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Unemployment in the SADC Region

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TABLE OF CONTENTS

ABSTRACT

The objective of this study is to estimate the determinants of unemployment in the Southern African Development Community (SADC) region using annual data from 2000 to 2016. Given the characteristic of the data, the study adopts Fixed Effect (FE) estimation technique. For further analysis, the study also estimated the ARDL panel model to capture persistence effect of unemployment in the region. The FE results reveals that real GDP, foreign direct investment, consumer price index, credit to the private sector and interest rate are negatively related to unemployment. While trade openness, labour productivity and population have a positive sign. The results estimated with ARDL model are not very different from those of FE model, but we obtained a noticeably smaller estimates for ARDL model. Variables which have negative association with unemployment suggest that they are likely to reduce unemployment. Therefore, such indicators may be of interest to policy makers when formulating unemployment reduction strategies. In terms of policy advise, the study recommends the government of SADC member states to encourage the education system that can equip leaners with entrepreneurial skills and in-job practical skills, in order to promote high success rate of SMMEs as well as to provide skills needed in the labour market. It also recommended enforcement of free trade of goods and services in the region as a means of making the industrial sector an engine of economic growth in order to create much needed employment.

Key words: Unemployment, SADC, Panel Data Analysis.

JEL Classification code: C20

1. INTRODUCTION

Unemployment is one of the main development challenges facing many countries around the world. This challenge was mostly prevalent in less developed and developing countries before the 2008/09 financial crisis. However, after the crisis even more developed and high income countries find themselves facing the same challenge. During the period 2000-2016, total unemployment rate for low, middle and high income countries was estimated at average of 5.5 3%, 5.52 % and 6.97 % per year, respectively (International Labour Organisation, 2016). Like elsewhere, the Southern Development Community (SADC) region is also afflicted by economic challenges of unemployment, and is one of the regions estimated to have high rates of unemployment in the world. Despite this challenge, an average growth of SADC Gross Domestic Product (GDP) is estimated to be one of the highest in the African continent. Available evidence indicates that, during the period 2000-2016, GDP growth in the SADC region was estimated at an average of 5.8 % per year (World Bank, 2016). However, during the same period, unemployment rate was estimated at an average of 17.9 % per year (International Labour Organisation, 2016), indicating that the gains of economic growth has not translated to addressing the problem of unemployment in the region.

Most people affected by unemployment in the SADC region are the youth. During the period 2000-2016, the rate of unemployment for adults and youth was estimated at an average of 10.1 % and 26.4 % per year, respectively, (International Labour Organisation, 2016). In terms of gender, females are more affected when compared to males. During the same period, the rate of unemployment for males and females was estimated at an average of 27.6 % and 34.4 % per year, respectively, (International Labour Organisation, 2016). Neither resource-based economies such as South Africa, Botswana, Angola and Namibia, nor agricultural-based economies like Madagascar, Lesotho and Mozambique have been able to reduce the level of unemployment in their respective countries.

Factors that have contributed to high rates of unemployment in the SADC region varies from country to country, simply because SADC member states are at different stages of development. In addition, they differ in terms of population size, geographical location (access to the sea), land size, resource endowment, stability of the political economy, and employment policies. For example, resource curse and lack of structural transformation have been consistently identified as the main cause of unemployment in many African countries (Ogbeide et al., 2016). Natural resource dependency is characterised by extractive industries which are capital intensive, therefore, are unable to create enough jobs in the labour market. These views have been observed in countries such as Democratic Republic of Congo, Botswana, Angola, and Mozambique.

Other factors that have contributed to unemployment in the region are civil wars and political unrest in countries such as Zimbabwe, Angola, Democratic republic of Congo, Mozambique, and South Africa. Such conflicts have worsened economic conditions leading to weak political system and mismanagement of resources, further leading to the erosion of enabling environment for employment creation (Oyefusi, 2007). Low success rate of

Small, Medium and Micro Enterprises (SMMEs) is another factor that has contributed to unemployment which has led to low industrial base (Katua, 2014; Mutyenyoka and Madzivhandila, 2014). In most cases, the SMMEs sector is characterised by low level of entrepreneurial skills, lack of financial support as well as low investment in areas with high potential to increase employment opportunities (Jili et al., 2017).

In countries such as Botswana, Democratic Republic of Congo, Lesotho, Mauritius, Mozambique, Namibia, South Africa, Swaziland, and Tanzania, a weak education system which has not been able to provide job seekers with the requisite skills needed in the labour market has received much of the blame for contributing to high levels of unemployment (Msigwa and Kipesha, 2013; Kyei and Gyekye, 2011; Ali and Jabeen, 2016; Eita and Ashipala, 2010). As a result, most of the people looking for employment are not able to find it, leaving them with no job experience which is one of the key requirement to be employed. Lack of skills needed in the labour market has been mostly experienced by the young generation, which has also contributed to low participation rate of youth in the labour market, which is another factor that has contributed to unemployment in the region (Ali and Jabeen, 2016). Low number of vocational training and limited access to skills development have probably exacerbated the education system to support practical skills required in the labour market. Underemployment where people settle for less-than-ideal jobs they are overqualified for has discouraged people to look for employment, and subsequently leading to increased level of unemployment (Eita and Ashipala, 2010). This problem is mostly common in Madagascar, Malawi, and Zambia.

It has been reiterated that high persistent of unemployment prevailing in some countries is dragging economic development of such countries down, since it is making it difficult for its people to actively participate in economic activities. However, there is recognition that employment enhancing growth can be achieved if economic growth is accompanied by structural transformation and diversification, more particularly in resource dependent countries to reduce dependency in natural resources which is mostly capital intensive. In addition, encouraging growth to occur in all sectors of the economy simultaneously would ensure promotion of labour intensive sectors, further leading to an increase in employment generation. Employment enhancing growth can also be achieved if changes in population demographics accompanies economic growth and countries are able to setup institutional policies that can help to enable labour absorption (Ogbeide et al., 2016).

