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The impact of economic growth on unemployment in South Africa: 1994-2012

Abstract

One of the most pressing problems facing the South African economy is unemployment, which has been erratic over the past few years. This paper analyzed the impact of economic growth on unemployment, using quarterly South African time series data from 1994-2012. The results of Johansen cointegration reflected that a long run equilibrium or relationship exists among the variables. In ascertaining the effects of macroeconomic variables thus REER, LP, GDP and BUG on unemployment in South Africa, the study utilized vector error correction model (VECM). The results of VECM indicated that GDP, BUG and REER have positive long run impact on unemployment whilst LP negatively impact unemployment. The study resulted in the following policy recommendation: South African government should redirect its spending towards activities that directly and indirectly promote creation of employment and decent jobs, a conducive environment and flexible labor market policies or legislations without impediments to employment creation should be created, and lastly government should prioritize industries that promote labor intensive. All this will help in absorbing large pools of the unemployed population thereby reducing unemployment in South Africa.

Keywords: unemployment, economic growth, vector error correction, South Africa.
JEL Classification: J64.

Introduction

South Africa is one of the African countries that is endowed with a lot of resources, both human and minerals. However, due to activities such as increase in corruption, gross mismanagement and adverse policies of various governments, these resources have not been optimally utilized. For instance, Faul (2013) points out the controversial scenario of the misuse of taxpayer's money and government funds worth almost 250 million rands on the upgrade of President Zuma's private house in his home village. Osinubi (2005) adds that resources should be fully utilized and channelled to profitable investments so as to bring about maximum economic benefits. As a result of not fully utilising and channelling resources in the right direction then a nation will end up having continual problems of unemployment and poverty (Osinubi, 2005). This is true of South Africa which is facing the greatest challenge of chronic unemployment which has maintained a rising trend over the past years (Berkowitz, 2011). Unemployment is undesirable and it significantly contributes to widespread of poverty and income inequality in South Africa. Furthermore, unemployment and poverty have led to tremendous increases in crime rates, morbidity and unrests, just mentioning few.

The issue of unemployment in South Africa is well pronounced as evidenced by many schools leavers and even graduates who cannot find jobs and many engage in jobs in which their potentials are not fully utilized. Isobel (2006) highlights that the chronic nature of unemployment in South Africa is reflected by the fact that many unemployed people have never worked before. In addition, many people who are unemployed and still actively looking for work have been looking for employment in excess of 3 years. The total labor force or economically active population in South Africa is comprized of all individuals of working age (between 15-64 years) who are either employed or unemployed. The youths consist of the large fraction of the unemployed population in South Africa. According to Lings (2012), the released first quarter for 2012 of Labor Force survey (FLS) by Stats SA reflects that there were 32.786 million people aged between 15 and 64 years in South Africa (up by 116 000 relative to Q4 2011 and up by 472 000 year on year). The number of economically active people was 17.948 million for comparison purposes with 2011 reflecting an increase by 207 000 relative to Q4 2011 and up by 466 000 on year to year. From this group, 13.497 million were employed, reflecting a decrease of 75 000 of employed people relative to Q4 2011 and up by 304 000 year on year. On the hand 4.526 million were unemployed, reflecting an increase of 282 000 relative to Q4 2011 and up by 162 000 year on year (Lings, 2012).

In order for someone to comprehend the term unemployment, there is a need to look at different types of unemployment namely: seasonal, structural, frictional and cyclical. Put differently, unemployment is mainly defined according to its causes. The main type of unemployment experienced in South Africa is structural unemployment. Structural unemployment occurs when there is a change in the structure of an

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industry or the economic activities of the country (Njoku and Ihugba, 2011). Some of the factors that contribute to increased unemployment rates are rapid changes in technology, inflation, recession and changes in taste, among others. Smit, Mostert and Oosthuizen (2006) note that the South Africa economy experienced rapid technological advancements which led to most industries to be more capital intensive, resulting in structural unemployment as human labor is no longer required. In addition, structural unemployment is associated with the mismatch between the skills of the workers and the skills requirements of available jobs.

