

Unemployment and Economic Growth in Tanzania

Salim Hamad Suleiman^{1*}, Safia Tafana Kassim² and Issa Moh'd Hemed³

¹Ministry of Trade, Industry and Marketing, P.O.Box 601, Migombani, Zanzibar, Tanzania.

²The Institute of Public Administration, Zanzibar, Tanzania.

³Zanzibar University, P.O.Box 2440, Zanzibar, Tanzania.

Authors' contributions

This work was carried out in collaboration between all authors. Author SHS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author IMH managed the analyses of the study. Author STK managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This paper examined the impact of unemployment on economic growth in Tanzania and causal relationship between unemployment and economic growth in Tanzania.

Methodology: The study utilized co-integration and Dynamic Ordinary Least Square (DOLS) Approach to test the relationship between unemployment and economic growth and granger causality test to examine the causal relationship between variable.

Results: The unit root tests showed that the all variables were integrated after taking first difference, the Johansen co-integration result showed that the variables were co-integrated. The DOLS estimate showed that unemployment rate has positive impact on economic growth in Tanzania but insignificant influence over the study period. In addition, granger causality test revealed that, there is a unidirectional causal relationship between unemployment and economic growth with direction from economic growth to unemployment.

Conclusion: We suggest that there is the need for government to take urgent steps against the rising unemployment rate, because unemployment is a major impediment to social progress and results in waste of trained manpower.

*Corresponding author: E-mail: salimsule1@hotmail.com;

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1. INTRODUCTION

The prevalence of unemployment in Tanzania is regarded as a major national developmental challenge both economically and socially. Over the past years the rate of job creation in Tanzania has not matched with the growth in the labour force [1]. The unemployment rate in Tanzania started to rise in the 1970s, when the country experienced an economic crisis, which was reflected by the fall in the economic growth rate from 5 percent to an average of 2.6 percent in the early 1980s, and fell further to about 1 percent at the beginning of the 1990s [2]. The Fig. 2. shows the economic growth trend in Tanzania.

Tanzania has overtime claimed the strong Real Gross Domestic Product (RGDP) growth rate which measured at 7.1 percent in 2002 to 8.4 percent in 2007. However, this claim has appeared to be paradox. This is because, while the country experienced strong economic growth rate of 7.2 percent, the annual unemployment rate was at the rising rate from 2 percent in 2005 to 2.9 percent in 2013, despite the unemployment rate declined to 2.3 percent in 2016 which largely attribute by initiatives actions taken by the government like creation of National Employment Policy [3]. This situation is so pitiful considering the fact that the country is blessed with plenty of human resources in the field of economics, accounting and finance, education, natural science and natural resources (Forestry, ocean, and minerals) which capable to utilize them and provide employment opportunity for the teeming youths in Tanzania.

Therefore, the current unemployment crisis has revived the academic and policy debate on the impact of unemployment on economic growth. Despite the government conscious the efforts in managing the unemployment problem, the issue of unemployment has still been a burden to the Tanzanian economy. In this study, we applied Dynamic Ordinary Least Square (DOLS) on the data covering the period between 1991 to 2015 to examine the relationship between unemployment and economic growth in Tanzania; and causal relationship between variables in Tanzania.

The rest of the paper is organized as follows: the second section provides a brief review of literature on the linkage between unemployment and economic growth; the third section describes

the empirical methodology; and the fourth section discusses the empirical results. Finally, the paper provides concluding remarks of the study.

2. LITERATURE REVIEW

The review clearly shows that, despite the fact that, there are so many studies [4,5,6] undertaken on the issue of unemployment and economic growth but only few of them have investigated on similar study for the case of Tanzania. Similarly, a weak point of these studies is that the methods used cannot capture the dynamic behaviour of the data, meanwhile, many studies support the negative relationship between unemployment and economic growth. For example, [7] analyzed the existence of an Okun type relationship between unemployment and output in Malaysia by employing time series data from 1970 to 2004. The study used Okun's first difference method and Granger causality test and found that there is existence of a negative relationship between output growth and unemployment. The study also showed the presence of two-way causality between output growth and unemployment rate in Malaysia.

