Unemployment Disparities in Southern Africa: Empirical Evidence from Southern African Development Community Member States

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ABSTRACT

The unemployment rate is one of the most important indicators of economic growth. Reducing unemployment is crucial to ensuring inclusive growth in a country. This paper analyses the relationship between the unemployment rate and other macroeconomic variables in the Southern African Development Community (SADC). The purpose of the study is to compare and understand the observed unemployment disparities between southernmost and the rest of the SADC countries. It draws on the theoretical framework of the Phillips curve and Okun’s law and uses static panel data and fully modified ordinary least squares techniques (FM-OLS) to estimate the empirical model. Annual data for the period 1991 to 2020 are used. Analyses are conducted both at the aggregate SADC data level and at the subgroup level, i.e. at the Southern African Customs Union (SACU) and non-SACU country levels. Diagnostic tests are conducted to ensure the robustness of the models. The empirical results of this study show that labour productivity, external debt and population have significant effects on unemployment across the SADC region. Inflation, labour productivity and population have significant effects in SACU, while external debt, labour productivity and population have significant effects in non-SACU countries. Gross domestic product (GDP) growth and foreign direct investment (FDI) have mixed but insignificant effects on the unemployment rate, indicating a low employment elasticity of growth in the region.
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ACRONYMS

BoP : Balance of Payment
ECOWAS : Economic Community of West African States
FDI : Foreign Direct Investment
FM-OLS : Fully Modified Ordinary Least Squares
GDP : Gross Domestic Product
ILO : International Labour Organisation
OECD : Organisation for Economic Co-operation and Development
SACU : Southern African Customs Union
SADC : Southern African Development Community
1. INTRODUCTION

1.1 Background
Unemployment varies from country to country due to various factors. Globally, the reasons for observed trends can differ from one region to another. For instance, in the case of Europe, the trend can be said to be mainly due to the generous benefits that European countries offer the unemployed. Some countries such as China have a different measure of unemployment than the United States or other European countries. In much of Africa and throughout Latin America, the high unemployment is a result of underdeveloped infrastructures and economies (Experimental Economics Center, 2022). However, understanding why there exists a substantial difference in the unemployment rates among countries within the same region can be a challenging task.

Unemployment is one of the biggest problems facing the world today. It is part of a vicious circle of poverty and underdevelopment, especially in many Third World countries. In 2020, the global unemployment rate reached 6.5 per cent, 1.1 percentage points higher than the previous year (United Nations, 2021). The unemployment rate in sub-Saharan Africa was 6.3 per cent. This was exacerbated by the Covid 19 pandemic, which has led to massive job losses, especially among women and youth. According to the United Nations (2021), the number of unemployed people worldwide increased by 33 million to 220 million. Another 81 million people have left the labour market altogether.

As important as the problem is, studying unemployment in developing countries has proven difficult over the years. This is due to the complex nature of labour markets in these countries. According to Byrne and Strobl (2001), the International Labour Organisation (ILO) has proposed relaxing the standard definition of unemployment in developing countries because labour markets there are not as efficient as in the developed world. Although employed persons are easy to classify in most countries, the classification of non-employed persons as unemployed or inactive has been controversial (Byrne & Strobl, 2001). Many governments are therefore faced with the challenge of determining unemployment rates and projections. This is quite a big
problem so unemployment rate figures are usually the subject of public debate and lead to political disputes. Although it is an extremely difficult task, the determination of unemployment rates and forecasts can be an effective tool that supports planning processes (Gostkowski & Rokicki, 2021).

The definition of an unemployed person according to the ILO, is a person aged 15 or over:

- without a job during a given week;
- available to start a job within the next two weeks; and
- actively having sought employment at some time during the last four weeks or having already found a job that starts within the next three months.

The causes of unemployment are diverse and economists have over the years attempted to model them. The classical economic theories attribute unemployment to be a result of wages (the market price of labour) being set at the wrong level (Rodrik, 2015). Employers would hire fewer workers if wages were very high, a scenario known as “classical unemployment”. Rodrik (2015, p.130) further discusses the Keynesian view that insufficient demand is the fundamental cause of unemployment. Although the theories try to explain, in general terms, the causes of unemployment, developing countries seem to have some distinct causes from those in the developed countries explained by the classical and Keynesian theories. According to Fox and Gandhi (2021), unemployment in Sub-Saharan Africa results from multiple causes. The consequences of high fertility on employment appear to be underappreciated in the region compared to other regions. The youth-dominated population is also experiencing an under-skilling problem leading to a shift in unemployment levels.

1.2 Labour markets in Southern Africa
The labour markets in Southern Africa exhibit similar characteristics to those of the rest of Africa (Ncube, 2008). They are segmented into rural and urban, formal and informal or public and private. About two-thirds of the labour force in Zambia, Malawi, Zimbabwe and Mozambique work in agriculture – proportions far above the sub-Saharan African average. In 2019, the highest unemployment rate recorded in Africa was 26.5 per cent for the Southern Africa region (ILO, 2020). The figure is inflated by South Africa’s particularly high rate of 27.0 per cent. The high unemployment rate in Southern Africa
is consistent with the lack of diversified economic enterprises in the region. According to ILO (2020), as of 2018, the share of informal employment in total employment for southern Africa was 40.2\(^1\) per cent, while the share of non-agricultural informal employment in total employment was 36.1\(^2\) per cent.

The labour markets in Southern Africa, therefore, are fragile and have often been characterised by the migration of the workforce in search of greener pastures. From the colonial era to the post-independence period, Southern African countries have cooperated in facilitating large movements of people from country to country in search of employment (Intergovernmental Committee of Experts, 1997). The labour migration to the South African mines dominated the movements. The mines employed over 725,000 people in the mid-1970s, of whom 40.0 per cent were foreign labour movements mainly from its northern neighbours now constituting the Southern African Development Community (SADC). As people, especially youth, move from one country to another in search of greener pastures, labour markets can be affected in several ways. For example, in the case of Europe, the opening up of labour markets following the enlargement of the European Union in 2004 mainly has had positive effects on source countries’ labour markets (Pryymachenko, Fregert, & Andersson, 2013).