As stated above, another type of unemployment is seasonal unemployment. Njoku et al. (2011) explains that seasonal unemployment is due to seasonal variations in the activities of particular industries caused by climate changes, changes in taste or by the inherent nature of such industries. For instance in agriculture sector in South Africa, farm workers in vineyards in the Western Cape are classified as seasonal workers. They tend to be on high demand during the harvesting period and are unemployed during off period season. Frictional unemployment however exists when there is unsatisfied demand for labor, because unemployed workers may be unable to fill the unsatisfied demand either because they do not possess the necessary skills or workers are not aware of the existence of jobs in question. This type of unemployment is very common in South Africa, mostly amongst unemployed unskilled laborers as they move from one place to another because there is lack of communication facilities such as telephones, internet and employment stations (Mafiri, 2002). Cyclical unemployment is also known as Keynesian unemployment and it is due to deficiency of aggregate effective demand. During the times of recession, business activities are low, most people lose their jobs and the economy faces higher levels of unemployment. Mafiri (2002) elucidates that in South Africa, cyclical unemployment has a dimension that makes it uneasy to address successfully: it is superimposed on large scale structural unemployment. As a result, the unemployment problem becomes severe, complex and difficult to alleviate.

The problems that were inherited from apartheid to a greater extent had and continue to have an influence on the nature of development in South Africa in terms of post-apartheid policies to subdue problems such as of unemployment, poverty and income inequality. The advent of democracy in 1994 created hope for better living standards and other expectations among previously disadvantaged population. Chikulo (2003) states that in an effort to reduce not only socio-economic imbalances in South Africa but also to meet these high expectations among the majority of the black population. The new government pledged rapid socio-economic development by prioritizing reduction in unemployment, poverty alleviation and income inequality in its development strategy agenda. In the early years of a democratically elected government entering into power, the issue of unemployment, poverty and income inequality needed immediate attention. The South African government thus introduced various development polices and strategies namely: (1) Redistribution Development Program (RDP), (2) Growth Employment and Redistribution Policy (GEAR), (3) Accelerated and Shared Growth Initiative of South Africa (ASGISA), and (4) Joint Initiative for Priority Skills Acquisition (JIPSA). These policies were introduced to combat challenges of chronic unemployment, poverty and income inequality.

Theoretically, economic growth is viewed as the most prominent instrument for reducing unemployment, poverty and to help improve the living standards of people. Kreishan (2011) states that an increase in the growth rate of GDP of an economy is expected to increase employment levels thus reducing unemployment. This is a widely accepted view in economics theory, hence the theoretical proposition relating output and unemployment is known as Okun's Law. Okun's law describes one of the famous empirical relationships of output and unemployment in macroeconomics theory and has been found to hold for several countries mainly in developed countries (Lee, 2000; Fariso & Quade, 2003; Daniels & Ejara, 2009). Osinubi (2005) observed that although economic growth is necessary for trimming down unemployment and poverty alleviation. However, it is not sufficient since economic growth alone cannot overcome all the crucial factors that contribute to poverty and unemployment. Therefore, there is a need to adopt more policies that help to construct investment programs which enable job creation, thus, spurring economic growth and eradicating of poverty.

1. Statement of the problem

The transition from apartheid to democracy in South Africa led to the era of economic redressing, in order to deal with inherited economic and social legacies of apartheid which includes high unemployment, income inequality and poverty level. Soon after the first elections of 1994, a crisis of expectations was created among the majority of previously disadvantaged South African citizens and they became optimistic that the new government might be

able to subdue the levels of unemployment, income inequality and poverty (Chikulo, 2003). Now, it is more than a decade after the first democratic elections of 1994, unemployment levels still remain high, and a major concern in South Africa. One of the most pressing problems facing South African economy is unemployment which has been erratic over the past few years, and official statistics of unemployment are currently at 24.5% according to Quantec (2015). Without doubt high unemployment is reality within the South African economy and most of unemployed group consist of the black population. Kingdon and Knight (2007) highlight some of the economic and social implications of unemployment in any nation and they state that it results in erosion of human capital, social exclusion, unrests, increases in crime rates and morbidity. Unemployment also contributes to widespread poverty and increases income inequality, thus, widening the gap or difference between the haves and the have-nots in a country. The South African government is therefore in a continual battle against unemployment and it is looking for policies that promote employment. By engaging in those policies that creates conducive environment for employment, the unemployment problem in the country will be alleviated.

Most developing and under-developing countries experience persistent problems of job shortage and unemployment. Over the past years the rate of job creation in South Africa has not matched the growth in the labor force. When a country is experiencing declines in employment creation associated with rising or positive economic growth this phenomenon is called "jobless growth." Biyase and Bonga-Bonga (2010) allege that there were hot debates and many concerns raised by policymakers and economists suggested that South Africa experienced "jobless growth." This reflects on the inability of the domestic economy to create jobs. Hence the influence of economic growth in South Africa requires to be investigated.

