1997 American Economic Association annual meeting, delivered a seminal discussion paper titled "*Is there a core of practical macroeconomics that we all believe.*" Princeton economist Alan Blinder cited Okun's law as one of these core principles, because of its persistent accuracy in prediction and the fact that Okun's law is a practical principle. The subject of the negative relationship between unemployment rate and economic growth rate as postulated and empirically tested by Okun in the early 1960s has evolved from both statistical and empirical relationship that is known as empirical law called Okun's law that predicts a negative relationship between the rate of change in unemployment and the rate of change in output (economic growth).

Arthur Okun was the first economists to have demonstrated and documented the relationship between two macroeconomic variables of the unemployment rate and economic growth rate based on his seminal paper of 1962. This law states that the relationship of growth to unemployment reduction (employment increase) is not one to one. Hence, Okun postulated that a one percent increase in the economic growth rate above the trend rate of growth (or the growth in potential output) would lead only to 3 percent in the reduction of unemployment. Reversing the causality, a one percent increase in unemployment will mean roughly more than three percent loss in economic growth. This relationship indicates that the rate of economic growth must be equal to its potential growth just to keep the unemployment rate constant. To reduce unemployment, therefore, the rate of economic growth must be above the growth rate of potential output. (Khemraj, Madrick and Semmler, 2006). Okun (1962) found that the relationship between unemployment and economic growth was both inverse and proportional. This precisely states that, a three percent increase in economic growth should result in a one percent decrease in the unemployment rate.

2.3 Theoretical Literature

2.3.1 Theoretical Integration between Economic Growth and Unemployment

The debate concerning the theoretical integration between economic growth and unemployment is considered as something possible and even desirable (Arico, 2001). The theoretical perspective of economic growth and unemployment began with the seminal works of Harrod (1939) and Domar (1947), followed by the works of Solow (1956) model. The issue of the long-run unemployment was totally ruled out in the neoclassical growth models which are seen as a basic tool for investigating economic expansion. In order to have extensive explanation and literature on the issues about economic growth and unemployment this could be traced to the studies of Frankel-Romer on the AK approach to endogenous growth and the second model by Romer based on labour augmented where technical knowledge is found to enhance productivity. Endogenous growth and unemployment as used by Pissarides (1993) based on the benchmark of Romer (1986) and the neo-Schumpeterian approach to growth and employment by Aghion and Howitt (1994).

2.3.2 Theoretical and Empirical Perspectives on the Relationship that Exists between Unemployment and Economic Growth

Okun (1962) examined the relationship between these two variables; (1) the difference between the actual level of output and its potential and (2) the difference between unemployment and its natural rate. As a by-product of his study of potential and the natural rate, Okun discovered that there exists a strong empirical relationship between output growth (Economic growth) and changes in the unemployment rate. In his seminar paper of 1962, Okun used data on the quarter to quarter growth rate of the real gross national product (GNP) and quarter to quarter difference in the unemployment rate from 1947 to 1960. According to Okun (1962), he estimated that if real GNP growth were held at zero the unemployment rate would grow at 0.3 percentage points, on average, from one quarter to next. Also, for each one percentage-point increase in real GNP growth, the unemployment rate would decrease by 0.3 percentage points. Reversing the causality, a 1 percent increase in unemployment will mean roughly more than three percent loss in GDP growth.

Smith (1975), Gordon (1984), Prachowny (1993), Weber (1995), Lee (2000), Freeman (2001) re-estimated the Okun's relations based on US data and other countries data such as that of Lee (2000) who did a comprehensive study on Okun's law in terms of the number of countries, model specification, and econometric technique confirmed the negative relationship between unemployment rate and that of the output growth. Kaufman (1988), Lee (2000), and Moosa (1999) examined the Okun's relationship to ascertain the robustness based on a cross-country that is six industrial countries, sixteen organizations of economic cooperative development (OECD) countries and G7 countries. Their studies revealed that there is a significant difference among them. Lee (2000) has shown that the results are sensitive to the choice of first-difference model or the "gap" model. However, Harris and Silverstone (2001) tested the Okun's coefficient in an asymmetric model for seven OECD countries of Germany, Canada, New Zealand, Japan, United Kingdom, United States and Australia. They found that some results only can be obtained with the asymmetric model rather than standard estimation of Okun's Law.