For the majority of the countries of Southern Africa, reliance on remittances from migrant workers from South African mines had distorted and trapped their economies in a vicious circle of underdevelopment (Intergovernmental Committee of Experts, 1997). Most of these countries have neglected the area of employment and general human resources utilisation and management. The region is currently grappling with rising levels of unemployment amongst youth, which stood at 25.1 per cent on average in 2017, with South Africa (57.4 per cent), Eswatini (54.8 per cent), and Namibia (45.5 per cent) recording the highest figures among the SADC’s 16 member states (SADC, 2020).

\(^1\) Source: Report on employment in Africa (Re-Africa) – tackling the youth employment challenge, page 16, Table 2.4 – International Labour Office -Geneva: ILO, 2020

\(^2\) Source: Report on employment in Africa (Re-Africa) – tackling the youth employment challenge, page 16, Table 2.4 – International Labour Office -Geneva: ILO, 2020
Some studies, however, suggest that opening up of labour markets may not only reduce unemployment in the source markets. According to Ruhs and Vargas-Silva (2020), research shows a small impact of overall immigration on the employment and unemployment rates of UK-born workers. Could this also be the case in Southern Africa? A study that was done by the OECD/ILO (2018) on how immigrants contribute to South Africa’s economy shows that overall, immigration generates favourable economic effects in South Africa. Immigrants’ workers have an upward effect on income per capita and a positive net fiscal contribution, while in general, they do not displace native-born workers. Immigrant workers also appear well-integrated in the labour market, demonstrate high employment rates, and may also generate additional employment opportunities for native-born workers (OECD/ILO, 2018). The findings, though, still leave the question of what determines unemployment levels in both the source and host markets given the observed unemployment rates over the years.

1.3 Unemployment in the SADC Member States from 1991 to 2020

The SADC, initially the Southern African Development Coordinating Conference (SADCC), was established in 1980. The SADCC was transformed into the SADC on 17 August 1992 in Windhoek, Namibia where the SADC Treaty was adopted, redefining the basis of cooperation among the Member States from a loose association into a legally binding arrangement (SADC, 2022). The main objectives of SADC are to achieve development, peace and security, and economic growth, alleviate poverty, enhance the standard and quality of life of the peoples of Southern Africa, and support the socially disadvantaged through regional integration, built on democratic principles and equitable and sustainable development.

Over the period 1991-2020, within which the SADC has been in existence, the unemployment rate has remained higher in the southmost countries of Lesotho, South Africa, Namibia, Eswatini and Botswana as compared to countries in the northern part of the region. Lesotho recorded the highest level of unemployment at 38.0 per cent in 1994. In South Africa and Eswatini, the unemployment rate reached 33.3 per cent and 28.2 per cent in 2002 and 2007, respectively. Mozambique and Tanzania have retained the lowest unemployment rate figures in the region. The highest unemployment rate in Mozambique was 3.4 per cent in 2015. Tanzania’s highest level of unemployment was 3.6 per cent in 1994. Overall, the decline in the unemployment
rate was higher in Lesotho and Zambia. In Angola, Botswana and Comoros, there were notable increases in the unemployment rate throughout the study period.

The following graph shows the average unemployment rate in SADC countries for the period 1991 to 2020:

![Average unemployment rate in SADC countries](image)

**Figure 1: Average unemployment rate in SADC countries**

Source: World Development Index

Note: Lesotho, South Africa, Eswatini, Namibia and Botswana are also members of the Southern African Customs Union (SACU).

Although the SADC Member States continue to advance the regional integration process, there exist historical, political and cultural factors that influence inter-country similarities and diversities. These have the potential to influence and affect regional policy implementation. For example, countries of Tanzania and the Democratic Republic of Congo can traditionally be more associated with the East African Community (EAC) despite being members of the SADC. Among the known ties of historical importance, present-day Malawi, Zambia and Zimbabwe were once under one administrative rule known as the Federation of Rhodesia and Nyasaland between 1953 and 1963 (Steinberg, 1962). It is no surprise that people of the three countries share cultural similarities including some native languages. Mozambique and Angola
have Portuguese as their official language due to colonial history, a language not common in the rest of the member states.

Notable intra-regional cooperation, however, is found in the five southmost countries of Lesotho, South Africa, Eswatini, Namibia and Botswana. They form the Southern African Customs Union (SACU), the world’s oldest Customs Union which was established in 1910 (SACU, 2022). The five countries also share a rich cultural background and political ties.

The Southern African Customs Union Agreement (2002) establishes common policies in industrial development, agriculture, competition and unfair trade practices. The policies allow free movement of goods between member countries, and provide for a common external tariff and sharing of revenue among members, from customs and excise realised in the common customs area. These policies aim to attain an economic union that, to a great extent, can also influence some of the major macroeconomic variables used to determine the unemployment level in the member states.

The idea of an economic union is further shared at the regional level as SADC member states continue discussing the process of deepening regional economic integration through the implementation of a single currency (SADC, 2020). The necessary prerequisites are being piloted in four of the five SACU member states (South Africa, Lesotho, Eswatini and Namibia) which currently have a Common Monetary Area that use the South African Rand. Incidentally, SACU countries have the highest unemployment rates in the region as shown in Figure 1 above, with only Lesotho recording an average decrease in the unemployment rate across the period under study. Figure 2 compares the unemployment rates in the SADC countries between the years 1991 and 2020.

The SADC Employment and Labour Sector has developed its first comprehensive SADC Employment and Labour Policy Framework, covering the period 2021-2030 (SADC, 2021). The policy framework addresses challenges relating to economic growth and employment creation, intending to enhance regional cooperation to reduce the serious decent work deficits in SADC. Given this context, it is imperative to
understand the unemployment dimensions of the region and how they relate to the set regional policies and protocols.