Research objectives

The main objective of the study is to investigate the impact of economic growth on unemployment in South Africa. This broad objective is explored through the following sub-objectives:

- To review the trends of economic growth and unemployment in South Africa since 1994.
- To examine the relationship between economic growth and unemployment in South Africa.
- To make policy recommendations to foster growth and reduce unemployment levels in South Africa.

Research hypothesis

The study hypothesised that:

- H_0: Economic growth does not have a significant negative impact on unemployment in South Africa.
- H_1: Economic growth has a significant negative impact on unemployment in South Africa.

2. Review of the related literature

Plethora of literature on the issue of unemployment and economic growthis available. This study is underpinned by several unemployment theories (Classical and Keynesian) and economic growth theories (Neoclassical and Endogenous). Classical theory postulated that any unemployment that exists in the economy would be short lived and the operation of the free market forces automatically restores full employment in the economy. The Keynesian theory of unemployment hypothesized that unemployment arises due to insufficient aggregate demand (Keynes, 1936). Keynes, therefore, recommended that the government should use appropriate policies such as expansionary monetary or fiscal policy as the remedy to eliminate or subdue the problem of unemployment or involuntary unemployment in the economy.

Neoclassical growth theory (Solow-Swan model) depicts that steady state growth rate is determined exogenously via technological progress. Based on Solow-Swan model, Aghion and Howiit (1997) argued that if there is no technological progress then the effects of diminishing returns to capital accumulation would eventually cause economic growth to cease. Trpkova and Tashevska (2011) observed thatendogenous growth models emphasised on the importance of human capital and innovation capacity in contributing to growth in the economy. Hence endogenous growth economists firmly believe that steady growth was generated endogenously.

Several studies have been carried out to examine the relationship between economic growth and unemployment. However, different results were obtained due to the econometric techniques, countries researched, data and period of the study used. Walterskirchen (1999), Swane and Vistrand (2006) and Yerdelen Tatoglu (2011) are among the empirical studies that examined economic growth and unemployment in developed countries. Some of researches on unemployment and economic growth in developing countries include Hussain, Siddiqi and Iqbal (2010), Aktar and Ozturk (2009), Sodipe and Ogunrinola (2011). Biyase and Bonga-Bonga (2010), Mahadea (2003), Burger and Von Fintel (2009), Kingdon and Knight (2007) are among the researchers that examined the effects of economic growth on unemployment and its relationships in South Africa.

3. Research methodology

For the purpose of estimating the impact of economic growth on unemployment in South Africa, this study uses a vector autoregression (VAR) model. The data is firstly tested for stationarity using the Augmented-Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. In order to test for cointegration, the Johansen (1991, 1995) cointegration technique is used and a vector error correction model (VECM) is utilized to estimate the long-run equation and the existence of error correction. Diagnostic checks were conducted to test the stochastic properties of the model and these include test for heteroskedacity (White test), normality (Jarque-Bera), and serial correlation (Lagrange Multiplier). In showing how unemployment reacts to shocks of any of the macroeconomics variables used in the VAR equation, the impulse response analysis and variance decomposition are performed. The proportions of forecast error variances of the variables accounted for by innovations in other variables are shown.

3.1. Model specification. The study modifies the model adopted by Aktar and Ozturk (2009) of unemployment as a function of inter alia economic growth and foreign direct investment in Turkey. The model specified that:

$$UR_t = f(GDP_t, EXP_t, FDI_t), \quad (1)$$

where t is time trend, UR_t, GDP_t, EXP_t, FDI_t are unemployment rate, gross domestic product, exports and foreign direct investment respectively.

In modifying the model in equation 1, this study adds three variables which are government deficit, labor productivity and real effective exchange rate. equation 2 below is modelled with variables adjusted to suit this study, where unemployment is modelled as a function of gross domestic product, budget deficit, real effective exchange rate and labor productivity. The empirical model of the study, therefore, is specified as follows:

$$UR_t = \beta_0 + \beta_1 GDP_t + \beta_2 REER_t + \beta_3 BUG_t + \beta_4 LP_t + \varepsilon. \quad (2)$$

All the variables used in this study are converted to natural logarithms so as to minimize the impact of outliers and to obtain elasticity coefficients of these variables. Therefore, the model to be estimated is as follows:

$$InUR_t = \beta_0 + \beta_1 InGDP_t + \beta_2 InREER_t + \\ + \beta_3 InBUG_t + \beta_4 InLP_t + \varepsilon_t, \quad (3)$$

where InUR_t is the natural logarithm of unemployment in South Africa (strict definition of unemployment rate); InGDP_t is the natural logarithm of gross domestic product and is used as a proxy for economic growth; In$REER_t$ is the natural logarithm of real effective exchange rate, measured in foreign currency terms; InBUG_t is the natural logarithm of budget deficit; InLP_t is the natural logarithm of labor productivity; β_0 = Intercept term, β_1, β_2, β_3 and β_4 are the parameter estimates or coefficients of explanatory variables and ε is the error term.