This study is predominantly important because unemployment is a serious socio-economic problem since it undermines development efforts such as reducing poverty and improving standard of living (Cheema and Atta, 2014; Aurangzeb and Khola, 2013; Maqbool et al., 2013). Unemployment deprives peoples' ability to work and earn income, making it more difficult for them to escape from poverty. Due to lack of income, peoples' desperation is most likely to unleash various criminal activities such as robbery, pick pocking, drug trafficking, rape, abduction, murder, occultism and prostitution. In

addition, lack of income may also bring social problems such as homelessness, divorce, alcohol and drug abuse (Batu, 2016; Oniore, et al., 2015; Eita and Ashipala, 2010; Msigwa and Kepisha, 2014).

Most unemployed youth are exposed and utilised in armed conflicts, terrorism, and rebel conflicts which undermines the national security and safety of most countries, and as a result scares away investors (Ali and Jabeen, 2017; Mahmood et al., 2014). Despite the economic and social challenges of unemployment, empirical research on economic indicators that could have a significant impact in reducing unemployment in the SADC region has received little attention. This study therefore, estimates the determinants of unemployment in the SADC region. The findings of this study will identify economic indicators that have a reducing impact on unemployment and contributes to an understanding of unemployment determinants in the region, which may be of interest to policy makers.

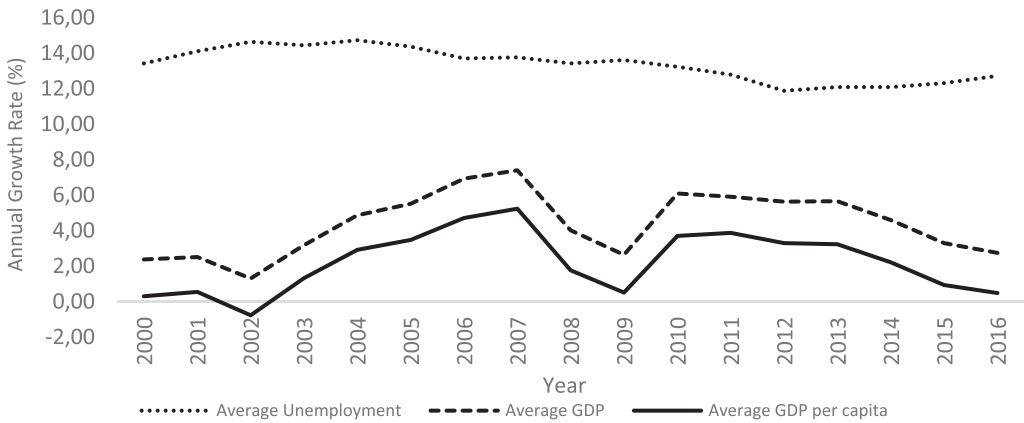
The rest of this paper is organized as follows. Section 2 discusses unemployment trends for the total population, youth, adults, males and females, as well as other development indicators such as GDP per capita. Then Section 3 provides brief review of literature, while Section 4 outlines methods of analysis, data and sources. Section 5 reports the estimated results together with concise interpretations. Finally, Section discusses conclusions and policy implications.

2. UNEMPLOYMENT IN SADC

Theoretically, improvements in economic development such as the growth of GDP or GDP per capita should enhance job creation and subsequently lead to reduction in unemployment. However, this has not been the case in many countries. Therefore, this section attempt to find out whether growth in economic development in the SADC region has had an impact in reducing unemployment. In addition, trends of unemployment for youth versus adults as well as for male versus females will be analysed in order to assess the mostly affected population.

Figure 1 depicts the trends of average real GDP and real GDP per capita, as well as total unemployment rate of people aged 15 years and above amongst all the countries in the SADC region. It reveals that during the period from 2000 to 2002, both real GDP and real GDP per capita growth rates trended downward, while unemployment rate exhibited an upward trend, which could be somewhat expected because of limited income to generate enough employment in the labour market. However, during the period 2000-2007, real GDP and real GDP per capita improved significantly and showed an upward trend. Thereafter, they both exhibited a downward from 2007 to 2009, an upward trend from 2009 to 2010, and a downward trend from 2010 to 2016. On the other hand, unemployment rate exhibited a downward trend during the period 2002-2016. Since unemployment rate was trending at a low pace, it indicates that SADC member states have paid little attention in addressing the unemployment although they have experienced improved economic growth during some years.

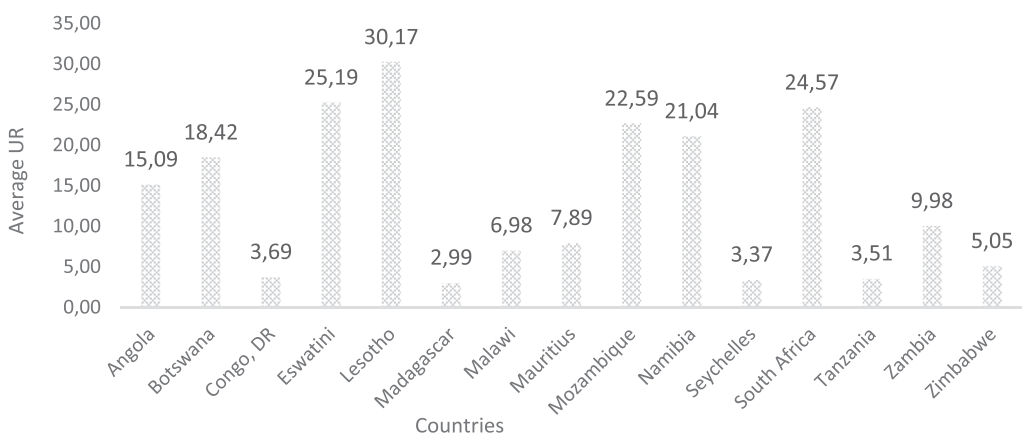
Figure 1: Real GDP and GDP per Capita Growth and Total Unemployment Rate



Source: World Bank (2018)

Figure 2 which shows averages of total unemployment rates (people aged 15 years and above) during the period 2000-2016, indicates that amongst SADC countries, Lesotho has the highest rate at 30.2 %, followed by Eswatini (25.2 %), South Africa (24.6%), Mozambique (22.6 %), Namibia (21.0 %) and Botswana (18.4%). During the same period, countries which recorded the least unemployment rates in the region are Madagascar (3.0 %), Seychelles (3.4 %), Tanzania (3.5%), and Democratic Republic of Congo (3.7 %).