![Comparison of unemployment rates in the SADC countries between 1991 and 2020](image)

Figure 2: summary comparison of unemployment rates in Southern Africa.

Source: World Development Index

**1.4 The objective of the study**

The purpose of the study is to compare the disparities in unemployment rates between countries in the SADC region. The study assesses structural changes in SADC economies and regional labour market policies to understand the status quo and draw rational conclusions for the future of regional labour markets.

The study aims to achieve this by examining the relationship between some key macroeconomic variables and the unemployment rate in the region. It, therefore, assesses the key determinants of unemployment in SADC. The study divides the region into two subgroups: Southern African Customs Union (SACU) and non-SACU. This is done given the different economic systems and the observed unemployment trends. A list of countries used in the study is attached as Appendix 3. A combined approach of linear models using panel data is proposed to estimate the macroeconomic variables that influence unemployment.
2. LITERATURE REVIEW

2.1 Theoretical Literature

2.1.1 The classical theory of unemployment
In classical economic theory, unemployment is seen as a sign that the smooth functioning of the labour market is impeded in some way (Goodwin, Nelson, Ackerman, & Weisskopf, 2006). It assumes a perfect market characterised by a supply and demand model: that is, the labour market is a single, static market characterised by perfect competition, spot transactions and double auction institutions. Goodwin et. al. (2006), therefore describe a market in which workers supply and employers demand labour. It is assumed that each unit of labour output is equal and that each worker in this market receives the same wage.

2.1.2 Keynesian theory of unemployment
The Keynesian school of thought views unemployment as a cyclical and involuntary phenomenon where a lack of aggregate demand in certain periods of the business cycle leads to a situation where there are insufficient employment opportunities to meet the number of job seekers (Damane & P. Sekantsi, 2018). This is detailed by the Keynesian Phillips curve, which shows that an increase in the money supply with high output leads to a decrease in interest rates and an increase in investment demand (Kelly, 2011). Since aggregate demand is greater than aggregate supply, prices rise, but while prices rise, real wages fall. When real wages fall, firms demand more labour, causing output to rise and unemployment to fall.

Using the output gap approach, the Okun coefficient was therefore estimated to explain the relationship between unemployment and GDP fluctuations (Okun, 1962). The original Okun equation (1) refers to the deviation of output from potential GDP:

\[ \Delta U = a + b(gap) \]  

The equation was later modified into:

\[ \Delta U = a - b \left( \frac{\Delta Y}{Y} \right) \]
where $Y$ is gross domestic product (GDP) and $U$ is unemployment (Sanele & Siphuxolo, 2021). Alternatively, Okun’s first difference method, equation (3), can be used to estimate output in response to changes in unemployment:

$$\left( \frac{\Delta Y}{Y} \right) = a - b \Delta U_t + \varepsilon_t \tag{3}$$

Or

$$\log Y_t = a - b \log U_t + \varepsilon_t \tag{4}$$

The Okun coefficient can be derived from the estimate of $b$. Equation (4) shows the inverse relationship between output growth and unemployment but does not explain the causal relationship between them. A Granger causality test can be used to determine whether this is the case (Sanele & Siphuxolo, 2021).

### 2.2 Empirical Literature

A key issue in macroeconomics is: why has the unemployment rate remained persistently higher in the southmost countries of the SADC region over the past three decades compared to countries north of the region? Different macroeconomic theories have previously been used to explain the unemployment rate of several countries.

The short-run Phillips curve has been used to show the trade-off between the inflation rate and unemployment rate while holding constant the expected inflation rate and the natural unemployment rate. Whereas this was initially viewed by economists and policymakers as a structural relationship in the economy that remains unchanged over long periods, the assertion was overturned by the Friedman-Phelps natural rate model (Gordon, 2018). They rejected the assumption that the expected inflation rate is constant. They argued that it is more likely that expected inflation adjusts if current inflation rates are different from past inflation rates.

Their view is supported by Junankar and Madsen (2004) who studied why the unemployment rate in 22 OECD countries increased over two decades and why it persisted at high levels. The study estimated four models, namely: the L&N model, B&S model, The McCallum model, and Phelps’ model using data from 1960 to 1993.
They estimated the models on a consistent database of 22 OECD countries over the period 1960 to 1993 using the best practice econometrics estimation methods. The study utilized the generalized instrumental variable method of Kmenta (1986), the Hsiao (1975) random coefficient estimator, the Swamy cross-section model, and the between-individual estimator of Baltagi and Griffin (1984). The findings of this study suggest that the “natural rate of unemployment” has been driven up mainly by wage push factors (Junankar & Madsen, 2004). The estimates revealed that coefficients on key variables often turn out with signs which are at odds with theories or are insignificant and that the second-order autoregressive model performs nearly as well as all the other models.

Gordon (2018), however, criticises the underlying assumption of the Friedman-Phelps approach that the labour market continuously clears and that changes in unemployment down or up occur only in response to “fooling” of workers, firms, or both. He implores a Keynesian approach to explain quantity rationing by inertia in price and wage setting. He argues that the positive correlation between inflation and unemployment in the 1970s and again in the 1990s is explained by joining the negatively sloped Phillips Curve with a positively sloped dynamic demand curve. For any given growth of nominal GDP, higher inflation caused by adverse supply shocks implies slower real GDP growth and higher unemployment (Gordon, 2018). This “triangle” model based on inflation inertia, demand, and supply worked well to explain why inflation and unemployment were both positively and negatively correlated between the 1960s and 1990s, but in the past decade, the slope of the short-run Phillips Curve has flattened as inflation exhibited a muted response to high unemployment in 2009-13 and low unemployment in 2016-2018.