3.2. Data sources. This study employed South African quarterly time series data of real GDP, unemployment, real effective exchange rate, government deficit and labor productivity for estimation of regression that covers a period from 1994 to 2012. The data utilized in this study were secondarily sourced from the electronic database of the South Africa Reserve Bank (SARB), Statistics South Africa (Stats SA) and Quantec. The period covered by this study helps to provide clear insight into the trends of post-apartheid era. That is when many economic development strategies and polices implemented by the government to subdue the level of unemployment plus other apartheid legacy.

3.3. Estimation techniques. *3.3.1. Testing for stationary or unit root test.* To test for the presence of unit roots in the series, the study used the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP). Gujarati (2004) stresses that regressing of a non-stationary time series on one or more non-stationary time series may produce a spurious regression problem. Hence when dealing with time series data it is vital to test for stationarity of time series data in order to avoid spurious regression. Another reason for running stationarity tests is that results obtained with non-stationary time series can only be used for that particular time period and cannot be generalized to future periods. Therefore, for forecasting purpose such non-stationarity time series may be of little practical value (Gujarati, 2004).

4. Results and discussion

4.1. Unit root test results. Augmented Dickey-Fuller and Phillips Peron unit tests results are presented in Table 1. The results show that most variables failed to pass both the ADF and P-P tests when they are in level expect the *REER* and *BUG*. Failure to reject the null hypothesis (failing to pass units tests) implies that the variables are non-stationary at level and this requires first or higher order differencing in order to make them stationary. The other variables: *GDP*, *LP* and *UN* only became stationary after the first differencing. This reflected that null hypothesis was rejected in favor of alternative hypothesis and making the series to be stationary. Therefore, all the variables used are integrated in the same order $I(1)$.

Table 1. Unit root tests results

		Augmented Dickey-Fuller (ADF)		Phillips Peron (P-P)	
Order of integration	Variable	Intercept	Trend and intercept	Intercept	Trend and intercept
Level 1st differenced	*LUN*	-2.428105	-2.163671	-2.387832	-2.002433
	DUN	-8.600376***	-8.787136***	-10.51225***	-11.32200***
	LGDP	-0.767991	-2.322597	-0.588012	-5.134607***
	DGDP	-2.859157*	-2.827792	-18.97381***	
	LREER	-2.767420*	-3.715454**	-2.758381*	-2.709520
	DREER	-9.452219	-9.389639***	-9.454330	-9.391353***
	LLP	-0.718396	-4.318353*	-0.698362	-3.403712*
	DLP	-6.868514***		-6.917136***	-6.876002***
	LBUG	-1.863169	-1.576961	-6.247430***	-6.227271***
	DBUG	-3.215054**	-3.446540*		
1%	Critical value	-3.520307	-4.094550	-3.520307	-4.085092
5%		-2.900670	-3.475305	-2.900670	-3.470851
10%		-2.587691	-3.165046	-2.587691	-3.162458

Notes: ***represent stationary variables at 1% significance level, ** represent stationary at 5% and * represent stationary variables at 10%.

4.2. Cointegration tests results. After establishing that variables are stationary, the next procedure is to perform cointegration tests so as to determine whether there exists long run relationship amongst the variables. The purpose of performing cointegration in this study is to examine the long-run equilibrium or relationship between unemployment and the explanatory variables (*GDP*, *REER*, *LP* and *BUG*) and this can also help in attaining feasible economic conclusions based on the outcomes or results obtained. For testing for cointegration, this study employed the Johansen's (1991, 1995) maximum likelihood method. Before establishing the long- and short-run coefficients, the Johansen technique utilized in this study also requires an indication of lag of the lag order and the deterministic trend assumption of the *VAR*. In order to select the lag order for the *VAR*, this study applied the information criterion approach as a direction to choose the lag order. Table 2 below shows the lag lengths chosen by different information criterion.