Figure 2: Average of SADC Member States Unemployment Rate (UR), 2000-2016

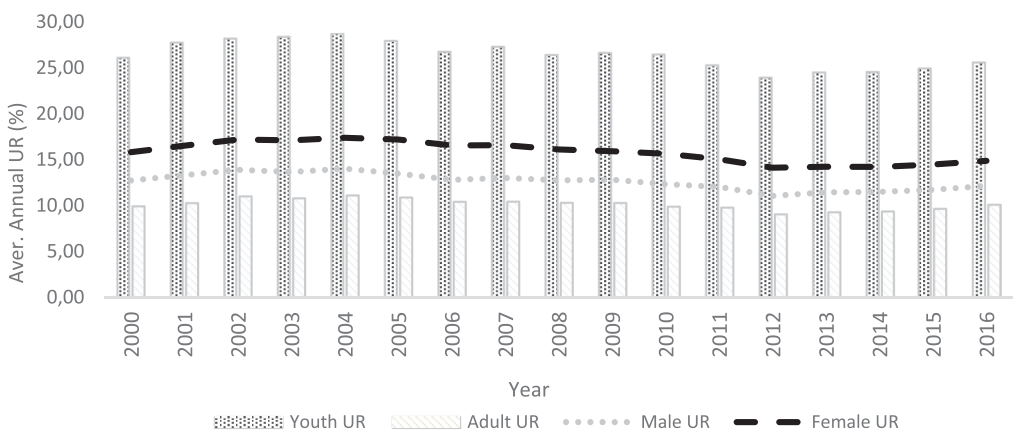


Source: International Labour Organisation (2018)

Figure 3 which compares unemployment rates for adults (people aged 25 years and above) and youth (people aged between 15 and 24 years) during the period 2000-2016,

reveals that youth are the most affected when compared to adults. For the entire period, unemployment for youth are well above for those of adults by large margins, indicating that work experience that youth lacks have played a major role in contributing to their unemployment. For example, adult and youth unemployment rates were estimated at an average of 9.9 % and 26.0 % in 2000, 10.2 % and 27.7 % in 2001, 10.8 % and 28.3 % in 2003, respectively. This huge difference was also experience during latter stages where adults and youth unemployment rates were estimated at an average of 9.3 % and 24.5 % in 2014, 9.6 % and 24.9 % in 2015, 10.1 % and 25.5 % in 2016, respectively. In addition, Figure 3 also compares unemployment rates for males and females, which indicates that females are the ones affected by lack of employment opportunities when compared to males, however, the differences in not huge like those for adults versus youth. During the period 2000-2016, both males and females average unemployment rates exhibited a downward trend, although both trend were somehow almost constant.

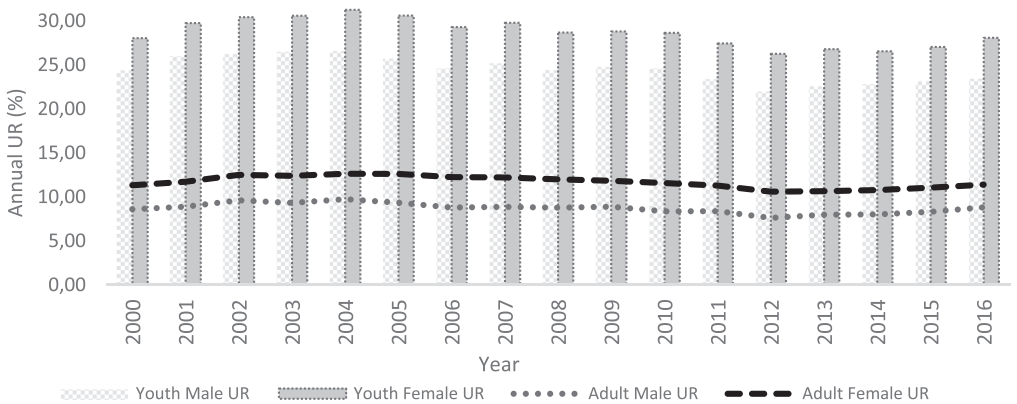
Figure 3: SADC Unemployment rate (UR) by Gender and Age



Source: International Labour Organisation (2018)

Figure 4 depicts unemployment rates for youth by gender. It reveals that youth who are females are the ones mostly affected by lack of employment opportunities when compared to males. Males youth and female youth unemployment rates were estimated at an average of 24.3 % and 28.0 % in 2000, 25.9 % and 29.7 % in 2001, 26.4 % and 30.6 % in 2003, respectively. During 2014, 2015, and 2016, male youth unemployment rates were estimated at an average of 22.8 %, 23.1 % and 23.4 %, respectively, while that for female youth were estimated at average of 26.6 %, 27.0 % and 28.1 %, respectively. Figure 4 also shows unemployment rates for adults by gender, and it indicates that adults who are female are most likely not to find employment when compared to males. During the period 2000-2016, both unemployment rate for adult males and adult females were slightly trending downward.

Figure 4: SADC Unemployment rate (UR) for Male Youth, Female Youth, Male Adults and Female Adults



Source: International Labour Organisation (2018)

3. BRIEF REVIEW OF THE LITERATURE

3.1 THEORETICAL FRAMEWORK

Unemployment occurs when someone who is actively searching for employment is unable to find one. It is the stock of people entering unemployment but are willing and eligible for work. Unemployment is measured as the ratio of number of people unemployed to total labour force. In the labour market analysis, aggregate demand for labour is downward-sloping, suggesting the number of workers demanded by firms is negatively related to real wages (measured as the ratio of nominal wages to price level). Labour demand is measured as the number of people employed plus available vacancies. On the other hand, the aggregate labour supply is upward-sloping, indicating that labour supplied by workers is positively related to real wages. In aggregate demand-aggregate supply analysis, full employment will be reached when labour supply equals labour demand, where real wage is at equilibrium. However, if wages become more than equilibrium wage, employers will demand less labour while workers will be willing to supply more of their labour. As a result, there will be a mismatch between labour demand and supply, leading to occurrence of unemployment. This is one of the demand-deficient unemployment called Classical unemployment. Another type of demand-deficient unemployment is Keynesian unemployment which occurs when there is low demand for goods and services. Generally, this two types of unemployment can occur in 3 forms: (1) Structural unemployment occurs when a person loose his or her job when there is structural change in the production process, such as technology or government policy; (2) Cyclical unemployment occurs due to difficulties in business production process, e.g., recession; and (3) Frictional unemployment is referred as the time someone take to shift from one employment to another (Makin, 1996).