Sadiku et. al. (2015) estimated the relationship between economic growth and unemployment in FYR of Macedonia by applying Okun’s law. They used four different models: the difference model, the dynamic model, ECM and the VAR estimation. The empirical results from all models showed that there was no robust evidence to confirm the inverse linkage between the unemployment rate and economic growth, as Okun’s law suggests. Instead, findings from the study suggested that Macedonia’s economic policies were not suitable for fostering development and reducing unemployment. This
was because the primary source of employment is the public sector rather than the private sector.

Among some of the studies done in Africa, Moosa (2008) investigated the responsiveness of unemployment to output, as represented by Okun’s law, in four Arab countries: Algeria, Egypt, Morocco and Tunisia. Okun’s coefficient turned out to be statistically insignificant, which means that output growth does not translate into employment gains. The findings imply that boosting growth is not a sufficient condition for reducing unemployment in Arab countries.

Sanele and Siphuxolo (2021) tested the existence of Okun’s coefficient in South Africa. They used annual data spanning from 1995 to 2020. Their study employed an error correction model (ECM) to test a short-run relationship between the variables. The study applied the Granger causality test to check the short-run causal relationship between the variables. The findings showed that there is a negative and significant relationship between unemployment and gross domestic product in the short run. They, therefore, concluded that Okun’s Law exists in South Africa. Based on the results from the Granger causality test the study showed that GDP growth reduces unemployment in South Africa.

Folawewo and Adeboje (2017). Investigated the macroeconomic determinants of unemployment in the Economic Community of West African States (ECOWAS). They used a combination of Okun’s law and the Philips curve hypotheses to derive, from a production function with an embedded labour market structure, the relationship between unemployment and output changes in the economy. They employed fixed and random effects, as well as fully modified ordinary least squares (FM-OLS) panel data estimation techniques on annual data covering 1991 to 2014. The study employed a Johansen Fisher panel cointegration test to establish the long-run relationship between the macroeconomic variables and unemployment. Results from empirical analyses performed at both aggregate ECOWAS data level and sub-regional levels, that is, Francophone and Anglophone country levels showed that gross domestic product (GDP) growth has a reducing but insignificant effect on the unemployment rate, which indicates low employment elasticity of growth in the region (Folawewo & Adeboje, 2017).
In light of this review of the literature, it is evident enough that there exists a theoretical relationship between unemployment and other key macroeconomic variables. Although several studies have successfully used the Phillips curve and Okun’s law to explain the relationship between inflation and unemployment as well as economic growth and unemployment, respectively, others have failed to do so. The reasons for failure to establish the relationships vary depending on several factors. Such could include the quality of the data used, methodology, and the economic dynamics of the countries where the study is conducted.

3. METHODOLOGY AND DATA

3.1 Theoretical Model
The study adopts a combined Philips curve and Okun’s law approach to analyse the relationship between the unemployment rate and several macroeconomic variables. It is based on the Dornbusch et al. (2011) Phillips-Okun curve. They, first, established the inflation and employment relationship from the Phillips curve framework by deriving the wage-employment relation and showing that the next period wage is equal to the prevailing present period wage, adjusted for the level of employment and expected inflation (Folawewo & Adeboje, 2017).

They showed that according to the Phillips curve, the rate of wage inflation decreases with the unemployment rate. Letting $W_t$ be the wage this period, and $W_{t+1}$ the wage next period, the rate of wage inflation, $g_w$, is defined as:

$$g_w = \frac{W_{t+1} - W_t}{W_t}$$

Given that $u$ represents the unemployment rate and $u^*$ representing the natural rate of unemployment, a simple Phillips curve is written as:

$$g_w = -\epsilon (u - u^*)$$
where $\epsilon$ measures the responsiveness of wages to unemployment. According to the equation, wages are falling as the unemployment rate exceeds the natural rate. That means $u > u^*$, and rising when unemployment is below the natural rate (Dornbusch, Fischer, & Startz, 2011). The difference between unemployment and the natural rate is called the unemployment gap and is expressed as $u - u^*$. Using the definition of the rate of wage inflation, equation (5) can be rewritten to look at the level of wages today relative to the past level:

$$W_{t+1} = W_t [1 - \epsilon(u - u^*)]$$  \hspace{1cm} (6a)

Equation (6a), therefore, shows that unemployment must fall below the natural rate for wages to rise above their previous level. Equation (6), however, does not incorporate the expected or anticipated inflation. We then rewrite the equation, the original wage-inflation Phillips curve, to show that it is the excess of wage inflation over expected inflation that matters:

$$(g_w - \pi^e) = -\epsilon(u - u^*)$$ \hspace{1cm} (7)

where $\pi^e$ is the level of expected price inflation.

If we maintain the assumption of a constant real wage, then the actual inflation, $\pi$, will equal wage inflation. The equation for the modern version of the Phillips curve, which is the (inflation-) expectations-augmented Phillips curve, can be written as:

$$\pi = \pi^e - \epsilon(u - u^*)$$ \hspace{1cm} (8)

Note that the modern Phillips curve, equation (8) possesses two critical properties:

- The expected inflation is passed one for one into actual inflation; and
- Unemployment is at the natural rate when actual inflation equals expected inflation.
Now, assuming that $N$ represents the actual level of employment and $N^*$ denotes the full employment level, then the unemployment rate can be defined as the fraction of the full-employment labour force, $N^*$, that is not employed:

$$u - u^* = \frac{N^* - N}{N^*} \quad (9)$$

Substituting equation (9) into (7), the Phillips curve relationship between the level of employment, expected inflation, and the rate of change in wages can be presented as:

$$g_w - \pi^e = \frac{W_{t+1} - W_t}{W_t} - \pi^e = -\epsilon \left( \frac{N^* - N}{N^*} \right) \quad (6b)$$

Equation (6b) shows that the wage next period (e.g. next quarter) is equal to the wage that prevailed in the present period but with an adjustment for the level of employment and expected inflation. If employment surpasses the full-employment level, then the wage next period will increase above this period’s wage by more than expected inflation.