Wu (2003) found Okun's law to be non-linear in China over the period of 1988-1998. The studies of Semmler and Zhang (2005) demonstrated that there appears to be a structural change in the relationship linking growth to unemployment reduction (employment increase) for major countries, including the United States. Grant (2002) and Moosa (1997) examined the sign and the magnitude of Okun's coefficient in different specifications and for different countries. They found that there exists several strategies to decompose output into its trend and cyclical component, and they yielded different quantitative estimates, while the sign of the relationship of interest remains negative. Andrei, Vasile and Adrian (2009) believed that the correlation between real GDP growth and unemployment is essentially for policy makers in order to obtain a sustainable rise on living standards and found that there is a negative relationship between unemployment and economic growth.

Salman (2012) believed that the relationship between real GDP and unemployment is determined by such factors as technological change, laws, labour market politics and transitions, demand, welfare benefits, population change, global competition and privatization, it is believed that the Okun's coefficient changes over time. Some economists have shown that GDP fluctuations have considerable consequences on the unemployment rate in a given economic environment. As opined by Lee (2000), these consequences are expected to be different in industrialized countries and in the United States. However, it now appears that Okun's law might actually be quite a vital instrument in making good comparisons across countries overtime. According to Kreishan (2011) who examined the relationship between unemployment and economic growth in Jordan based on annual data revealed that Okun's law could not be confirmed for Jordan, thus, this suggest that the lack of economic growth does not explain the unemployment problem in Jordan. While Javeid (2005) who used annual time series data for Pakistan ascertained that there exist negative relationship between unemployment and that of economic growth rate variables. Also Stephen (2012) confirmed the existence of an inverse relationship between unemployment and growth in both Britain and France.

Saint-Paul (1993) argued that there is a positive relationship between unemployment and productivity growth. While Davis and Haltiwanger (1992) suggested that there exist some possibility of a positive long-run relationship between growth and unemployment, since they showed that periods of high unemployment tend to be periods of high job-turn-over at the establishment level. Caballero (1993) in his studies revealed that there exist a weak positive relationship between growth and unemployment in the UK and US between 1966 and 1989. High unemployment may have an adverse effect on growth in the presence of a learning-by-doing, reduction of the pool saving available for investment in physical or human capital activities. According to Pissarides (1992) unemployment leads to an erosion of human capital. People unemployed for long periods of time would become de-skilled, as their professional skills becoming old-fashioned in an era of rapid technological changes and as a result a rapidly changing job market

2.1 Review of Empirical and Methodological Literature

Table 2.4.1: Summary of empirical evidence on the relationship between economic growth rate and unemployment rate and the methodology adopted.