Following Beveridge (1944) and Bonthuis et al. (2013) the general functional form of unemployment dynamics can be specified as,

$$UR_t = \alpha + \beta_1 UR_{t-1} + \beta_2 VR_t + \beta_3 VR_t^2 + \varepsilon_t \quad (1)$$

where UR is unemployment rate, the lagged unemployment rate captures the effect of unemployment persistence, VR is vacancy rate, and the squared VR indicates that Beveridge curve is non-linear (Bonthuis et al., 2013). Beveridge curve suggests that unemployment rate is negatively related to vacancy rate. According to Beveridge (1944), vacancy rates increases when there is economic growth, leading to reduction in unemployment, while during economic recession, vacancy rates declines leading to an increase in unemployment rate. Beveridge curve mainly captures the effect of structural unemployment, and when it shifts outwards it indicates that labour market is experiencing structural change.

Another concept of unemployment dynamics can be explained by the Phillip curve. Philip curve shows that unemployment and inflation have a negative relationship, suggesting a trade-off between the two (Phillips, 1958). According to Neoclassical theory of unemployment, any policy aimed at stimulating economic growth will lead to an increment in national income and wages. As long as wages increase at a lesser rate than prices, businesses will increase the production of goods and services while people will be motivated to supply more of their labour due to an increase in money wages. Hence workers will be thinking an increase in money wages is an increase in real wages, they will continue to increase their labour supply, hence reduce the level of unemployment. As time goes, money wages will increase to an inflation level and real wages will remain unchanged (Lucas, 1973). Philip curve can be algebraically represented by formula below;

$$\pi = \pi^e + \beta\left(UR - UR^n\right) \quad (2)$$

where π is inflation rate, π^e is expected inflation, UR is unemployment rate and UR^n is natural rate of unemployment.

3.2 DETERMINANTS OF UNEMPLOYMENT

This sub-section outlines theoretical models employed in different countries as well as variables identified as possible determinants of unemployment. The review of literature will focus more on recent studies.

Several studies have used time series analysis to estimate the determinants of unemployment in some of the SADC countries. Khumalo and Eita (2015) estimated unemployment in Swaziland using data for the period 1991-2012, while Eita and Ashipala (2010) used data for the period 1971-2007 in Namibia. Both studies used output gap, and inflation

rate as independent variables. However, Khumalo and Eita (2015) included government spending and dummy variables for the end of apartheid in South Africa in 1994 and 2007-2009 economic crisis in addition to their independent variables, while Eita and Ashipala (2010) added total investment, real wages and labour productivity. Both studies used Engle Granger two steps estimation procedure in their analysis. The results obtained reveal that consumer prices are negatively related to unemployment in the long rung for both studies. However, the association of unemployment and consumer prices was positive in the model estimated by Eita and Ashipala (2010) and negative for Khumalo and Eita (2015) in the short run. With regard to other variables, there was a positive relationship between unemployment and government spending and all dummy variables used in Swaziland. For Namibia, a positive relationship was found for both real wages and labour productivity, and negative relationship for total investment in the long run. As suggested, unemployment in both countries can be reduced by utilising government expenditure as well as investment on economic development oriented projects.

Msigwa and Kipesha (2013) estimated the determinants of youth unemployment in Tanzania using Multinomial logistic regression model. The model used Tanzanian Integrated Labour Force survey of 2006 and considered both international definition of youth (people aged between 15 and 24 years) and national definition (people aged between 15 and 34 years). The results obtained indicated that education, gender, skills, geographical location and marital status are main factor that influence youth unemployment in Tanzania. The study recommended authorities to learn and strengthen employment laws and regulations so that the labour market can absorb all the skilled youth, and also ensure that the labour market present equal employment opportunities for both males and females.

Ali and Jabeen (2016) carried a study in Zambia which estimated the determinants of youth unemployment from the labour supply approach. The study randomly sampled 3 out of 10 provinces of Zambia (namely, Copperbelt, Luapula and Southern) and targeted youth aged between 15 and 24 years' old who were unemployed but willing to work. The survey was carried out during September to November 2015, and questions which were asked focused on period of being unemployed (years), access to finance, marital status, education, skills training, ICT skills, access to internet, reasons for being unemployed and job information both in the formal and informal sector. The study revealed that the most contributing factor to youth unemployment in the formal sector is education and job skills, while in the informal sector was lack of finance. Therefore, the study recommended the Zambia authorities to improve the education system in order to promote skilled workforce more especially in the formal sector and access to finance for youth in the informal sector so that they can be able to start up their own business and employ other youth.

Another study which used survey method to estimate the determinants of unemployment was by Kyei and Gyekye (2011) in Limpopo Province in South Africa. The study

used survey data from Global Insight and explored regression, principal component and cluster analysis as the methods of analysis. In order to estimate the impact of explanatory variables on unemployment, the study used age (youth, middle age and old age), education (no schooling, primary, incomplete school, matric, degree and postgraduate), race (coloured, African, Asian and White), gender (male and female), and GDP as independent variables. The result revealed that education plays a key role for being employed as unemployment is mostly affected individuals with qualification below degree. As a policy advise, hence the study revealed that the Limpopo province is characterised by lack of education, it was therefore suggested that free education should be availed to all and the labour market should make equal employment opportunities for both males and females.

Still in South Africa, Chamunorwa and Mlambo (2014) estimated the impacts of immigrant labour on unemployment. The relationship between unemployment and immigrant labour and other economic variables was estimated using Ordinary Least Squares using data for the period 1980-2010. In this study, unemployment rate was treated as dependent variable while immigration, Gross Domestic Product, inflation and education were used as explanatory variables. The results obtained showed that inflows of immigrant labour worsen unemployment, while GDP and inflation are negatively related to unemployment. In terms of policy advice, since the study revealed that immigration lead to excess of labour supply which as a result lead to a decline in labour wages, it was suggested that issuing of work related permits should be done in a way that it does not lead to excess labour supply.