Next, the relationship between unemployment and output is explored. According to Okun’s law, unemployment and output are tightly linked in the short-run (Dornbusch, Fischer, & Startz, 2011). Okun’s law is presented in equation (10) as follows:

$$\frac{Y - Y^*}{Y^*} = -\omega(u - u^*) \quad (10)$$

If 1 extra point of unemployment costs 2 per cent of GDP then $\omega \approx 2$, that is, $\omega$ shows the relationship between GDP growth and the employment gap. The negative sign shows a trade-off between the two sides. Assuming that firm’s base price is on the labour cost of production, then if each unit of labour produces $a$ units of output, the labour cost of production per unit is $W/a$. For example, given a wage of $15 per hour
and \( a \) is 3, then labour cost would be $5 per unit. The ratio \( W/a \) is known as the unit labour cost. Firms, therefore, set price as a markup, \( z \), on labour costs:

\[
p = \frac{(1 + z)W}{a}
\]  

(11)

The Phillips curve in equation (6b) presents wage increases as a function of expected price inflation and the gap between unemployment and the natural rate. Okun’s law, equation (10), translates the unemployment gap to the GDP gap (actual GDP, \( Y \) versus potential GDP, \( Y^* \)), needed for the aggregate supply curve. The price–cost relation in (11) shows that wage inflation and price inflation rates are the same. The three equations together give the following combined Phillips curve and Okun’s law:

\[
P_{t+1} = P_{t+1}^e + P_t \frac{\varepsilon}{\omega} \left( \frac{Y - Y^*}{Y^*} \right)
\]  

(12)

The approximate version of equation (12) is written as equation (13):

\[
P_{t+1} = P_{t+1}^e \left[ 1 + \lambda(Y - Y^*) \right]
\]  

(13)

3.2 Empirical Model

The study uses a combination of Okun’s law and the Philips curve hypotheses, guided by the empirical literature and theoretical model. The relationship between unemployment and other macroeconomic variables is derived from a production function with an embedded labour market structure. Following Folawewo & Adeboje (2017) and Dogan (2012), the empirical model for the study is stated as:

\[
y_{it} = \alpha \Gamma X_{it} + \varepsilon_{it}
\]  

(14)
where \( y \) is unemployment, \( X \) is a vector of determinants of unemployment, \( \varepsilon \) is random errors, \( i \) denotes individual countries in the SADC region, and \( t \) represents the year, \( t = 1991, 1992 \ldots, 2020 \). The is specified in its explicit form as follows:

\[
\text{unemp}_{it} = \alpha_{1i} + \alpha_{2gdp_{it}} + \alpha_{3inf_{it}} + \alpha_{4fdi_{it}} + \alpha_{5labprod_{it}} + \alpha_{6debt_{it}} + \alpha_{7pop_{it}} + \nu_{it} \tag{15}
\]

where \( \nu_{it} = \mu_{it} + \varepsilon_{i} \)

The unemployment rate (\( \text{unemp} \)) is a function of GDP growth (\( \text{gdp} \)), inflation (\( \text{inf} \)), foreign direct investment (\( \text{fdi} \)), labour productivity (\( \text{labprod} \)), total external debt stocks (\( \text{debt} \)), and population (\( \text{pop} \)). The \( \varepsilon_{i} \) is the cross-section, or individual-specific, error component while \( \mu_{it} \) is the combined time series and cross-section error component.

### 3.2.1 Stationarity Test

A series must be checked for stationarity before fitting a model into the time series data. Stationarity occurs when the joint distribution of a time series variable and its lagged values does not change over time (Stock & Watson, 2020). That is, the joint distribution of \((Y_{s+1}, Y_{s+2}, \ldots, Y_{s+T})\) does not depend on \( s \), regardless of the value of \( T \); otherwise, \( Y_{t} \) is said to be nonstationary. To address the stationarity properties of the time series, panel data unit root tests were done to ascertain whether or not the observed country-specific time series for the variables exhibit stochastic trends. The tests were based on the general structure of panel unit root testing procedures which follow the \( AR(t) \) process:

\[
y_{i,t} = \mu_{i} + \phi_{i}y_{i,t-1} + \sum_{j=1}^{k_{i}} \varphi_{i,j} \Delta y_{i,t-j} + \varepsilon_{i,t} \tag{16}
\]

or, equally

\[
\Delta y_{i,t} = \mu_{i} + \rho_{i}y_{i,t-1} + \sum_{j=1}^{k_{i}} \varphi_{i,j} \Delta y_{i,t-j} + \varepsilon_{i,t} \tag{17}
\]

where \( i = 1, \ldots, N \) is the cross-section dimension, \( t = 1, \ldots, T \) is the time dimension, \( \rho_{i} = (\phi_{i} - 1) \) and \( \varepsilon_{i,t} \) independently and identically distributed with \( \text{E}(\varepsilon_{i,t}) = \ldots \)
$0, \, \text{E}(\varepsilon_{i,t}^2) = \sigma_i^2 < \infty \text{ and } \text{E}(\varepsilon_{i,t}^4) < \infty$ (Kleiber & Lupi, 2011). The null hypothesis $H_0 : \rho_i = 0 \forall i$ indicates the presence of a unit root in the variable.

The tests conducted include:

(i) Levin, Lin and Chu (LLC) (2002) panel unit root test;
(ii) The Im, Pesaran and Shin (IPS) (2004) unit root test;
(iii) Maddala and Wu (Madwu) (1999) unit root test;
(iv) Choi (2001) modified panel unit root test; and

3.2.2 Cointegration Test

Two or more series are said to be cointegrated if they have a common stochastic trend (Stock & Watson, 2020). A Johansen cointegration test was performed to examine whether the variables are cointegrated (i.e. whether there are stable long-term equilibrium relationships among them) to avoid spurious regressions.

