The effect of unemployment on economic growth in South Africa (1994-2016)

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ABSTRACT

This study sought to investigate the trends and impact of unemployment on economic growth in South Africa using quarterly data over the period 1994Q1 to 2016Q4. The Auto Regressive Distribution Lag (ARDL) bounds test approach is applied to determine the existence of the long run linkage among the variables. The results from the ARDL model suggest that there is a long run relationship between unemployment and economic growth. The empirical results obtained confirmed that there is a negative relationship between unemployment and economic growth both in the long and short run.

Keywords: Unemployment, Labour Force, Economic Growth, Co-integration, South Africa, Autoregressive Distribution Lag Model (ARDL).

JEL codes: A13; B22; C30; H30

1. INTRODUCTION

To attain high and sustainable output growth with low levels and stable rates of unemployment is the major objective of macroeconomic policies. Kingdon and Knight (2007) highlight some of the economic and social implications of unemployment in a nation's results in the erosion of human capital, social exclusion, protests, increased crime rates and morbidity. Unemployment is a major contributor to widespread poverty and income inequality. Therefore, it is of utmost importance to understand the relationship between unemployment and economic growth to ensure sound policies that will boost economic growth.

The process of transitioning from an autocratic apartheid government to democracy in South Africa led to an era of economic redressing. In order to deal with the inherited economic and social legacies of apartheid which included sky high unemployment rate, income inequalities and exorbitant poverty levels affecting the black majority population. It is now more than two

decades after the first democratic elections, however unemployment levels remain high and it is a major concern. Unemployment levels in South Africa are extremely high which is erratic and problematic. Figure 1.1 shows that unemployment rates were lower in 1994 than in 2016 from the first to the last quarter. The official statistic of unemployment in the last quarter of 2016 (Q4 2016) was 26.5% compared to 20% in the last quarter of 1994 (Q4 1994) according to the (SARB, 2017).

Figure 1.1: Quarterly Comparative analysis of Unemployment Rates in 1994 relative to 2016
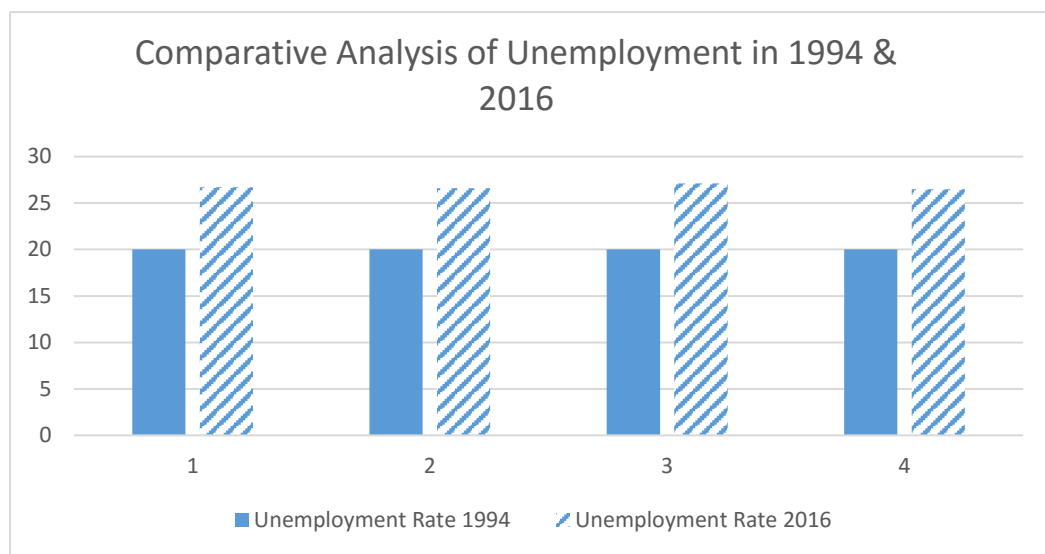
Source: Authors Calculation & Stats SA

Economic growth is viewed as a significant instrument for reducing unemployment, poverty and to help improve the living standards of people. (Banda, 2016) alluded that an increase in the growth rates of GDP is expected to increase employment levels thus reducing unemployment. This is a widely accepted economic theory, which is well documented through the theoretical proposition relating output and unemployment which is known as Okun's law. (Banda, 2016) argues that Okun's Law describes one of the famous empirical relationships of output (GDP) and unemployment in macroeconomic theory and thus has been found to hold for several countries mainly developed countries.