Table 2. Lag selection criterion

Lag	Log*L*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	-776.5719	NA	3433.208	22.33063	22.49123	22.39442
1	-493.8867	516.9102	2.183465	14.96819	15.93183	15.35096
2	-461.3659	54.82071	1.780788	14.75331	16.51999	15.45506
3	-400.2641	94.27131	0.652822	13.72183	16.29154	14.74255
4	-318.5443	114.4078	0.136296	12.10126	15.47401*	13.44096
5	-265.6853	66.45131*	0.067368*	11.30529	15.48107	12.96396*
6	-238.9146	29.83017	0.073869	11.25470*	16.23351	13.23235

Notes: *indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.

Table 2 reports lag-order selection statistics. Table 2 shows that the selection of lag order was made using a maximum of 6 lags in order to permit adjustment in the model and to accomplish well behaved residuals. Furthermore, the results for lag length selection criteria reported in table 2 highlighted that the criteria selected lag 5. Information criterion – *LR*, *FPE* and *HQ* selected the most lag order of 5. However lag 5 produced spurious estimates thus positive and insignificant coefficient of the error correction model (ECM). As such lag 4 was chosen as the optimal lag for the data set. Thereafter the Johansen cointegration test was performed using 4 lag for the *VAR*. Cointegration rank tests can then be tested by the trace test and the maximum Eigen value statistics. Sometimes trace and maximum Eigenvalue statistics may produce different results. If that is the case, Alexander (2001) urges that the results of trace should be preferred since the trace test is more robust than the maximum Eigenvalue statistic in testing for cointegration. Table 3 and 4 below shows the results of the cointegration tests.

Table 3. Unrestricted cointegration rank tests (trace) results

Hypothesized number of CE(s)	Eigenvalue	Trace statistic	0.05 critical value	Prob.**
None*	0.391669	79.70581	68.81889	0.0066

Table 3 (cont.). Unrestricted cointegration rank tests (trace) results

Hypothesized number of CE(s)	Eigenvalue	Trace statistic	0.05 critical value	Prob.**
At most 1	0.283952	42.92512	47.856143	0.1344
At most 2	0.164315	18.20856	29.7977	0.5507
At most 3	0.064359	4.925260	15.49471	0.8167
At most 4	3.42E-05	0.002528	3.841466	0.9575

Note: Trace test indicates 1 cointegration eqn(s) at the 0.05 level. *denotes rejection of the hypothesis at the 0.05 level. ** MacKinnon-Haug-Michelis (1999) p-values.

Table 4. Unrestricted cointegration rank test (maximum eigenvalue) results

Hypothesized number of CE(s)	Eigenvalue	Ma-eigenvalue statistic	0.05 critical value	Prob.**
None*	0.391669	36.78069	33.87687	0.0066
At most 1	0.283952	24.71656	27.58434	0.1344
At most 2	0.164315	13.28330	21.13162	0.5507
At most 3	0.064359	4.922732	14.26460	0.8167
At most 4	3.42E-05	0.002528	3.841466	0.9575

Notes: Max-eigenvalue test indicates 1 cointegration eqn(s) at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level. ** MacKinnon-Haug-Michelis (1999) p-values.

The results of both tests reported in Table 3 and Table 4 showed that at least 1 cointegration equation exists at 5% significant level. For the trace test, the null hypothesis of no cointegrating vectors is rejected since the test statistic of 79.70581 is greater than the 5% critical value of approximately 68.81889. However on the null hypothesis of 1 cointegrating vectors, the trace test failed to reject since the test statistic of 42.92512 is less than the 5% critical value of 47.856143. Due to this reason, the trace test suggested 1 cointegrating relationship exists at 5% significance level. The results of maximum Eigenvalue test in Table 4 achieved similar results to that of the trace test as it rejected the null hypothesis of no cointegration. However, the maximum Eigenvalue test failed to reject the null hypothesis of 1 cointegrating vectors since the max-Eigen statistic of 24.71656 is less than the 5% critical value of approximately 27.58434. Both methods indicatedthat there is 1 cointegrating vector. Therefore, this study concludes that there is stable and one significant long run relationship among the variables thus between unemployment and the explanatory variables, these are *GDP*, *BUG*, *REER* and *LP*.

4.3. Vector error correlation model (VECM). Variables can either have short- or long-run effects, this study utilized a vector error correction model (VECM) to disaggregate these effects. The purpose of VECM technique is that it allows us to distinguish between long- and short-run impacts of variables for the unemployment model. Using the results obtained from cointegration tests, the VECM was specified and the results of VECM are reported in Table 5 and 6 below.