S/N	Names of Authors and year of studies	No. of Countries	Period	Dependent variable(s)	Independent variable(s)	Methodology	Okun's Coefficient Obtained
1	Prachowny (1993)	1 (United States)	1975Q1-1988Q4	Output growth gap	Capacity utilization gap, unemployment gap, Labour-supply gap and hours gap	OLS(first difference and production method)	-0.62 and -0.67
2	Weber (1995)	1 (United States)	1948Q1-1988Q4	Unemployment gap and output gap	Output gap and unemployment gap	OLS,ARDL, VAR and rolling OLS	-0.32, -0.22 and -0.26
3	Moosa (1997)	7 (United States, France, Japan, United Kingdom, Canada, Italy and Germany)	1960-1995	Unemployment gap	Lagged unemployment gap and output gap	OLS ,rolling OLS and SUR	-0.49 and -0.09
4	Lee(2000)	16 OECD countries and Germany	1955-1999, 1960-2006	Output gap	Unemployment gap	Panel least squares(PLS) (first difference and HP filter	-0.22
5	Harris & Silverstone(2001)	6 (Canada, Japan, US, Australia, New Zealand and UK)	1978Q1-1998Q3	Unemployment rate	Output rate	ECM(first difference)	-0.09 and -0.5
6	Geldenhuis & Marinkov (2007)	1 (South Africa)	1970-2005	Output gap	Unemployment gap	HP , BN and BP filters	-0.24, -1.09, -0.17 and -0.78
7	Amassoma & Nwosa (2013)	1 (Nigeria)	1986-2010	Productivity growth	Unemployment , labour force, capital, inflation and government expenditure	Co integration and ECM	1.12 and 1.35
8	Akeju & Olanipekun (2014)	1 (Nigeria)	1980-2012	Unemployment gap	Output gap	Co integration and ECM	0.097 and 0.069
9	Adachi (2007)	2 (Japan and US)	1969-2000	Output	unemployment	OLS(first difference)	-6.18 and -1.81
10	Tombolo & Hasegawa (2014)	1 (Brazil)	1980Q1-2013Q3	Unemployment	Output	OLS (first difference)	-0.1878 and -0.2055
11	Kargi (2013)	34 OECD countries	1987-2012	Unemployment	Output	OLS(first difference)	-0.27
S/N	Names of Authors and year of studies	No. of Countries	Period	Dependent variable(s)	Independent variable(s)	Methodology	Okun's Coefficient Obtained

12	Boulton (2010)	10(eastern European countries) Poland, Romania, Slovakia, Slovenia, Bulgaria, Czech Republic, Hungary, Latvia and Lithuania	1991-2008	Real GDP	Unemployment	OLS (first difference)	0.83, -4.2, -3.44, -4.54, 2.71, 0.26, -5.44, 1.87 and -2.74
13	Madito & Khumalo (2014)	1(South Africa)	1967Q1-2013Q4	Economic growth rate	Unemployment rate	VECM(first difference)	-0.618
14	Ho(2002)	1(Macau)	1993-2001	Output	Unemployment	OLS(first difference)	-1.6951
15	Andrei (2009)	1(Romania)	24Q000 Q1-2008	Output gap	Unemployment gap	OLS	-0.493
16	Hutengs & Stadtmann (2012)	Euro zone		Unemployment	GDP	OLS(first difference)	-0.034, -0.91, -0.75 and -0.234
18	Zanin & Marra (2012)	9(Spain, Portugal, The Netherlands, Italy, Ireland, Greece, Finland, Austria and France)	1996-2009	Unemployment	Real GDP growth	OLS and rolling OLS(first difference)	-0.34, -0.14, -0.19,-0.05, -0.31,-0.07, -0.12, -0.32 and-0.10
19	Barreto & Howland (1993)	1(Japan)	1953-1982	Unemployment Output	Output Unemployment	OLS(first difference)	-0.032 -9.46
20	Tatoglu (2011)	19 European countries	1977-2008	Unemployment Output	Output Unemployment	Panel co integration and Panel ECM	0.003, 0.007, -0.087, -0.075
21	Ozel & Sezgin (2013)	7{Industrial countries(G7)}	2000-2011	Unemployment rate	Growth rate and Productivity	Panel least squares, Fixed and Random effects	-0.351, -0.250
22	Khemraji ; Madrick & Semmler (2006)	4(US, France, UK and Germany)	1961-2000	Output	Unemployment	OLS(first difference)	-9.83, -3.12, -4.36, -5.67
23	Elshamy (2013)	1(Egypt)	1970-2010	Output	Unemployment	OLS,ECM(Gap model)	-0.021
24	Salman (2012)	1(Sweden)	1993Q1-2011Q2	GDP growth rate	Total unemployment, Female and male unemployment	OLS(first difference)	-0.076, -0.084, -0.079