Osinubi (2005) observed that although economic growth is of significant importance in reducing unemployment and poverty alleviation, however it is not sufficient since economic growth alone cannot overcome all the critical factors that contribute to poverty and unemployment. Therefore, there is a need to adopt more policies that help to construct investment programs which in turn will enable job creation, accelerate economic growth, eradicate poverty and unemployment.

The high levels of unemployment in a country signify lack of governance by the monitoring authority of a country. This study therefore serves to investigate the relationship between unemployment and economic growth in South Africa using the autoregressive distributed lag (ARDL) model. The contribution of this study comes at the time when South Africa is facing high levels of unemployment and is in dire need to find policies that will curb unemployment and ensure a sustainable growth.

This paper is organised as follows: review of the literature is discussed in section two, data and methodology are presented in section three. Section four deals with empirical results followed by section five, which concludes and gives policy implications

2. LITERATURE REVIEW

The past decades have seen an extensive theoretical and empirical research on the relationship between unemployment and economic growth, but the issue still remains controversial for the policy makers. The study gives a brief review of the different studies that investigated the relationship between unemployment and economic growth. The pioneer of the relationship between unemployment and economic growth was Arthur Okun. In Okun's (1962) study it was discovered that if GDP grows rapidly, the unemployment rate declines, if growth is very low or negative the unemployment rate rises, and if growth equals potential, the unemployment rate remains unchanged. Most studies followed after to test whether Okun's law is valid.

Pierdzioch et al. (2009) examined the relationship between economic growth and unemployment focussing on the G7 countries covering the period 1989-2007. Their results confirmed the consistency between Okun's law and professional economist's forecasts of changes in unemployment rate and the real output growth rate. They also found a direct relationship between magnitude of unemployment and the size of the output gap. Wang and Abrams (2007) found similar results of a negative relationship between economic growth and unemployment focussing on the 20 OECD countries for the period between 1970 and 1999.

Stephen (2012) explored the relationship between urban unemployment crisis on economic growth of Nigerian economy, incorporating inflation rate and investment as intermittent variables. Estimates showed that there exists a negative relationship between urban unemployment and economic growth. Another Nigerian study was carried by Ahmed et al. (2011) to explore the relationship among unemployment and growth (GDP) for the period from 2000 to 2008. Their findings purported that unemployment effect is 65.5 percent on the Nigerian GDP growth and there exist a negative relationship between unemployment and

economic growth. The study that found contracting results for Nigeria was by Bankole and Fatai (2013). In estimating the Okun's coefficient, and checking the validity of Okun's law in Nigeria, during the period 1980-2008, they established a positive coefficient in the Regression, implying that Okun's law interpretation is not applicable to Nigeria.

Irfan Lal et al. (2010) served to test the validity of Okun's law in some Asian countries. The study used the time series annual data during the period 1980-2006. Engle Granger (1987) cointegration technique established a long run association between the variables. Chang-Shuai Li and ZIJuan Liu (2012) conducted a study on the relationship between Chinese unemployment rate, economic growth and inflation. They employed VAR and VEC model to estimate the causality and co-integration among the variables, respectively. The study revealed that unemployment impact negatively on growth while inflation affects growth positively in China.

Omoke and Ugwuanyi (2010) examined the relationship between money, inflation and output in Nigeria. In employing co-integration and Granger-causality test analysis, their findings revealed no existence of a co-integrating relationship among the variables. Another Nigerian study was conducted by Rafindadi (2012) to detemine the relationship between output and unemployment dynamics. In employing OLS and Threshold model, the study found a negative nonlinear relationship between output and unemployment. Shahid's (2014) study examined the effect of inflation and unemployment on economic growth in Pakistan and found that there is an inverse relationship between economic growth and unemployment.

Banda (2016) investigated the relationship between unemployment and economic in South Africa for the period between 1994 and 2012. The findings from Johansen cointegration revealed that there is a long run relationship among the variables. The result further showed that there is a positive relationship between GDP and unemployment in South Africa. Biyase and Bonga-Bonga's (2010) study applied OLS and established that the relationship between growth and employment are 'paradoxical' which means that the South African unemployment rate is ascribed to an output performance which is not sufficiently job-generating, instead there is a surge in labour force participation rates.