Table 5. Long-run cointegration equation results

Variables	Coefficient	Standard error	*t*-statistic
Constant	-286.3074		
UN(-1)	1.000000	-	-
GDP(-1)	19.49725	21.4227	0.91012
REER(-1)	0.446199	0.05322	8.38481
LP(-1)	-0.288840	0.19680	-1.46771
BUG(-1)	0.609186	0.21191	2.87472

The results from Table 5 above illustrate the long run impact of explanatory variables (*GDP*, *REER*, *LP*, and *BUG*) on unemployment in South Africa in an equation form as follows:

$$UN = -286.307 + 19.497GDP + 0.446REER - - 0.289LP + 0.609BUG. \quad (4)$$

The equation 4 reflects that *GDP*, *REER* and *BUG* have a positive long-run relationship with unemployment. It is worth mentioning that *REER* and *BUG* are statistically significantas displayed above in explaining unemployment since their absolute *t*-statistic values are greater 2. The results, therefore, suggest that a one percent unit increase in *REER* (an appreciation) increases unemployment by approximately 0.446 thus appreciation leads to reduction on job creation in the long run. The results also suggest that a one percent unit increase in GDP increases unemployment by approximately 19.497. Usually an increase in economic growth is accompanied by reduction in unemployment level. However when growth is not accompanied with job creations, this is regarded as a "jobless growth" phenomenon. Mahadea (2003) produced similar results and mentioned that South Africa experienced positive economic growth rates which have been associated with shrinking job creation. The results confirm the jobless growth hypothesis that states South African GDP growth is failing to create jobs.

Equation 4 also reflects that only *LP* has a negative long-run relationship with unemployment. Consequently the results suggest that a one percent unit

increase in *LP* reduces unemployment by approximately -0.289. This relationship is compatible with the economics theory. Marginal productivity theory, specify that as long as the marginal product of the extra worker is increasing this induces firms or businesses to hire more workers hence reflecting a negative relationship between *LP* and unemployment. Furthermore, the results also suggest that a percent unit increase in *BUG* increases unemployment by approximately 0.609.

Table 6. Error correction results

Variable	Coefficient	Standard error	*t*-statistic
D(UN)	-0.431765	0.15212	-2.83832
D(GDP)	0.002450	0.00073	3.34783
D(REER)	-1.070730	0.57300	-1.86863
D(LP)	0.671146	0.19927	3.36797
D(BUG)	0.440239	0.13679	3.21832

Table 6 depicted the VECM results which indicated evidence error correction. Results show that the coefficient of the differenced dependent variable (UN) is -0.431765 reflect that the speed of adjustment is approximately 43.177 percent. This implies that if there is a deviation from equilibrium, only 43.177% of unemployment is corrected in one year as the variable moves towards restoring equilibrium. The results also indicate that *GDP*, *BUG* and *LP* are statistically significant as displayed in explaining unemployment model in South Africa since the absolute *t*-statistic values are above 2. *REER* is the only variable which is insignificant since the absolute *t*-statistic value is below 2. The low speed of adjustment by unemployment may reflect the existence of some factors that affect unemployment in South Africa other than *GDP*, *REER*, *LP* and *BUG*. These factors may include the monetary policy, level of education and demographic factors, among others.

The error correction results also suggest that a one percent unit increase in *GDP* has the effect of increasing unemployment by approximately 0.00245. On all the explanatory variables in the unemployment model, it is worth mentioning that *REER* has an impact on reducing unemployment in South Africa. A one percent unit increase in *BUG* increases unemployment by approximately 0.4402. A coefficient of 0.6711 on *LP* indicates that a one percent unit increase in *LP* increases unemployment by approximately 0.6711. The findings of this study also suggest that a one percent unit increase *REER* reduces unemployment by approximately 1.0707. Therefore, in the short run, *GDP*, *LP* and *BUG* increase unemployment while depreciation of the domestic currency is encouraged in the short run.

4.4. Diagnostic checks. This study performed diagnostic checks in order to validate the parameter evaluation of the outcomes attained by the unemployment model employed. In testing for fitness of the model, this study used three tests namely langrage multiplier (LM) test for serial correlation white test for heteroskedasticityand the Jarque-Bera (JB) test for normality.