Outside the SADC region, other unemployment studies were carried out in other African regions. For example, panel data analysis was carried out by Folawewo and Adeboje (2017) in Economic Community of Western African States (ECOWAS) for the period 1991-2014. This study employed Pooled, Fixed Effect, Random Effect and Panel Fully Modified OLS and estimated unemployment rate as a function of GDP growth, inflation rate, FDI, labour productivity growth, total external debt stocks and population. The results show that inflation rate and labour productivity growth has a positive impact on unemployment while GDP growth, external debt and FDI has a weak but significant negative effect on unemployment. In other parts of the world, another study which employed panel analysis is that of Aurangzeb and Khola (2013) for India China and Pakistan with cross sectional data for the period 1980-2009. It used Co-integration and Granger Causality estimation procedure and estimated unemployment rate as a function of GDP growth, effective exchange rate, inflation rate and population growth. The results reveal a negative relationship between unemployment and all the variables accept for population growth for all the countries. However, GDP revealed a positive relationship with unemployment for Pakistan. It was recommended that policies which promote enabling environment for employment growth are vital to reducing unemployment and improving social well-being.

Panel data analysis was also employed by (Gur, 2015; Trimurti and Komalasari, 2014). Gur (2015) estimated ratio of unemployed people to total labour force as a function of GDP growth, ratio of trade volume to GDP, population growth, inflation rate, industrial product growth, and ratio of total investment to GDP, and employed panel regression estimation procedure using data for the period 2001-2012 for BRIC countries (Brazil, Russia, India and China). Trimurti and Komalasari (2014) applied SPSS regression analysis using data on seven regions of Indonesia for the period 2002-2012 to estimate unemployment rate as a function of ratio of regional GDP to total GDP, inflation rate and minimum wages. The estimated results indicate that GDP, labour wages, trade volume, total investment, industrial product growth, budget savings, and private investment are main factors that lead to reduction in unemployment, while inflation, population growth, and broad money had no significant effect on unemployment.

Other studies carried time series analysis of unemployment on individual countries around the world. For example, Ogbeide et al. (2016) and Alozie et al. (2017) used time series data for the period 1981-2013, and 1982-2014, respectively, to both estimate the determinants of unemployment rate in Nigeria. Both studies employed Error Correction Model (ECM) estimation procedure while Ordinary Least Squares was used in addition by Ogbeide et al. (2016) for model adequacy. However, explanatory variables used in these two studies slightly differ, Ogbeide et al. (2016) used ratio of capital expenditure to GDP, Consumer Price Index (CPI), GDP per capita, ratio of natural resource rent to GDP, and ratio of credit to the private sector to GDP while manufacturing capacity utilisation rate, real effective exchange rate, trade openness and foreign direct investment (FDI) were used as control variables. While Alozie et al. (2017) used ratio of gross fixed capital formation to GDP, exchange rate, interest rate, and inflation rate. In general, the result indicated the positive impact of natural resource rent and credit to the private sector on unemployment, while GDP per capita, FDI, trade openness and exchange rate depreciation has a negative impact. It was recommended that the Nigerian policy should focus on interest rate to attract both domestic and foreign investment for labour intensive projects, strengthen private sector financing, as well as efficient use of natural resources to reduce unemployment.

Maqbool et al. (2013) and Cheema and Atta (2014) both estimated determinants of unemployment in Pakistan using data for the period 1982-2014 and 1973-2010, respectively. Subramaniam and Baharumshah (2011) analysed unemployment in Philippines with time series data for the period 1974-2003. These studies applied similar estimation procedure, for example, they used Autoregressive Distributed Lag (ARDL) model to regress unemployment on a set of explanatory variables. However, they differed slightly in terms of explanatory variables. Maqbool et al. (2013) used GDP, FDI, CPI, external debt, population and private investment. Cheema and Atta (2014) used ratio of actual GDP to potential GDP as a measure of output gap, exchange rate, gross fixed investment, labour productivity, and trade openness.

Subramaniam and Baharumshah (2011) used job vacancy rate, GDP growth, FDI, government spending, inflation rate, and dummy variables for Asian economic crisis and Philippines evolutional change.

In general, the results obtained by Maqbool et al. (2013) and Subramaniam and Baharumshah (2011) reveals that unemployment is negatively related to GDP, FDI, CPI, exchange rate, and government spending, and positively related to population and job vacancies in the long run. Contrarily, results by Cheema and Atta (2014) reveals that unemployment is positively related to output gap, exchange rate and labour productivity, and negatively related to gross fixed investment and trade openness in the long run. In summary, it was recommended that economic development focused policies through investment in labour intensive and trade led growth would lead to reduction in unemployment.

4. METHODS OF ANALYSIS AND DATA

4.1 MODEL SPECIFICATION

The empirical model for estimating the determinants of unemployment in the SADC region was specified by equation 3. The method of analysis follows a Static Panel data analysis approach and adopted a Fixed Effect model to estimate the determinants of unemployment in SADC. The choice of which panel data estimator (Fixed vs Random effect) to use depends whether there is correlation between explanatory variables and individual effects. As it will be shown in Section 5.1, Hausman test indicates that there is correlation between country effects and explanatory variables, which suggest the use of Fixed Effect model. In addition, the use of country fixed effect was adopted in order to address composition bias that prevails in the labour force of different countries in the SADC region.

The model takes unemployment rate as a dependent variable and regress it on a set of economic indicators that have been theoretically identified in literature. This model is specified as a linear-log model because the dependent variable is used as its original scale and regressed on natural logarithm of explanatory variable. This approach is used when the impact of explanatory variables on dependent variable decreases with an increase in explanatory variables. In this case, the growth of GDP for example is expected to reduce unemployment. Since SADC is comprised of 15 member states, the estimation procedure considers a panel regression of 15 countries or cross sections. Therefore, equation 3 is a panel estimation to country i, $i = (1,2,\cdots,15)$ observed at time period t, $(t = 2000,2001,\cdots,2016)$.

$$UR_{it} = \beta_0 + \beta_1 \log(GDP_{it}) + \beta_2 \log(PR_{it}) + \beta_3 \log(CPI_{it}) + \beta_4 \log(PP_{it}) + \beta_5 \log(FDI_{it}) + \beta_6 \log(TO_{it}) + \beta_7 \log(CRE_{it}) + \beta_8 I_{it} + \varepsilon_{it} \quad (3)$$

where *UR* is unemployment rate, *GDP* is real Gross Domestic product, *PR* is labour productivity, *CPI* is consumer price index, *PP* is population, *FDI* is foreign direct investment, *TO* is trade openness measured as the ratio of exports plus imports to *GDP*, *CRE* is domestic credit to the private sector, *I* is lending interest rate. β's are the matrix of 15 dimensional rows of parameters to be estimated, ε is time invariant error term fixed for each country, and u is disturbance error term. All variables are expressed in natural logarithm except for unemployment rate and lending interest rate.