3. METHODOLOGY

The study makes use of time series data collected between the period 1994 to 2016 in South Africa. The data consists of the unemployment rate and economic growth rate of South Africa for the period 1994 to 2016 on a quarterly basis. The Source of data for this study were mainly The South African Reserve Bank, The Federal Reserve economic database and World Bank database. This study thus captured economic growth as Real GDP and unemployment as the rate of unemployed labour force in relation to the labour force of the country. The dominating form of unemployment in South Africa is structural and technological of whereby advancements in technology tends to increase output, which will result in an increase in unemployment. The study will thus consider two variables: Unemployment and Economic Growth (GDP).

This study has adopted the Okun's (1962) type model and modified it to incorporate unemployment as the independent variable while economic growth proxied by the real GDP as the dependent variable. The Okun's Law is the reduced version of the Philips curve assuming an inverse relationship between the rate of growth of GDP and unemployment rate. The model is specified as:

$$Rgdp = f\ (Unempl \dots \dots) \tag{1}$$

Therefore, $\quad Rgdp = \beta_1 + \beta_2 Unempl + \mu \tag{2}$

Where, $Rgdp$ is the rate of GDP Growth (Economic Growth)

$\quad Unempl$ is the unemployment Rate

$\quad \beta_1, \beta_2$ are the parameters

$\quad \mu$ is the error term (white noise)

The *a priori* expectations are as follows:

$$\beta_1 < 0\ and\ \beta_2 > 0\quad (ie.\beta_1\ \beta_2\ are\ negative\ values)$$

To estimate equation 1, the stability properties of the variables employed were first investigated. The two unit root tests that used in the study include Augmented Dickey-Fuller (ADF) and the Philips-Perron (PP) test. The reason these tests where selected is informed by

the imperatives of comparison and consistency. According to Hamilton (1994), the PP unit root test is generally considered to have a greater reliability than the ADF because it is robust in the presence of serial correlation and heteroscedasticity, though it has its own shortcomings.

The study will also make use of a new technique of estimation which is the bounds testing approach to test for cointegration, within an autoregressive distributive lag (ARDL) framework proposed by Pesaran and others (Pesaran 1997, Pesaran and Shin 1999 and Pesaran 2001). The main reason to use the ARDL in this study is due to the fact that the order of integration is no longer a sensitive issue and thus can be applied regardless of whether the regressors are I(0) or I(1) as normally the nature of national income is non stationary. In addition, the bounds tests shows good small sample properties in comparison to standard cointegration analysis without the pre-conditions of stationarity.

This involves examining the existence of a long-run relationship using the following unrestricted error-correction model (UECM):

$$\Delta LY_t = \alpha_1 + \alpha_T T + \alpha_Y LY_{t-1} + \alpha_{Unempl}LUnempl_{t-1} + \sum_{i=1}^{P} \alpha_i \Delta LY_{t-i} +$$
$$+ \sum_{j=0}^{q} \alpha_j \Delta UN_{t-j} + \varepsilon_{1t} \qquad (3)$$

ARDL approach commence by specifying and estimating a general distributed lag model in order to justify retention of lagged level variables in Equation 3, which implies co-integration among the variables exists.

Pesaran et al. (2001) proposed applying the familiar F-test with new critical values that they tabulate, followed by a joint significance test, where the null and alternative hypotheses are as below:

$$\boldsymbol{H_0}: Y = Y_2 = 0$$

$$\boldsymbol{H_a}: Y_1 \neq Y_2 \neq 0$$

Two asymptotic critical value bounds provide a test for cointegration when the independent variables are $\boldsymbol{I(d)}$ with $\boldsymbol{0 \leq d \leq 1}$. The lower bound assumes that all the repressors are $\boldsymbol{I(0)}$, and the upper bound assumes that they are $\boldsymbol{I(1)}$. If the computed F-statistics is less than lower bound critical value, it does not reject null hypothesis of no cointegration.

However, if the computed F-statistics is greater than upper bound critical value, then it rejects null hypothesis, which means that there are steady state equilibrium between the variables in the model. To determine the reliability of the ARDL result, the study checks for serial correlation, functional form, normality and heteroskedasticity of the ARDL model. In addition, the stability of the parameters will be tested using the Cumulative Sum of Recursive Residual (CUSUM) and the Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ)

4. FINDINGS OF THE STUDY

The null hypothesis for the test (in ADF and PP) suggest that the data series under consideration has unit root and is tested against the alternative hypothesis that the series has no unit root (that is it is stationary). As can be realised in Table 4.1, the ADF and PP tests revealed that GDP and Unempl are non-stationary at levels. This is because we fail to reject the null hypothesis of unit root at 1% and 5% level of significance. On the other hand, when the first difference of GDP and Unempl is considered, the variables become stationary.