Table 7. Diagnostic checks results

Test	Null hypothesis	*t*-statistic	Probability
Langrage multiplier (LM)	No serial correlation	30.03959	0.2228
White (CH-sq)	No conditional heteroskedasticity	32.39	0.0657
Jarque-Bera (JB)	There is a normal distribution	2.000358	0.3678

The results in Table 7 show that there is no serial correlation, no conditional heteroskedasticity and there is a normal distribution in the unemployment model.

4.5. Impulse response analysis. The impulse response analysis in Figure 1 (see in Appendix) reflect the dynamic response of unemployment to a one-period standard deviation shock to the innovations of the system and also point out the directions and persistence of the response to each shock over a 10 year period. The analysis suggests that the shocks to all the variables are significant although they are not persistent. A single period standard deviation shock to *GDP* and *REER* marginally diminished the level of unemployment from a period 2 years and 2 years respectively but the impact dies off in a period of about 3 and 4 years respectively. A one-period standard deviation shock to *LP* appreciates unemployment from period 2.5 until it reaches 5 years and gradually levels off. The one-period standard deviation shock to *BUG* reflects a very turbulent nature, for instance in the period 1 *BUG* appreciates unemployment up to period 2, thereafter from period 2 up to 4 *BUG* diminished unemployment and this kind of sequence keeps on continuing until it gradually levels out during the period of 8 years. These results suggest that an increase in both *GDP* and *REER* imply diminishing unemployment.

4.6. Variance decomposition analysis. The results of the variation decomposition analysis are presented in Table 8 and the results reflect that the proportion of the forecast error variance in unemployment explained by its own innovations and innovations in macroeconomic variables.

For the purpose of ascertaining the effects of macroeconomic variables on unemployment for a relatively longer time, this study performed variance decomposition for 10 years period. The results in Table 8 revealed that in the 1st year, all of the variance in unemployment is explained by

its own innovations (shocks). In the 5th year, unemployment itself explains 89.9 percent of its variation, while macroeconomic variables explain the remaining 10.1 percent. Of this 10.1 percent, GDP explains 2.2 percent, REER explains 6.3 percent, LP explains 0.8 and BUG explains 0.8. However, in the 10th year, unemployment explains 82.6 percent of its own variation, while other macroeconomic variables explain the remaining 17.4 percent.

Table 8. Variance decomposition analysis

Period	S.E	UN	GDP	REER	LP	BUG
1	1.618645	100.0000	0.000000	0.000000	0.000000	0.000000
2	2.027540	97.58766	0.041872	1.084248	0.978441	0.307777
3	2.236812	94.53660	1.889359	2.147652	1.123338	0.303053
4	2.469642	91.06957	2.365353	4.879436	0.965459	0.720181
5	2.751803	89.88171	2.185862	6.345907	0.801644	0.784875
6	3.018546	89.00134	1.992610	7.604249	0.749033	0.652765
7	3.259969	86.55277	3.010587	9.60292	0.792391	0.583959
8	3.485668	84.42575	3.760189	9.995544	1.113898	0.704624
9	3.718823	83.28991	3.968913	10.67858	1.243145	0.819443
10	3.947862	82.58663	3.893820	11.40881	1.350019	0.760721

The influence of GDP increased to 3.90, while REER increased to 11.4 percent, LP increased to 1.4 percent and also BUG decreased to about 0.76 percent. These results are compatible with the economics theory as shocks to macroeconomic variables thus GDP, REER, LP and BUG continue to explain a significant proportion of variations in unemployment.

Conclusions and recommendations

This study was motivated by the growing importance of unemployment and growth relationship in developing countries. However, little has been done to explore the unemployment-growth nexus in developing countries especially in Africa. The South African economy is currently experiencing problems of job shortage and the rate of unemployment has been erratic over the past years. This led to policymakers and economists to construct sets of possible reasons why the level of unemployment rate in South Africa is so high, so as to find ways to curbing it.

In light of the above summary, the results suggest several policy recommendations that can be drawn in order to reverse the trend of erratic unemployment. These recommendations are expected to significantly contribute to employment generation in South Africa.

After apartheid the South African government promulgated several laws that have significantly changed the labor market institutions. Arora and Ricci (2006) argue that aspects of some labor practices and regulations such as laws governing collective bargaining processes, labor standards and working conditions have contributed to high unemployment by rendering the labor market inflexible. In addition changes in the labor market institutions consist of significant costs to employers and consequently deter employment creation. An important issue raised in this study was that government alone cannot combat high level of unemployment that is in South Africa. The government needs to create conducive environment and flexible labor market policies or legislations that entice many private sector and small businesses, thus consolidating the existing entrepreneurship with the new entrepreneurial so as to creates more employment and absorbing a large pool of unemployed group.