[8] investigated a coherent relationship between Economic Growth and Unemployment in Pakistan. They used the time series data since 1972 to 2006. They used the Augmented Dicky Fuller test for Unit Root, all variables are stationary at first difference then they used the Johansen Cointegration to find the long run relationship between variables. The results of Co-integration test intimate that GDP Growth, Unemployment, Labor, Capital, Openness of Trade have long run relationship. The overall results revealed that GDP growth has negative relationship with unemployment.

Similarly, [9] examined the impact of unemployment on real gross domestic product in Nigeria for period 2000-2008. The result showed that unemployment has an impact on Real Gross Domestic Product (RGDP) and that inverse relationship exists between unemployment and real gross domestic product (RGDP) in Nigeria. Similar study conducted by [10] examines the relationship between unemployment and economic growth in Peru and Lima for the period of 1992 to 2012 using Ordinary Least Square (OLS) techniques. The results confirmed a negative relationship between unemployment and economic growth in both cases.

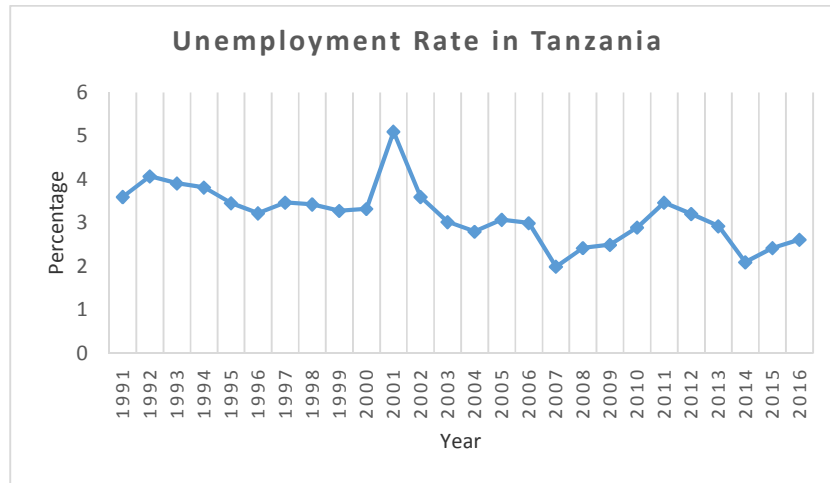


Fig. 1. Unemployment rate
 Author compilation from WDI, 2017

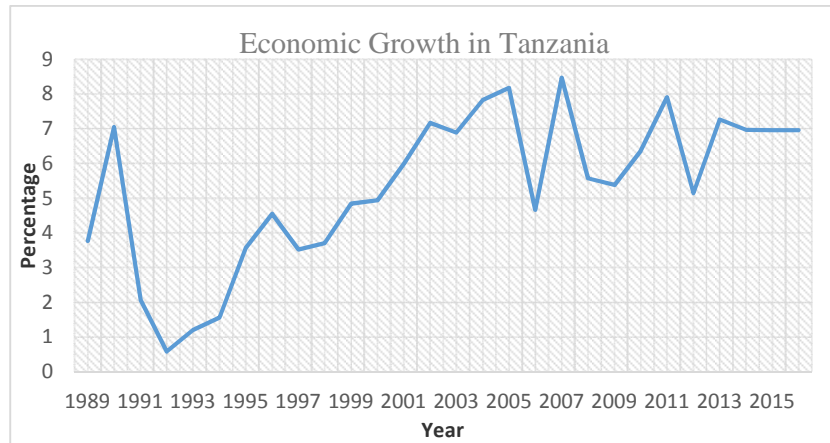


Fig. 2. Economic growth
 Author compilation from WDI, 2017

Few studies conducted in this area found no significant relationship between unemployment and economic growth. However, these studies suggested the existence of positive relationship between unemployment and economic growth. For instance, [11] investigates the relationship between unemployment and economic growth in Jordan through the implementation of Okun's law, Using annual data covering the period 1970-2008, The empirical results reveal that Okun's law cannot be confirmed for Jordan. Thus, it can be suggested that the lack of economic growth does not explain the unemployment problem in Jordan.