Source: Author's Compilation 2017

3.0 Theoretical Framework and Methodology

3.1 Theoretical Framework

The relationship between economic growth and the unemployment rate based on theoretical linkage could be traced to one school of economic thought to another. The classical economist's school of thought believed that the connection between economic growth and unemployment is a one-way linkage that exists between the inputs of

labour to economic growth. According to Kaldor (1967) as cited in Obadan & Odusola (2000) in invoking the Verdoorn's law states that faster growth of output is responsible for a faster growth of productivity. The positive relationship that exists between employment and economic growth was also confirmed by Dernburg & McDougall (1985). Also from the view of the classical economists referring to Cobb-Douglas production function based on the technical links between output and the inputs such as labour and capital. The model indicated that the level of labour force assuming other variable is assumed to be constant help to determine the growth rate of output.

From the Keynesian economists' angle, the issue of output (economic growth) and unemployment is explained in terms of aggregate demand. The Keynesians believed that the demand for labour as a case of derived demand. The Keynesian theoretical linkages for economic growth and unemployment as analyzed by Hussain and Nadol (1997), Thirlwal (1997) and Grill and Zanalda (1995) states that increase in employment, technological change and capital stock are largely endogenous. In a nut-shell, the growth of employment/unemployment is the determinants of long term increase in economic growth influenced by the level of unemployment/employment rate of a country. The theoretical connection of economic growth and unemployment began with the works of Harrod (1936), Domar (1947) and Solow (1956) in their investigation of the issue of the long-run unemployment in influencing the level of economic growth. The extension of the Keynesian model could be found in the studies of Okun (19962).

Theoretically Okun's law establishes the linkages between economic growth rate and unemployment rate, which he ascertained empirically to be negative. Okun's law is seen as a benchmark for determining the economic well-being of a country. The economic implication of the Okun's coefficient is that a 1 % reduction in the unemployment rate would result in 3 % or more increase in the level of economic growth rate of a country. However, Okun's law shows clearly a direct link between economic growth rate and the unemployment rate. Hence, to determine a given level of the unemployment, what level of economic growth should the policymakers/government expect based on the sample periods for a given study. Therefore is the need to use the reverse regression where economic growth as the dependent variable and the unemployment rate as the independent variable (Barreto & Howland, 1993).

3.2 Methodology

3.2.1 Estimation Techniques and Procedures

This sub-section provides an estimation approach that captures the relationship that exists between economic growth rate and unemployment rate as previously demonstrated empirically by Okun in 1962. The paper estimation is based on data from a cross section of low-income countries in Sub-Saharan Africa with respect to the classification of the World Bank Development Indicators (2014) of countries into income groups. In order to examine the relationship between the various forms of unemployment rates and economic growth rate within low-income countries in Sub-Saharan Africa. The paper used annual time series data, the use of annual data observed in the studies of Moosa (1997) and Viren (2001). Hence based on this study, empirical analyses would be done on annual data of twenty-three (23) low-income countries in Sub-Saharan Africa. The timeframe of the paper covers the period of 1991-2013.

3.2.2 Model Specification

The first difference version model of Okun's used the first difference of GDP growth rate and that of unemployment rate. The difference version has purely statistical and simple calculations which can be directly evaluated from the available empirical data. (Hilmer and Hilmer, 2014). Hence, based on the knowledge gained from both theoretical and empirical literature, the adopted the first difference version model of Okun's equation. The interest of the paper is to determine how change in unemployment rate affects economic growth rate in low-income countries in SSA.

According to Barreto and Howland (1993) believed that the direction of the regression, that is economic growth regressed on unemployment or unemployment regressed on economic growth is determined by the researcher research question.

The standard first difference version of Okun's equation is given as follows:

$$U_t - U_{t-1} = \alpha + \beta(Y_t - Y_{t-1}) + e_t \text{----- (1)}$$

This can again be expressed as:

$$U_{i,t} - U_{i,t-1} = \alpha + \beta(Y_{i,t} - Y_{i,t-1}) + e_{i,t} \text{----- (2)}$$

Where $i = 1, 2, 3, 4 \dots m$, countries.
 $t = 1, 2, 3, \dots n$, years.