4.1 Unit root tests

	Levels		First difference	
Variable	**ADF**	**PP**	**ADF**	**PP**
GDP	-5.4353	-5.4191	-12.7417***	-19.1277***
Uempl	-2.6429	-2.4946	-10.4917***	-11.0497***
Values marked with a *** represent stationary variables at 1% significance level, and ** represent stationary at 5% and * represent stationary variables at 10%.				

Source: Author's own calculation

4.2 Bounds test to Co-integration

Since unit root tests have been applied, the next step is to employ the ARDL approach, developed by Pesaran et al. (2001) to determine the existence of a long run relationship between economic growth and unemployment. The results of the ARDL cointegration test are illustrated in Table 4.2

Table 4.2. ARDL bounds test results

Test Statistic	Value	k
F-statistic	8.914061	1
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	4.58

Source: Author's own calculation

The results obtained from ARDL bounds test and the estimated F-test indicate the presence of long run relationship amongst variables. The decision rule is based on the F-statistics (**8.914061**) that is above the upper bound critical value of **4.58**, at 1% level of significance. As such we reject the null hypothesis of no co-integration. The results of the bounds test are consistent with those that were found by Nemushungwa, Gyekye and Ocran (2015).

4.3 Estimation Results of Long-run and Short-run Elasticities

The results obtained in table 4.2 confirmed that co-integration between the variables exist, we then move to the second phase to determine the long run relationship. The ARDL co-integration test was performed, and the result obtained a tabulated in Table 4.3. The results obtained confirm the a negative relationship amongst the variables of interest. Specifically, it was

revealed that a unit increase in unemployment will result in a decrease of **0.011%** in Economic growth. In other words a higher unemployment level triggers a negative growth in the economy.

Table 4.3: Long run co-integration results

Variable	Coefficient	Standard error	t-statistic	Prob
Constant	0.603652	0.492045	1.226822	0.2232
LOG_GDP	-0.465595	0.090052	-5.170283	0.0000
LOG_Unempl	-0.011471	0.019967	-0.574491	0.0071

Source: Author's own calculation

After estimating the long run coefficients, the next step is to estimate the short run dynamic growth model. The results for the short run are illustrated in Table 4.4. It is shown that ECM_{t-1} (-0.4656) is negative and significant, which affirms the existence of the long run relationship between economic growth and unemployment. This coefficient indicates that a deviation from the long run equilibrium level of output in one quarter is corrected by 47 percent over the following quarter. Based on the results shown in Table 4.4, the short run dynamics of growth equation can be moulded as follows:

$$LGDP_t = -0.004 Uempl_t$$

The elasticity of output with respect to unemployment is negative and significant at 1 percent level of significance. This implies that unemployment hinders economic growth in the short run. These results are in line with Oken's law and are consistent to the findings by Pierdzioch et al (2009) and Stephen (2012).

Table 4.4 Short run analysis

| Variable	Coefficient	Std. Error	T-Statistic
GDP(-1)	0.534405***	0.090052	5.934390
UNEMPL	-0.0011471**	0.019967	-0.574491
C	0.603652	0.492045	1.226.822
CointE(-1)***	-0.465595	0.089029	-5.229719
Where *,** and *** represent significance at 10%, 5% and 1%, respectively			

4.4 Short-run diagnostics

The results for the short-run diagnostics tests are shown in Table 6. The results posit that the error terms of the short run models have no serial correlation, they are free of heteroskedasticity and are normally distributed.

Table 4.6: Short-run diagnostics

TEST	NULL Hypothesis	TEST Statistic	P value
Ramsey Reset	No Evidence of Misspecification	0.482373	0.4892
White's Test	No Heteroscedasticity	0.562487	0.7284
Jargue- Bera Test	There is Normal Distribution	0.365454	0.9254

Both Figure 4.1 and 4.2 below show that the cumulative sum and cumulative sum of square residuals lie within the 5% critical line of significance. This implies that there is stability in the model.