Likewise, [12] investigated the relationship between unemployment and economic growth in Nigeria with the aim of testing the applicability of

the theoretical proposition of the Okun's law which postulated that unemployment has negative relationship with economic growth, the study employed Error Correction Model (ECM) and Johansen Cointegration techniques to examine both the short run dynamics and the long run relationship among the variables. The variables used in the study include real output growth and unemployment rate. The result indicated that both the short and the long run relationship exist between unemployment rate and real output growth in Nigeria.

3. METHODOLOGY

We adopted the framework of popular neoclassical growth model developed by Robert Solow, which was an extension to the

Harrod- Domar model. The Solow's growth model was attempted to explain long-run economic growth by estimating capital accumulation or produced capital, labour or population growth, and increase in productivity which is known as technological progress. The model could be expressed as:-

$$Y_t = f(K_t, L_t, A_t)$$

Where:-

- Y_t = the total output at time t
- K_t = the accumulated or produced capital at time t
- L_t = the labour at time t
- A = the labour augmenting technology or knowledge

Thus, Y_t which is the total output is replaced with Growth Domestic Product (GDP); K_t which is the produced capital is replaced with capital formation; L_t which is labour is replaced with two variables i.e., unemployment rate and Population (Labour force) and A_t is replaced with other variable like export, FDI, Inflation etc. This result in a model such as:-

$$RGDP = f(K, UEMPL, L)$$

Where,

RGDP represents real gross domestic product as a common measure for economic growth, UEMPL is unemployment rate which represents the total unemployment level in economy for the period under review, L as labour force measured by number of people living in a given area as Inward and outward flows and stock and K as capital formation. The equation 1 below is further illustrated in linear form as:

$$GDPT = \alpha + \beta_1 LL_t + \beta_2 LK_t + \beta_3 LUEMPL_t + \mu \epsilon_t$$

RGDP is the dependent variable; UEMPL, LL, and K are the explanatory variables; β_1 , β_2 and

β_3 are the linear coefficients of the equations, α is the constant term and μ is the stochastic variable.

3.1 Variables Description

Since the aim of this study is to determine the impact of unemployment on economic growth in Tanzania, the study used the model which consists relevant with important variables for robust results. Gross Domestic Product (GDP) was used as a dependent variable and Capital formation; unemployment rate and Population (Labour force) were used as the independent variables. These variables were explained in Table 1.

3.2 Empirical Methodology

3.2.1 Unit root test

This stage of estimation procedure tests the stationary of the variables in order to determine the order of integration of the data series. Therefore, in order to verify selected data are stable for further analysis. The "Augmented Dickey-Fuller (ADF)" unit root test has been conducted to test the null hypotheses of unit root against the alternative hypotheses of stationary. If the time series are found to be stationary, it means that its variance, mean and covariance are constant overtime. This test was performed on both the level and the first differences of all variables.

3.2.2 Cointegration test

The next stage after confirmed our variable were stationary at first difference, we applied the Johansen cointegration test to test long run relationship between variables. This test is more appropriate than the Engle and Granger test since it allowed more than one long-run association and, it is based on the ADF test which considers one long-run association.