Where: $U_{i,t}$ = the observed unemployment rate of countries i .

$Y_{i,t}$ = the GDP growth rate (economic growth rate) of low-income countries within the Sub-Saharan Africa.

α = the intercept, which indicates the average economic growth of full-employment output (potential output). β = the Okun's coefficient, which was estimated by Okun to be negative ($\beta < 0$). The term β shows the variation in changes in economic growth rate as a result of a unit change in unemployment rate.

$e_{i,t}$ = error term. The error term is assumed to contain some different information such as factors affecting the dependent variable that are not used as the independent variables, specification errors, and the issues concerning the inherent randomness in human character (Hilmer *et al.*, 2014).

The rate of output growth needed for a stable unemployment rate will be determined based on the formula:

$$\text{Rate of output ratio} = -\left(\frac{\alpha}{-\beta}\right) \dots \dots \dots (3)$$

Equation (3) indicates the ratio of how much the economy of a country must grow to sustain a stable level of unemployment rate.

The value $\frac{\alpha}{\beta}$ is the minimum level of output growth needed to reduce the unemployment rate (Knotek, 2007).

Therefore the various empirical models for this paper are expressed as follows:

$$TUN_{i,t} - TUN_{i,t-1} = \alpha + \beta(GGR_{i,t} - GGR_{i,t-1}) + e_{i,t} \dots \dots \dots (4)$$

Where:

TUN = total unemployment rate, GGR= GDP growth rate; e_t = the error term.
 $\beta < 0$ that is the expected a priori in the above equations 4 is expected to be negative.

4.0 Presentation of Results and Analyses

4.1 Presentation of Summary Statistics

Table 4.1.1: Descriptive Statistics for Low Income Countries in SSA

	GGR	TUN
Mean	3.82	5.90
Standard Deviation	8.14	2.71
Number of Observations	529	529
Number of Countries	23	23

Source: Author's Estimation Result (2017)

Table 4.1.1 shows the summary statistics of variables used in the paper study for low-income countries in SSA based on the World Bank classification of countries into income groups. The descriptive statistics results revealed that on average, the GDP growth rate (GGR) for low income countries stood on average at 3.82, the mean for total unemployment rate (TUN) was 5.90. The result imply on average that the GDP growth rate for low income countries within the Sub-Saharan Africa grow low and within the sample period.

Table 4.1.2: Correlation Matrix for 23 low-Income Countries in SSA (1991-2013)

	GGR	TUN
GGR	1	-0.0251
TUN	-0.0251	1

Source: Author's Correlation Results (2017)

Based on the correlation matrix results presented in Table 4.1.2 above which depicts correlation among the variables. As expected, the various unemployment variables and economic growth rate variable revealed a negative relationship which therefore shows that there exists an inverse connection between unemployment rate and economic growth rate in low-income countries in SSA as expected based on Okun's law (1962). The negative value of the correlation matrix also implies that movements of all the variables tend to be in the same.

4.2 Presentation of Empirical Results

This paper section examines the degree to which the independent variable (economic grate rate) impacted on unemployment rate. Generally, the results will help to depict a significant inverse relationship between two variables based on panel data set from 1991 to 2013. The overall sample comprises 23 low-income countries in

SSA. The calculations of the rate of the output growth rate needed to maintain a stable unemployment were done for all countries within the sample period. E-View 8.0 computer econometric software was employed in running the estimation results.

Table 4.2.1: Panel Least Squares Estimation Results for the overall sample of Low-income countries in SSA. Total unemployment rate (TUN) as the dependent variable and Economic growth rate (GGR) as the independent variable.