4.2 FIXED EFFECT MODEL VS RANDOM EFFECT MODEL

Hence our model is using panela data, it is important to note that, prior to estimation, Hausman test was performed in order to identify which model is suitable for our data. Following Baltagi (2013), assuming that UR represents our dependent variable (unemployment rate) and X is a vector of explanatory variables, observed for country i at time t, a general panel model takes the form,

$$UR_{it} = \alpha_i + \beta' X_{it} + e_{it} \tag{4}$$

where β is vectors of parameters to be estimated, and then error term e has a one way error component decomposition as follows,

$$e_{it} = u_i + \varepsilon_{it} \tag{5}$$

where u is individual heterogeneity and e is the remainder of the error. Taking other error components decomposition into account, equation 4 can be expanded in to equation 6.

$$UR_{it} = \alpha_i + \beta' X_{it} + u_i + \varepsilon_{it} \tag{6}$$

Fixed Effect (FE) model is used in preference to Random Effect (RE) model in panel data analysis when it is assumed that parameters are fixed in all cross sections and individual effect are correlated with explanatory variables, thus $E(Xu) \neq 0$. Random effect model would only be preferred when it is assumed that parameters in all cross sections are random, and individual effects and explanatory variables are not correlated, implying that $E(Xu) = 0$ (Hausman, 1978). Therefore, in order to choose between Fixed Effect model and Random Effect model, alternative specification test (shown in the next section) was conducted to select a model that will adequately represent our data.

The Hausman test which will be discussed in the next section, identifies the Fixed Effect model as an adequate representation of our data, therefore taking into account individual heterogeneity (u), our Static Panel data model which adopts Fixed Effect specification is represented as below,

$$UR_{it} = \beta_0 + \beta_1 \log(GDP_{it}) + \beta_2 \log(PR_{it}) + \beta_3 \log(CPI_{it}) + \beta_4 \log(PP_{it}) + \beta_5 \log(FDI_{it}) + \beta_6 \log(TO_{it}) + \beta_7 \log(CRE_{it}) + \beta_8 I_{it} + u_i + \varepsilon_{it} \quad (7)$$

The growth of GDP or output in a particular country is dependent on the level of inputs such as labour, capital and technology amongst others. Assuming other factors being constant, the growth of labour force is expected to increase GDP growth, indicating a positive relationship that exist between GDP and employment. Therefore, GDP is expected to have a reducing effect on unemployment (Al-Habees and Rumman, 2012). According to Fedderke (2002), labour productivity measured as output per worker intensifies unemployment in the short run but reduces it in the long run. High labour productivity therefore, indicates an increase in output per worker due to improved employee's skills, work ethics and effort. During period of high labour productivity, firms may realise that they can increase their production without hiring more labour. Therefore, an increase in labour productivity may worsen unemployment in the short run, however, reduce it in the long run due to continued increase in production.

Following Kim, Booth and Wu (1986), Philip Curve suggests a trade-off between inflation and unemployment as low rates of unemployment is associated with high demand for wages thus influencing an increase in inflation (Kim, Booth and Wu, 1986). Therefore, unemployment and inflation are expected to have a negative relationship. Population growth increase the number of people entering the labour market, who are eligible to work, as a result increase labour supply. If employment generation is unable to match up with growing population, then unemployment will increase, therefore population is expected to have a positive impact on unemployment (Al-Habees and Rumman, 2012). From economic perspective, foreign direct investment is instrumental in enhancing economic growth since it provides recipient countries with financial stability that would ensure formation of new firms and upgrade the existing ones as well as enhancing technology transfer and competitiveness of industries. Therefore, FDI promotes employment creation, as a result reduce the level of unemployment. The same thing applies to domestic to the private sector regarding its impact on unemployment. Just like FDI, credit to the private sector is investment that is used to enhance competitiveness of local industries in terms of technological development, efficiency and expansion of production, thereby increasing employment generation and subsequently reduce unemployment.

Promoting trade openness by establishing relationship with other countries as a means of encouraging higher volumes of trade stimulate industrial development in countries that are export oriented. Through industrial development, aggregate production of export will increase leading to labour utilisation, subsequently reducing the level of unemployment. On the other hand, imports dependent countries are likely not to reduce unemployment since they rely on goods and services produced in other countries. Therefore, the impact of trade openness on unemployment is ambiguous depending on the structure of the

economy. Low interest rate reduces the cost of borrowing for investment purposes, thus increasing the level of investment. Therefore, extra investment spurred by low interest rate encourages industries to hire more employees to handle growth in their production processes, leading to increased employment generation and reduction in the level of unemployment.