Table 1. Variables description

Variable	Measure	Expected sign
Economic Growth	GDP per capita	
Population (PoP)	Measure the number of labor force as a proxy	+
Capital formation (K)	Gross Capital Formation as a proxy for capital formation;	+
Unemployment rate	Measure the total unemployment level in the economy for the period	-

Source: Author's construction (2017)

3.2.3 Dynamic ordinary least square (DOLS)

We applied Dynamic Ordinary Least Square (DOLS) approach proposed by [13] and [14] and extended to panel analysis [15]. By incorporating leads and lags of the first differences of the regressors endogenous feedback effects from the dependent variable to the regressors are absorbed. In contrast to OLS, the DOLS estimator is therefore consistent, even if regressors are endogenous. This method favoured compared to Static OLS and Johansen and Juselius approach due to the following reasons. Firstly, it is more robust and appropriate for small sample size which implies more efficient and unbiased estimates [16] Secondly, the method is more appropriate in case there is an endogenous relationship among the variables as in our case. The DOLS Model is restructured as following:-

$$LGDP_t = \alpha + \beta_1 LK_t + \beta_2 LUEMPL_t + \beta_3 LL_t + \sum_{j=-q}^p \phi_j \Delta K_t + \sum_{j=-q}^p \delta_j \Delta UEMPL_t + \sum_{j=-q}^p \omega_j \Delta L_t + \varepsilon_{it}$$

In this case, the use of lag and lead is to capture serial correlation and endogeneity of the regresses that could result in unbiased estimation. Therefore, p and q are the number of lags and leads respectively.

3.2.4 The granger causality test

The final stage of the estimation procedure examined the causality between unemployment and economic growth through the application of the Granger causality test propounded [17]. It focused on determining whether the direction of the relationship is bi-directional, unidirectional, feedback or no causation between the two variables.

4. RESULTS AND DISCUSSION

4.1 Unit Root Test

The results of unit root test (ADF) in Tables 2 and 3 indicate that variables are not stationary at level. However, after taking first difference they became stationary (meaning that no unit root problem) .It was also observed from the ADF unit root test estimate that all variables were integrated at order one.

Table 2. Unit root results (level)

Variables	Constant	
	ADF test	
	Statistics	P-value
LGDP	4.400425	1.0000
LUEMPL	-2.027883	0.2738
LKK	0.440156	0.9807
LL	-0.906293	0.7633

Source: Author computation from collected Data (2017)

Table 3. Unit root results (first difference)

Variables	Constant	
	ADF test	
	Statistics	P-value
D(LGDP)	-2.740998	0.0820
D(LUEMPL)	-5.801226	0.0001
D(LKK)	-3.740503	0.0103
D(LL)	-5.956338	0.0001

Source: Author computation from collected Data (2017)

4.2 Johansen Co-integration Test

The co-integration estimate was carried out using the Johansen co-integration technique and this is a powerful test, particularly when a multivariate model is used. Johansen test usually involves two test namely "Trace statistics" and "Maximum Eigen value". From the results of co integration, it was observed that trace statistics and maximum Eigen-value statistics were greater than their critical values. Therefore, reject the null hypothesis of no co-integration relationship among unemployment, labour force and capital formation. In Table 4, we present the results of Johansen Cointegration Test.

4.3 Relationship between Unemployment and Economic Growth

The application of DOLS was necessary because the existence of co-integration among the variables. The estimation of DOLS requires the inclusion of leads and lags in order to robust result and to avoid the autocorrelation problem and to capture the endogeneity of the independent variables. Hence, the estimation used set of the lags and leads, by using one year lags and one year lead.

Table 4. Johansen test for co-integration

Hypothesized No. of CE(s)	Trace			Maximum Eigen		
	Statistic	Critical value	Prob.**	Statistic	Critical value	Prob.**
None *	59.01787	47.85613	0.0032*	37.84405	27.58434	0.0017*
At most 1	21.17382	29.79707	0.3469	12.04433	21.13162	0.5433
At most 2	9.129490	15.49471	0.3535	8.607300	14.26460	0.3203
At most 3	0.522190	3.841466	0.4699	0.522190	3.841466	0.4699

Source: Author computation from collected Data (2017)

Note: Max-Eigen value test and Trace test *t* indicates 1 co integrating eqn(s) at the 0.05 level.