Category of Countries	AGGR	ATUN	α	β	t-stat	Prob. Value	R
23 Low-income	3.8	5.9	4.259	-0.075	-0.574	0.566	56.79

Source: Author's Estimation Results (2017)

Note: α =intercept, β =Okun's coefficient, R =rate of output ratio = $-\left(\frac{\alpha}{-\beta}\right)$

***/**/* represents significance at 1%, 5% and 10% level.

The estimation results for the low-income countries in SSA based on the first differenced equation using panel data method of panel least Squares was used to determine the relationship between economic growth rate (GGR) and total unemployment rate (TUN). The above results in Table 4.2.1 indicated that total unemployment rate is negatively related to economic growth rate and the t-statistic value was found to be statistically insignificant. The Okun's coefficient for low-income countries in SSA indicated the negative relationship of the variables used as shown in the above table 4.2.1 Okun's coefficient of -0.075 indicates that a unit decrease in unemployment rate would result in an additional output growth of 0.075 and the needed rate of output growth for stable unemployment within the low-income countries is 56.79. The work of Stephen (2012) also confirmed the existence of an inverse relationship between unemployment and economic growth in both Britain and France. Hence, the estimation results obtained in this study is in agreement with other previous studies based on the application of Okun's law. The lower Okun's coefficient observed for low-income countries is similar to other previous empirical results obtained in regard to panel tests of the relationship between economic growth and unemployment by Huang *et al* (2013), Freeman (2001) and Zanin (2014).

Table 4.2.2: OLS Estimation Results for Low- Income Countries in SSA. Total unemployment rate (TUN) as the dependent variable and Economic growth rate (GGR) as the independent variable.

Countries	ATUN	AGGR	α	β	t-stat	Prob. Value	R
Burundi	7.2	1.2	7.1953	-0.0106	-1.97***	0.000	678.80
Burkina Faso	2.8	5.7	2.9604	-0.0288	-0.93	0.363	102.79
Chad	7.0	6.0	7.03158	-0.0038	-1.95**	0.064	1850.41
Congo D. R	8.2	0.6	8.1924	-0.00169	-1.25	0.224	4847.57
Gambia	7.1	3.4	7.1576	-0.0131	-3.03***	0.006	546.38
Guinea-Bissau	6.9	1.8	6.8894	0.0035	1.16	0.258	1968.4
Guinea	2.0	3.3	1.5605	0.1460	2.90***	0.009	10.69
Ethiopia	6.6	6.4	7.1395	-0.0813	-2.44**	0.024	87.82
Liberia	7.6	8.9	7.6003	0.0009	0.02	0.985	8444.8
Mali	8.4	4.6	8.4467	-0.0035	-0.24	0.817	2413.34
Malawi	7.5	4.1	7.6011	-0.0141	-2.30**	0.032	539.09
Niger	5.1	3.6	5.0662	0.0022	0.92	0.368	2,302.8
Sierra-Leone	3.4	2.6	3.3824	-0.0016	-1.19	0.246	2,114
Tanzania	3.7	5.2	4.6080	-0.1675	-2.04**	0.054	27.51
Uganda	3.1	6.8	3.2037	-0.0089	-0.13	0.895	359.96
Kenya	9.7	3.4	9.9179	-0.0740	-3.86***	0.001	134.03
Benin	1.0	4.3	1.3320	-0.0781	-2.42**	0.025	17.06
Central African Republic	7.0	1.4	7.0242	-0.0142	-9.75***	0.000	494.66
Mozambique	8.5	6.7	8.7432	-0.0335	-2.54***	0.019	260.99
Togo	7.1	2.8	71.1425	-0.0123	-4.79***	0.000	580.69
Madagascar	3.5	2.7	3.5538	-0.0182	-0.51	0.618	195.26
Comoros	6.7	2.2	6.6958	-0.0082	-1.32	0.203	816.56
Zimbabwe	0.5	0.02	5.5039	0.0256	1.54	0.138	-214.99

Source: Author's Estimation Results (2017)

Where: ***/**/* represents significance at 1%, 5% and 10% level.