3.2.3 Lag Length Selection

Selecting an optimal lag length is important in choosing a model. By including too many lags, standard errors of coefficient estimates can be inflated whereas too few lags may result in estimation bias.

3.2.4 Estimation Technique

The study uses two approaches: the static panel data analysis technique and the fully modified ordinary least squares technique (FM-OLS) to estimate empirical models. A Hausman test is implored to determine the static panel data estimator between fixed and random effect models. Further, a Breusch-Pagan Lagrange Multiplier (LM) test for a balanced panel is done to find out if there are no variances across countries.

Fixed effects assume that differences between individuals (cross-section) can be accommodated from different intercepts (Zulfikar, 2018). That is, to estimate the Fixed Effects model with different intercepts between individuals, the dummy variable technique is used. Such estimation models are often referred to as the Least Squares Dummy Variable technique (LSDV) (Zulfikar, 2018). The Fixed Effects equation is:
\[ y_{it} = \alpha_i + \beta' X_{it} + \varepsilon_{it} \]  \hspace{1cm} (18)

for \( i = 1,2, \ldots, N \) and \( t = 1,2, \ldots, T \).

Where \( N \) = number of individuals or cross-sections and \( T \) = the number of time periods.

Whereas the Random Effects model assumes that parameters in all cross-sections are random, and individual effects and explanatory variables are not correlated (Hausman, 1978). The model estimates panel data where interference variables may be interconnected between time and between individuals. The difference between intercepts is accommodated by the error terms of each country (Zulfikar, 2018). It applies the principle of maximum likelihood or the Generalized Least Square (GLS) technique. The random effects equation is:

\[ y_{it} = \alpha_i + \beta' X_{it} + u_i + \varepsilon_{it} \]  \hspace{1cm} (19)

for \( i = 1,2, \ldots, N \) and \( t = 1,2, \ldots, T \).

Where: \( N \) = number of individuals or cross section;
\( T \) = the number of time periods;
\( E_{it} \) = the residual as a whole where the residual is a combination of cross section and time series; and
\( U_i \) = the individual residual which is the random characteristic of unit observation the \( i \)-th and remains at all times.

To cover the heterogeneity aspect across individual members of the panel and provide optimal estimates of cointegrating regressions, the FM-OLS is employed. The method modifies least squares to account for serial correlation effects and for the endogeneity in the regressors that results from the existence of a cointegrating relationship (Phillips, 1995). The equation for which the FM-OLS estimator is calculated:

\[ y = \delta \cdot D + \beta \cdot x + u \]  \hspace{1cm} (20)
with $D$ as the deterministic matrix. Then $\theta = (\delta', \beta')'$ is the full parameter vector.

### 3.2.5 Data and Sources
The analysis used macro-level time series data from 1991 to 2020. Almost all data is sourced from the World Bank’s World Development Indicator (WDI) database except data on labour productivity which is sourced from International Labour Organisation (ILO) Database. The inflation indicator had some missing data for several countries hence additional data was collected from other sources including the specific countries’ central banks. Appendix 1 outlines a comprehensive definition of variables and data sources.

### 4. RESULTS AND DISCUSSION

#### 4.2 Panel Unit Root Test and Cointegration Test
Panel unit root tests were used in the study to determine the stationarity of the variables. The summary results of the tests are presented in Table 1. For all five tests conducted, the null hypothesis of the presence of a unit root is rejected for four of the seven variables. This means that four variables are stationary at the same level. However, labour productivity, external debt and population are stationary in the first difference.

Since some of the variables are non-stationary (i.e. not integrated of order zero, I(0)), a panel cointegration test is performed to determine whether the variables have a long-run relationship. The cointegration test for the unemployment model is based on the Johansen test. It was chosen because it avoids the issue of choosing a dependent variable and also issues created when errors are carried from one step to the next. Further, unlike other panel cointegration tests such as Pedroni (1999, 2001), the Johansen test can handle a combination of I(0) and I(1) series (Folawewo & Adeboje, 2017).

Based on the test results as shown in Appendix 2, all the variables are jointly cointegrated at a 5% significant level and have a long-run relationship. Six of the seven variables are jointly cointegrated at a 1% significant level. All the variables, therefore, are used together in predicting the behaviour of unemployment.
Table 1: Panel Unit Root Tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>LLC Test statistic</th>
<th>IPS W_{bar} statistic</th>
<th>Madwu Chi^2 statistic</th>
<th>Choi Pm statistic</th>
<th>Choi L statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNEMP</td>
<td>-2.177 I(0)</td>
<td>-8.602 I(1)</td>
<td>48.877 I(0)</td>
<td>2.790 I(0)</td>
<td>-1.770 I(0)</td>
</tr>
<tr>
<td>GDPGR</td>
<td>-6.463 I(0)</td>
<td>-8.778 I(0)</td>
<td>225.890 I(0)</td>
<td>26.444 I(0)</td>
<td>-15.894 I(0)</td>
</tr>
<tr>
<td>INF</td>
<td>-22.591 I(0)</td>
<td>-14.773 I(0)</td>
<td>399.800 I(0)</td>
<td>49.684 I(0)</td>
<td>-29.654 I(0)</td>
</tr>
<tr>
<td>FDI</td>
<td>-4.924 I(0)</td>
<td>-5.479 I(0)</td>
<td>112.800 I(0)</td>
<td>11.331 I(0)</td>
<td>-7.749 I(0)</td>
</tr>
<tr>
<td>LABPROD</td>
<td>-8.850 I(1)</td>
<td>-11.707 I(1)</td>
<td>259.400 I(1)</td>
<td>30.922 I(1)</td>
<td>-19.250 I(1)</td>
</tr>
<tr>
<td>EXTDEBT</td>
<td>-14.162 I(1)</td>
<td>-14.089 I(1)</td>
<td>300.490 I(1)</td>
<td>36.413 I(1)</td>
<td>-22.441 I(1)</td>
</tr>
<tr>
<td>POP</td>
<td>-1.884 I(1)</td>
<td>-2.445 I(1)</td>
<td>133.24 I(0)</td>
<td>14.063 I(0)</td>
<td>-3.263 I(1)</td>
</tr>
</tbody>
</table>