* denotes rejection of the hypothesis at the 0.05 level

Table 5. DOLS estimates of the long run effect of unemployment on economic growth for Tanzania

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LKK	0.303552	0.066094	4.592709	0.0010*
LLL	1.380798	0.257729	5.357562	0.0003*
LUEMPL	0.064825	0.098701	0.656786	0.5261
C	-6.030967	3.377344	-1.785713	0.1045

Source: Author computation

Note: * Significant at the 0.05 level

Table 6. Granger causality results

Null Hypothesis:	Obs	F-Statistic	Prob.
LKK does not Granger Cause LGDP	24	4.02714	0.0348*
LGDP does not Granger Cause LKK		7.53301	0.0039*
LLL does not Granger Cause LGDP	24	5.06867	0.0172*
LGDP does not Granger Cause LLL		2.14568	0.1445
LUEMPL does not Granger Cause LGDP	24	0.39809	0.6771
LGDP does not Granger Cause LUEMPL		2.86473	0.0818**

Note: * and** represent statistical significance at 5% and 10% respectively.

Source: Author computation

Based on DOLS estimation, as can be observed from Table 5, the results reveal that there is a positive relationship between unemployment and economic growth for the Tanzania but insignificant effect. This implies that unemployment rate had an insignificant effect on economic growth in Tanzania.

Yet, the result is not shocking in the case of Tanzania since its economy experienced increase in unemployment rate which unfortunately has been going along with an increase in the economic growth in recent time. The implication of this is that the economic growth of Tanzania is indifferent to the unemployment condition in the economy. This result supports the previous studies which show that unemployment does not have a significant impact on the economic growth [18,19] and [20].

Additionally, our results indicate that there is positive and significant relationship between

stock capital formation and economic growth at 5 percent level of significance this reveals that a unit increase in capital stock will result in an increase of 0.304 percent in economic growth. This finding is supported by a study of [21] which highlighted that economic growth will increase if there is an increase in the capital stock.

With respect to other explanatory variables, it was observed that labour force had a significant-positive on economic growth with coefficient values of 1.38 percent. The implication of this is that a one percent increase in labour force would positively stimulate economic growth in the long run at the 1.38 percent.

4.4 Granger Causality

The Granger causality method is used to test the direction of causality among the variables. In Table 6 report the results of granger causality, that there is a unidirectional causal relationship between unemployment and economic growth

with direction from economic growth to unemployment. This result also consistent with the study of [22]. However, the result is statistical significant at 10%.

Meanwhile, the result shows that there is bidirectional causality between capital stock and economic growth, hence both capital stock and growth were caused each other. In addition, the result shows unidirectional causality between labour and economic growth in Tanzania. Since the factor labour is an essential determinant of economic growth, both mental and physical efforts needed to ensure steady performance of the economy.

5. CONCLUSION

Our paper investigated the impact of unemployment on economic growth in Tanzania. The data sources used are retrieved from the World Bank online database 2017 from the year 1991 to 2015. We examine the existence of a significant relationship between unemployment and economic growth in Tanzania and the causal relationship between variables by testing granger causality.

We apply DOLS estimate to test the null hypothesis of no significant long run relationship between unemployment and economic growth in Tanzania during period of the study. Our result rejects the null hypothesis, and confirms that unemployment rate has positive impact but insignificant influence on economic growth in Tanzania over the study period. Similarly, the granger causality test reveals that there is no causal relationship between unemployment and economic growth in Tanzania. We suggest that the government have to take urgent steps against the unforeseen rising on the rate of unemployment, since unemployment is a major impediment to social progress and results in waste of trained manpower thereby reduce the rate of economic growth.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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