4.3 AUTOREGRESSIVE DISTRIBUTED LAG MODEL

For further analysis of the determinants of unemployment in the SADC region, we extended our analysis to dynamic panel data model using Autoregressive Distributed Lag (ARDL) model. Since unemployment rates in the SADC region has been shown to exhibit an upward trend since 2012 up to 2016, it is important to capture persistence effect of unemployment in our analysis. Therefore, we allow for the possible persistence of unemployment using ARDL model. The ARDL model specification is similar to equation one, except that lagged value of unemployment rate is added on the right-hand side as an explanatory variable. Following Pesaran, Shin and Smith (2001), the ARDL model used in the paper can be specified as follows,

$$\begin{aligned}\Delta UR_{it} = {} & \beta_0 + \beta_1 \log(UR_{it}) + \beta_2 \log(GDP_{it}) + \beta_3 \log(PR_{it}) + \beta_4 \log(CPI_{it}) + \beta_5 \log(PP_{it}) \\ & + \beta_6 \log(FDI_{it}) + \beta_7 \log(TO_{it}) + \beta_8 \log(CRE_{it}) + \beta_9 I_{it} + \alpha_1 \Delta \log(UR_{it}) \\ & + \alpha_2 \Delta \log(GDP_{it}) + \alpha_3 \mathrm{l}\Delta \mathrm{og}(PR_{it}) + \alpha_4 \Delta \log(CPI_{it}) + \alpha_5 \Delta \log(PP_{it}) \\ & + \alpha_6 \Delta \log(FDI_{it}) + \alpha_7 \Delta \log(TO_{it}) \quad + \alpha_8 \Delta \log(CRE_{it}) + \alpha_9 \Delta I_{it} + \varsigma_{it} \end{aligned} \tag{8}$$

where Δ denotes differenced operator, and the rest are as explained before under equation 1. The ARDL model specified above separate short-run and long-run dynamics of unemployment, however the main objective of estimating this model is to determine the long-run relationship between unemployment and explanatory variables. And our result will only concentrate on the long-run dynamics.

4.4 DATA AND SOURCES

Unemployment rate, labour productivity and labour force participation rate for each country used in this study were collected from International Labour Organisation (2018). While data on real GDP, consumer price index, population, foreign direct investment, trade openness (exports and imports), credit to the private sector and lending interest rate were collected from World Bank (2018). Regarding treatment of variables, real GDP, FDI, credit to the private sector, and trade openness for all SADC member states were measured at constant 2010 USD, while CPI for all the countries used 2010 as a base year.

5. RESULTS AND DISCUSSION

5.1 HAUSMAN TEST

The choice of which model to use between Fixed Effect and Random Effect model was evaluated using Hausman test, which compares the likelihood function under the null hypothesis (Random Effect will give efficient estimates) and alternative hypothesis (Fixed Effect will give efficient estimates) using Chi-Squared (X^2) test statistic. Table 1 shows the result of Hausman test.

Table 1: Hausman Test

Test Summary	X^2 Statistics		X^2 d.f	P-Value
Cross-Section Random		18.84	8.00	0.0158
Cross-Section Random Effect Test Comparisons				
Variable	Fixed	Random	Var. Difference	P-Value
Real GDP	-48.60	-45.34	0.816	0.000
Population	55.30	48.66	5.179	0.000
Interest Rate	-0.003	-0.010	0.000	0.024
Trade Openness	0.042	0.043	0.000	0.088
Labour Productivity	48.19	46.69	0.911	0.013
Private Sector Credit	0.025	0.013	0.000	0.002
Consumer Price Index	-2.391	-0.742	0.184	0.000
Foreign Direct Investment	-0.003	-0.001	0.000	0.004

Note: X^2 is Chi-Squared test statistic, $d.f$ is degrees of freedom associated with Chi-Squared test.

To compute this test, equation 4 was first estimated under the Random Effect specification with the assumption that random effects and independent variables are not correlated. If the Chi-Squared test statistics is greater than its corresponding critical value, we reject the null hypothesis which favours Random Effect specification and conclude that Fixed Effect model is an adequate representation of our data. The test indicates that Chi-Squared statistics of 39.81 is more than its associated critical value (9.00), therefore Fixed Effect model will be preferred.

5.2 FIXED EFFECT RESULT

The panel regression results on the determinants of unemployment in the SADC region, estimated using equation 4, are shown in Table 2. The estimated coefficients have theoretically expected signs, and all of the explanatory variables are statistically significant, except for foreign direct investment. The diagnostic tests (shown in Appendix, Table A1) support the specification of our model. More importantly, Jarque-

Bera and Serial Correlation tests indicate that estimated errors are normally distributed and explanatory variables and their lagged values over different time periods are not correlated, respectively.

The results indicate that the impact of GDP on unemployment rate is negative. Hence our model is specified as liner-log model, the coefficient with respect to GDP measures the absolute change in unemployment for a relative change in GDP. The estimated coefficient of -1.8 indicates that increasing GDP by 1 million US dollar will reduce unemployment rate by 1.8 %, or a percentage increase in GDP will reduce unemployment rate by 0.018 %, suggesting that employment growth is very low as the economy grows. The impact of population growth on unemployment is estimated at 1.9 indicating that a percentage increase in population increases labour supply which worsens unemployment rate by 0.019 %.

Labour productivity have a positive impact on unemployment rate which suggests that as output per labour increases, employers realise that they can increase production without hiring more employees, as a result worsen unemployment. The positive impact of labour productivity on unemployment was also found by Cheema and Atta (2014). There is a positive relationship between unemployment and trade openness, indicating the import dependency of many SADC economies as well as the effect of their resource dependency where their export sector is largely characterised by extractive industries with limited employment opportunities. There is inverse relationship between unemployment rate and foreign direct investment, consumer price index, credit to the private sector, interest rate as well as labour force participation rate. The impact of foreign direct investment and credit to the private sector in reducing unemployment is relatively low indicating limited funds availed to encourage private sector growth as well as to promote high success rate of SMMEs. The coefficient with respect to inflation support Philip Curve hypothesis. The negative impact of FDI and inflation on unemployment were consistent with those found by Maqbool et al. (2013).

Table 2: Fixed Effects Results

Variables/Statistical Measures	Coefficient	Std Errors	P-Value	
Constant	27.35	5.937	0.000	***
Real GDP	-1.798	0.432	0.000	***
Population	0.131	0.061	0.000	***
Interest Rate	-0.005	0.002	0.037	**
Trade Openness	0.337	0.095	0.001	***
Labour Productivity	0.659	0.049	0.000	***
Private Sector Credit	-0.003	0.002	0.077	*
Consumer Price Index	-0.130	0.064	0.043	**
Foreign Direct Investment	-0.002	0.001	0.844	
R-Squared	0.964			
Adjusted R-Squared	0.957			
Probability (F-Statistics)			0.0000	

Note: ***, **, and * indicate significant at 1%, 5% and 10% level of significance, respectively.