Note: Automatic lag length based on AIC

4.3 Hausman Test

A Hausman test is run to decide on whether to apply the fixed or random effects model in estimating the unemployment equation. It tests whether the unique errors \( (u_i) \) are correlated with the regressors (Torres-Reyna, 2010). The test is run under the hypothesis:

\[
H_0 : \text{Random Effects Model is consistent}
\]
\[
H_A : \text{Fixed Effects Model is consistent}
\]

The result, \( \text{chisq} = 1.2834, \text{df} = 6, \text{p-value} = 0.9726 \), indicates that the p-value is insignificant and fails to reject the null hypothesis hence Random Effects model is preferred.

4.4 Regression Diagnostics

4.4.1 Random Effects versus Pooled OLS

A Breusch-Pagan Lagrange multiplier (LM) test was done to ascertain if there are significant differences across countries. The null hypothesis is that variances across countries are zero. That is, there is no significant difference or panel effect across countries. Based on the results obtained, in Appendix 4, we fail to reject the null hypothesis and conclude that the Random Effects model is not appropriate. There is no evidence of significant differences across countries, therefore, we can run a Pooled OLS regression.
4.4.2 Fixed Effects versus Pooled OLS

An F test was then carried out to confirm the consistency of the Pooled OLS model over the Fixed Effects model, under the hypothesis:

\[ H_0: \text{Pooled OLS model is consistent} \]
\[ H_A: \text{Fixed Effects Model is consistent} \]

The F test for individual effects failed to reject the null hypothesis, Appendix 4, and confirmed that there are no significant effects in the dataset. We, therefore, proceeded to use the Pooled OLS model.

4.4.3 Cross-sectional dependence testing

Cross-sectional dependence tests were conducted to test for contemporaneous correlation using both the Breusch-Pagan LM test of independence and the Pasaran CD test. According to Baltagi (2013), cross-sectional dependence is a problem in macro panels with long time series. This is not much of a problem in micro panels, that is, a few years and a large number of cases. Breusch-Pagan LM and Pasaran CD (cross-sectional dependence) tests are used to test whether the residuals are correlated across entities. Cross-sectional dependence can lead to bias in test results (also called contemporaneous correlation). The null hypothesis in both Breusch-Pagan LM and Pasaran CD tests of independence is that residuals across entities are not correlated.

Following the tests, the Breusch-Pagan LM test failed to reject the null hypothesis signifying the presence of cross-sectional dependence. The Pasaran CD test, however, failed to reject the null hypothesis. Nevertheless, the study estimated the Pooled OLS model using the Driscoll-Kraay standard errors to overcome the problem of cross-sectional correlation. Results of the Breusch-Pagan LM and Pasaran CD tests are in Appendix 4.

4.5 Empirical Results

Therefore, after the Hausman test and the results of the regression diagnostic test, which showed that the pooled OLS model is efficient and consistent, the interpretation
of the results is based on the pooled OLS and FM-OLS models. The panel data regression results for the aggregated SADC data are presented in Table 3, while the results for the SACU and non-SACU countries are presented in Table 4 and Table 5, respectively.

The relationship between GDP growth and the unemployment rate in the SADC region is mixed. While we do not find that there is an inverse relationship between GDP growth and the unemployment rate in the SACU subregion, the impact of output growth on unemployment appears to be negative in the non-SACU countries. However, the study finds that GDP growth in SADC is of little or no significance in all models.

The non-negative regression coefficient of output growth in SACU member countries can be explained by an imbalance between output growth and labour supply growth. According to Levine (2013), in the absence of productivity growth, output growth equals labour supply growth as long as each new worker is employed. If the GDP growth rate falls below the labour force growth rate, not enough new jobs will be created to accommodate all job seekers. Eventually, the share of employed persons in the labour force will decline, causing both GDP and the unemployment rate to rise simultaneously. A similar scenario occurs with labour productivity growth, as long as more people enter the labour market than are needed to produce a given quantity of goods and services. The non-negative relationship is consistent with the results of similar studies by Sadiku et al. (2015) in Macedonia and, in African countries: Adenuga et al. (2013); and Ashipala & Eita (2010).

The negative result in non-SACU member states, although not significant, confirms the existence of Okun's law. This suggests that GDP growth is not sufficient to offset the impact of the combined growth rates of the labour force and productivity (potential output) that would lead to a decline in the unemployment rate (Levine, 2013). The SADC region should therefore adopt and implement policies that support sustainable economic growth and job creation. Several other studies have noted the negative and insignificant relationship between GDP growth and the unemployment rate: Folawewo & Adeboje (2017); Moosa (2008).
The results show that the estimated effect of inflation on unemployment in SADC and non-SACU member states is overall negative and statistically insignificant. However, the regression coefficient is positive in all models in SACU member states and significant in the FM-OLS model. The coefficient of 0.0089 refutes the Phillips curve hypothesis of a trade-off between inflation and unemployment and confirms the results of Folawewo & Adeboje (2017) and Damane & Sekantsi (2018). The result also confirms the natural rate model, which assumes that there is a natural rate of unemployment, which is known to represent a level of employment that is consistent with a stable rate of inflation. According to Labonte (2016), the inflation rate is expected to accelerate when the unemployment rate falls below the natural rate of unemployment, which is called the negative unemployment gap. When the unemployment rate exceeds the natural rate of unemployment, which is referred to as a positive unemployment gap, inflation is expected to decelerate. However, if the unemployment rate remains below the natural level, this would lead to a continuous increase in inflation rather than a one-time increase in the inflation rate. Both high unemployment and high inflation could occur. The natural rate of unemployment is also referred to as the nonaccelerating inflation rate of unemployment (NAIRU). The inverse relationship between the unemployment rate and the inflation rate in non-SACU member states confirms the Philips curve hypothesis. It also suggests that there is a difference between some SACU and non-SACU member states in how the inflation rate affects or is affected by the labour market.