ATUN= average total unemployment rate

AGGR= average economic growth rate

α = Intercept term

β = Okun's coefficient

$$\text{Rate of output growth (R)} = -\left(\frac{\alpha}{-\beta}\right)$$

The analysis of Table 4.2.2 contains 23 low income countries out of which 18 of the countries OLS results revealed the expected negative relationship between economic growth rate and total unemployment rate indicating the Okun's Law that reflected the inverse relationship between economic growth and total unemployment for 18 countries out of the 23 low income countries and 12 countries individual t-statistic values were found to be statistically significant either at 1%,5% or 10% as reflected in Table 4.2.2 above. It was observed that the Okun's coefficients for some of these low income countries had very low magnitude and the results further indicated that Okun's coefficient varies among countries as a result of the level of the influence of the unemployment rate on economic growth rate. Okun (1962) was interested in the empirical relationship between economic growth rate and unemployment rate, which therefore revealed that a percentage increase (decrease) in unemployment rate result in a three percentage decrease (increase) in the economic growth rate. Hence based on the above with respect to the low income countries it was discovered that Okun's relationship is similar or the same in absolute term.

For example Benin with Okun's coefficient (β) of -2.78 approximately 3.0, Sierra-Leone β of -3.44 and Ethiopia β of -2.72. A comparison of the average economic growth rate (AGGR) variable for low income countries of 3.8 revealed that some countries within the low income group falls below the calculated average, countries such as Burundi had 1.2, Congo D.R 0.6, Gambia 3.4, Guinea-Bissau 1.8, Guinea 3.3, Sierra-Leone 2.6, Niger 3.6, Kenya 3.4, Togo 2.8, Madagascar 2.7, Comoros 2.2, Central African Republic 1.4 and Zimbabwe had 0.02 respectively. The calculation of the rate of output growth rate needed for stable total unemployment rate shows that some countries in the low income group in SSA has to grow at a very higher rate as compared to that of the other countries within the group in order to maintain a stable rate of unemployment. Countries such as Uganda, Mali, Kenya, Mozambique and Tanzania were observed to have very high rate which implies a serious threat to economic, political as well as social interests of these countries due to unemployment situations. While Liberia was observed to be having negative rate of output growth. The only country within the group that was observed to have a low rate is Guinea 0.37 percent.

The issue of the positive relationship regarding empirical sign of the correlation between economic growth rate and total unemployment rate either across countries or across longer periods of time follows the argument of saint-Paul (1993), Davis and Haltiwanger (1992) while Bean and Pissarides (1993) indicated that the bivariate correlation between economic growth rate and unemployment rate can be either positive or negative depending on the economic structure and the magnitude of growth. The work of Aghion and Howitt (1994) agreed that high rates of economic growth are negatively correlated with unemployment and low rates of economic growth are positively correlated with unemployment. The issues of the positive empirical sign were observed in some of the low income countries category such as Guinea-Bissau, Guinea, Niger and Zimbabwe these countries were observed to have low economic growth rate that could be responsible for such factors as poverty, underutilization of natural and mineral as well low human resources development.

5.0 Summary, Conclusions and Recommendations

The results of the paper reflect the empirical behaviour between unemployment rate and economic growth rate in low-income countries in SSA. The data used covered a time frame of 1991 to 2013 period on annual basis and 23 low-income countries within SSA region were used; it was based on balanced panel data series where panel least squares and ordinary least squares techniques were employed to test the empirical estimation. The various statistical as well as empirical results were quite revealing indicating the inverse relationship between economic growth rate and unemployment rate variables, which further indicated the existence of Okun's relationship and applicability within some low-income countries in SSA. The paper study also shows that the Okun's coefficients vary across countries in terms of its coefficient magnitude. Based on the findings of the paper, it therefore recommend, that the governments of these low-income countries should promote more jobs creation especially in intensive labour industries, that the ratio of output growth needed to maintain stable level of unemployment rate could be sustained when there are boost in economic activities that would encouraged investment and employment opportunities, while those countries that were found to have exhibited positive relationship between unemployment rate and economic growth rate should place more emphasis on how to increase the level of economic activities that would attract employment opportunities.

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