4.1 CUSUM test
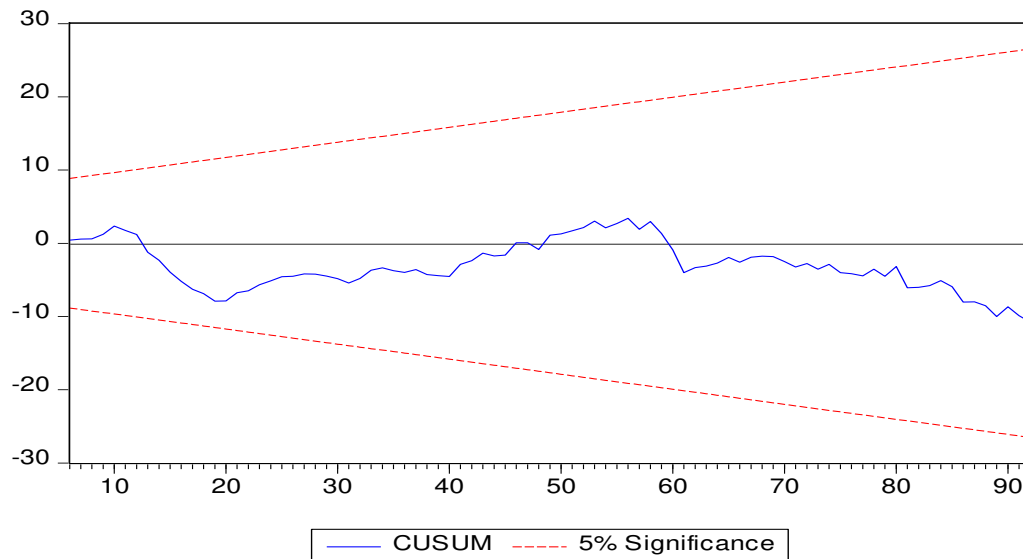
4.2 CUSUM squared Test
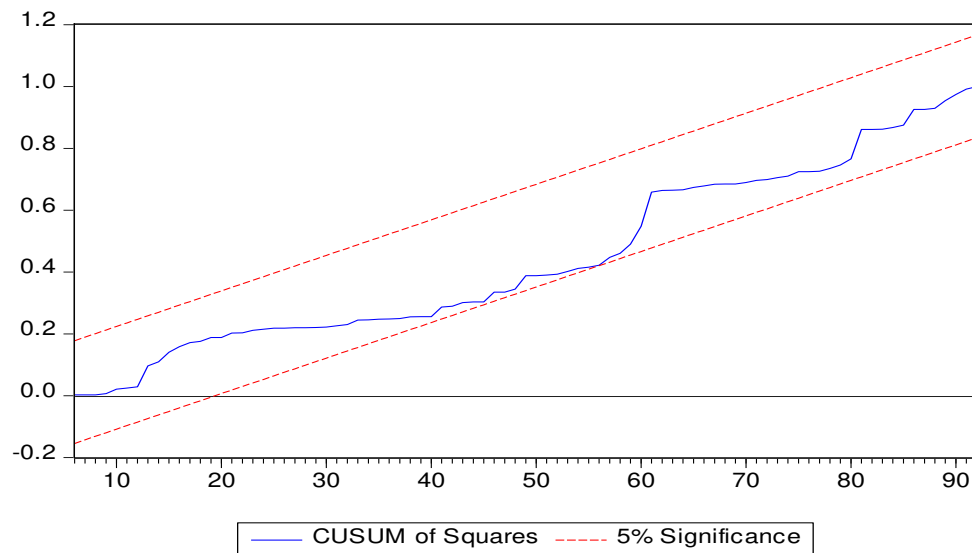
5. CONCLUSION

The main objective of the study was to investigate the impact of unemployment on economic growth, using data for the period 1994:Q1-2016:Q4, in South Africa. The study discussed the Okun's law theories and it considered the Okun's difference type model as the relevant theory in explaining the long run impact of unemployment on economic growth. In doing so, the study applied the autoregressive distributed lag (ARDL) bounds testing approach to determine co-integration among the variables. The results from the ARDL bounds testing approach reveal that there is a long run relationship between economic growth and unemployment in South Africa.

Furthermore, the results demonstrated that in the long run, unemployment rate increases economic growth by **-0.011%** which satisfy the negative inverse relationship as assumed by Okun (1962). It was evidenced that in the Short run a unit increase in economic growth causes a decrease of **0.004%** in unemployment rate which is an inverse relationship. As empirically evidenced, from previous studies that economic growth is influenced by unemployment, it can be deduced that Okun's law holds.

The empirical results of this study provide the policy makers with a better understanding of unemployment and economic growth linkage to formulate investment policies in South Africa. The government should come up with effective macro-economic policies and ensure improvements in the structure and functioning systems of governance for stabilising economic growth along with job creation. The government thus needs to create a conducive environment and flexible labour market policies or legislations that entice many private sector and small businesses which will in turn consolidate the existing entrepreneurship activity with new entrepreneurial entrants so as to create more employment and absorb a large pool of unemployed population.

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