Attainment of high growth and creation of decent employment still remains a challenge in South Africa. The study revealed that economic growth plays a vital role in curtailing down unemployment levels. However, in order to achieve impressive growth rates that will help to boon the nation or economy and boost the demand for labor and decent employment creation. Policymakers should create policies that support and promotes accelerated and sustained economic growth.

The study revealed that a one percent increase in BUG increases unemployment by approximately 0.609. In contrary, some economists and policymakers acclaimed the use of adopting a budget deficit policy; when government spends more than the revenue it collects so as to promote and boost employment creation thus reduces unemployment levels. However to curtail down the unemployment levels, the study suggest that the South African government should redirect its spending towards activities that directly or indirectly promote the creation of employment through improving healthcare facilities, infrastructure development strategy, education and employment inducing programs. Even activities that help in crime fighting can assist in creating a good reputation for South Africa and to be a safe

investment destination for many investors (whether they are domestic or international investors), consequently reducing unemployment levels. Unemployment has been persistent for quite some time. Samson, Quene and Niekerk (2001) elucidated that the technological production method employed within the South African economy is more capital intensity rather than labor intensity and also increasing the demanding for skilled labor. This tend to be a challenging factor since the most unemployed groups are unskilled and less skilled labor therefore job creation policies on sectors that employ these groups should be prioritized through engaging in labor intensive industries.

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Appendix

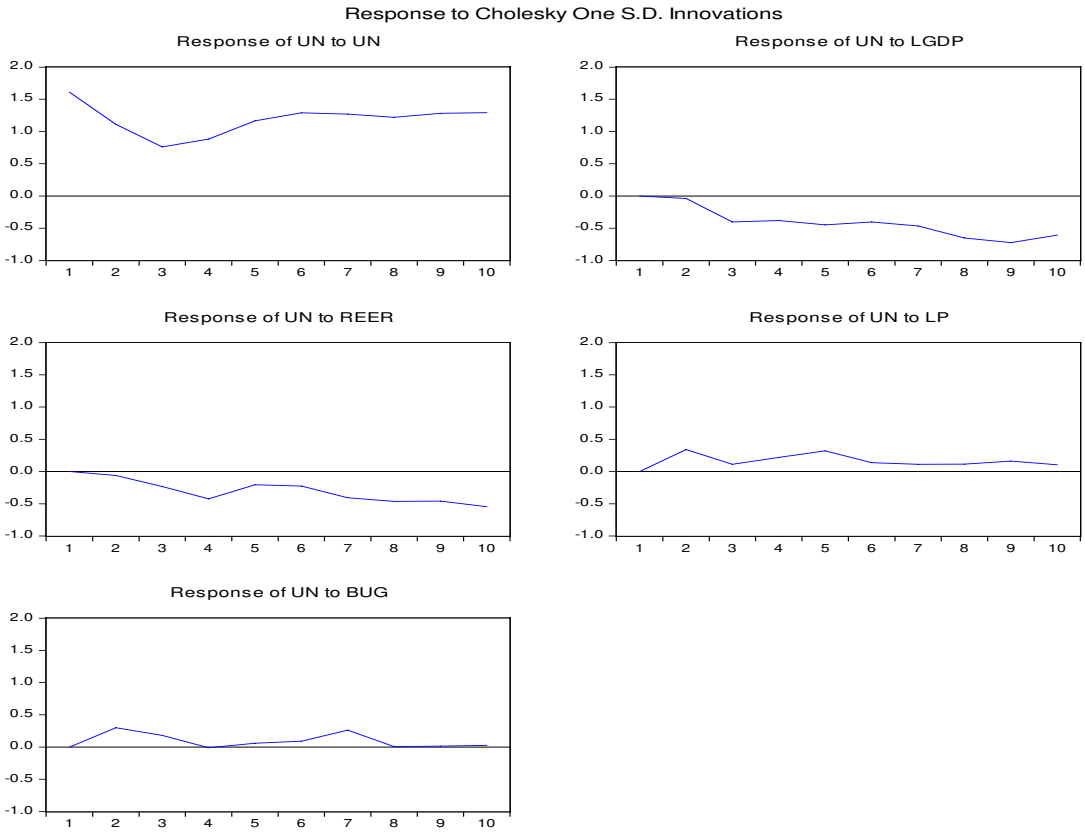

Fig. 1. Impulse response analysis