5.3 DYNAMIC ARDL PANEL RESULT

The long-run results of ARDL panel model estimated using equation 4 are shown in Table 3. The estimated coefficients have theoretically expected signs, and all of the explanatory variables are statistically significant. However, FDI is still not significant in the second model. The ARDL model yielded R-squared and adjusted R-Squared which are slightly higher than those of Fixed Effect model, suggesting that the ARDL model plays an important role with regard to the variability of the explanatory variables in explaining the unemployment dynamics in the SADC region.

The ARDL panel model shows that the persistent effect of unemployment in the region shows that it is having a positive impact on unemployment as indicated by a positive coefficient of the lagged value of unemployment (0.87). The estimated coefficient with respect to GDP in the ARDL model is now less than the one estimated using the Fixed Effect model as a result of allowing for the impact of persistent effect. After allowing for the possible persistent effect of unemployment, now GDP does not have big impact in reducing unemployment as it did in the previous model. With regard to coefficient of other explanatory variables, the results estimated using ARDL model are slightly lower than those estimated using the Fixed Effect model, but with relatively small margins.

The coefficient with respect to population in the ARDL model (0.127) is lower than that estimated with the Fixed effect model (0.131), and the same is observed

for interest, where ARDL estimated -0.003 while FE model estimated -0.005. The estimated coefficient with respect to trade openness from the ARDL model (0.309) is quite similar to the one estimated with FE model (0.337). The estimated coefficient with respect to labour productivity estimated with ARDL model (0.374) was found to be less than the one estimated with FE model (0.659). The same thing was observed for credit to the private sector, consumer price index and foreign direct investment, where coefficients estimated using ARDL for all these variables were found to be slightly less than those estimated with FE model. For comparisons, the coefficient estimated with ARDL model are not very different from those estimated with FE model, but we obtained a noticeably smaller estimates for ARDL which allowed for the possible persistent effect of unemployment. These results illustrate the impact to which the possible effect of persistence of unemployment is having on other economic variable which to significantly have a reducing impact on unemployment. As a result of the persistent effect, the reducing impact of such variables on unemployment has marginally declined.

Table 3: ARDL Panel Results

Variables/Statistical Measures	Coefficient	Std Errors	P-Value	
Constant	0.353	0.411	0.391	
Lagged Unemployment Rate	0.867	0.029	0.000	***
Real GDP	-0.402	0.086	0.000	***
Population	0.127	0.014	0.052	*
Interest Rate	-0.003	0.002	0.001	***
Trade Openness	0.309	0.050	0.061	*
Labour Productivity	0.374	0.084	0.000	***
Private Sector Credit	-0.001	0.001	0.066	*
Consumer Price Index	-0.045	0.024	0.062	*
Foreign Direct Investment	-0.001	0.003	0.883	
R-Squared	0.968			
Adjusted R-Squared	0.966			
Probability (F-Statistics)			0.0000	

Note: ***, **, and * indicate significant at 1%, 5% and 10% level of significance, respectively.

To check for adequacy of our results, diagnostic tests were also performed with the ARDL panel model and the results are shown in Table A2 (see Appendix). The Normality test and Serial Correlation tests indicate that estimated errors are normally distributed and explanatory variables and their lagged values over different time periods are not correlated, respectively, which support specification of our model.

6. CONCLUSION AND POLICY IMPLICATIONS

This study estimates the determinants of unemployment in the SADC region using panel data from 2000 to 2016. The main objective was to find economic indicators that have a reducing impact on unemployment. The obtained results indicate that the estimated coefficient of unemployment rate with respect to real GDP, foreign direct investment, consumer price index, credit to the private sector, interest rate and labour force participation rate are negative, while that with respect to trade openness, labour productivity and population are positive. Economic indicators which are negatively related to unemployment in this study are very important in reducing the rate of unemployment in the region, which may be of interest to policy makers when formulating unemployment reduction strategies. However, economic indicators which are positively related to unemployment rate, although theoretically are expected to have a reducing impact on unemployment may suggest that such indicator may have not been used effectively to reduce unemployment in the region. In addition, a weak impact of FDI and credit to private sector in reducing unemployment may signal that historically there have been lack of funds to encourage private sector growth and may be the reason why there is high rate of unemployment in the region.

To allow for possible persistence of unemployment, we estimated a dynamic panel model using Autoregressive Distributed Lag model. The model was estimated to capture persistence effect of unemployment in the SADC region by adding the lagged value unemployment rate as part of the explanatory variables. The coefficients estimated with ARDL model are not very different from those estimated with FE model, but we obtained a noticeably smaller estimates for ARDL. These results illustrate the impact to which the possible effect of persistence of unemployment is having on other economic variable that have a reducing impact on unemployment.

These results could be important to policy makers when identifying indicators which are significantly important in reducing unemployment in the region as well as those which are against theoretical expectation in terms of reducing unemployment, in order to identify areas of improvement when formulating employment generation strategies. Other factors that should be considered by policy makers not captured in our model is the education system. The education system of respective SADC member states should not only focus on academic performance, it should also provide practical skills needed in the labour market. There should be unlimited access to vocational and technical training that can equip learners with hands-on practical skills needed in the production of goods and services, as well as encouraging free trade of goods and services as a means of making the regions industrial sector an engine of growth, and subsequently reduce unemployment. Therefore, implementation of policies of economic regional integration should be enforced.

Low-skilled youth in the region require entrepreneurial skills and enterprise development in order to promote high success rate of SMMEs, therefore it is important for governments of SADC member states to work closely with the SMME sector to promote skills development and continue its financial support because the SMME sector has shown to be a viable sector that can create employment for many countries. High success rate of SMMEs can be enhanced by encouraging conducive environment for the smooth and easy operation of the sector such as providing adequate power and promoting peace and security in order to attract local and foreign investment in the region.

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APPENDIX

Table A1: Fixed Effect Diagnostic Test

Test	P-Value	Conclusion
Histogram Normality Test	0.127	Residuals are normally distributed
Heteroscedasticity	0.841	Variance in residuals is constant
Cross Section Dependency	0.959	No cross section correlation in residuals

Table A2: ARDL Diagnostic Test

Test	P-Value	Conclusion
Histogram Normality Test	0.366	Residuals are normally distributed
Heteroscedasticity	0.462	Variance in residuals is constant
Cross Section Dependency	0.748	No cross section correlation in residuals

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