FDI and unemployment are inversely related, meaning that an increase in FDI tends to lead to job creation. However, in the case of the SADC region, both SACU and non-SACU member states, there is insufficient evidence to suggest that the impact of FDI is sufficient to reduce unemployment. The coefficients in all models are very insignificant. The results are consistent with the findings of Mkombe et al. (2021). The nonsignificant effect may indicate that the nature of FDI in the region is partly mergers and acquisitions, which create fewer jobs compared to greenfield investments. According to Strat et al. (2015), greenfield investments have significantly higher positive effects on employment rates compared to brownfield investments. Brownfield

---

3 An investor or a company builds own, brand new facilities from ground up.
4 An investor or a company purchases or leases an existing facility.
investment would have no or even a negative impact on employment. The low regression coefficients may therefore suggest that a large proportion of FDI in the SADC region is brownfield investments. In addition to the type of FDI, it is very important to increase the volume and performance of FDI (Mkombe, et al., 2021). Currently, the scale and performance of FDI in SADC countries are affected by various country-specific restrictions that negatively impact FDI inflows and performance.

According to the findings of the study, labour productivity is an important determinant of unemployment in the SADC region. Although the FM-OLS shows an inverse relationship between labour productivity and the unemployment rate for the SADC aggregate, the relationship is positive in the pooled OLS model and all models for the SACU and non-SACU analysis. The significant positive effect suggests that an increase in labour productivity does not create employment, which is consistent with

<table>
<thead>
<tr>
<th>Variable</th>
<th>Static panel data estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fixed effects</td>
</tr>
<tr>
<td>Constant</td>
<td>0.0021</td>
</tr>
<tr>
<td>GDPgr</td>
<td>0.0004</td>
</tr>
<tr>
<td>Inf</td>
<td>-0.0000</td>
</tr>
<tr>
<td>FDI</td>
<td>-0.0000</td>
</tr>
<tr>
<td>Labprod</td>
<td>0.5607***</td>
</tr>
<tr>
<td>Extdebt</td>
<td>-0.2190*</td>
</tr>
<tr>
<td>Pop</td>
<td>0.2095</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.489</td>
</tr>
<tr>
<td>F-test</td>
<td>54.640***</td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parentheses;
'***', '**', and '*' signify 1%, 5% and 10% significance levels, respectively.
one aspect of the theoretical postulate (Folawewo & Adeboje, 2017). The trend could also represent a structural break, according to which labour productivity, average real wages and the unemployment rate rise simultaneously. The break seems to, first, have a negative impact on employment levels and then affect wages per worker and productivity (Wakeford, 2010). Real wages and productivity are in a long-run equilibrium relationship (cointegration), but unemployment is not linked to the system, which underpins the insider-outsider theory. Productivity grows faster than wages, so labour’s share of gross output shrinks over time. A plausible explanation could be that a relatively large technology shock, capital intensification and rising real wages do not allow improved output per worker to lead to an increase in employment (Krugman, 1994).

Table 3: Estimation results (SACU)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fixed effects</th>
<th>Random effects</th>
<th>Pooled OLS</th>
<th>Panel fully modified OLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.0222</td>
<td>0.0222</td>
<td>-0.0001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0183)</td>
<td>(0.0319)</td>
<td>(0.0005)</td>
<td></td>
</tr>
<tr>
<td>GDPgr</td>
<td>0.0039</td>
<td>0.0039</td>
<td>0.0039</td>
<td>0.0018</td>
</tr>
<tr>
<td></td>
<td>(0.0069)</td>
<td>(0.0078)</td>
<td>(0.0070)</td>
<td>(0.0042)</td>
</tr>
<tr>
<td>Inf</td>
<td>0.0097</td>
<td>0.0098***</td>
<td>0.0098</td>
<td>0.0089**</td>
</tr>
<tr>
<td></td>
<td>(0.0106)</td>
<td>(0.0020)</td>
<td>(0.0107)</td>
<td>(0.0029)</td>
</tr>
<tr>
<td>FDI</td>
<td>-0.0000</td>
<td>-0.0000***</td>
<td>-0.0000</td>
<td>-0.0000</td>
</tr>
<tr>
<td></td>
<td>(0.0000)</td>
<td>(0.0000)</td>
<td>(0.0000)</td>
<td>(0.0000)</td>
</tr>
<tr>
<td>Labprod</td>
<td>0.8124***</td>
<td>0.8114**</td>
<td>0.8114***</td>
<td>0.8560***</td>
</tr>
<tr>
<td></td>
<td>(0.0651)</td>
<td>(0.2675)</td>
<td>(0.0645)</td>
<td>(0.0868)</td>
</tr>
<tr>
<td>Extdebt</td>
<td>-0.1951</td>
<td>-0.1968</td>
<td>-0.1968</td>
<td>-0.1746</td>
</tr>
<tr>
<td></td>
<td>(0.1723)</td>
<td>(0.1150)</td>
<td>(0.1734)</td>
<td>(0.0965)</td>
</tr>
<tr>
<td>Pop</td>
<td>0.3455</td>
<td>0.3529</td>
<td>0.3529</td>
<td>0.3231**</td>
</tr>
<tr>
<td></td>
<td>(0.2227)</td>
<td>(0.2607)</td>
<td>(0.2283)</td>
<td>(0.1175)</td>
</tr>
<tr>
<td>R²</td>
<td>0.575</td>
<td>0.573</td>
<td>0.573</td>
<td></td>
</tr>
<tr>
<td>F-test</td>
<td>24.767***</td>
<td>151.434***</td>
<td>25.239***</td>
<td></td>
</tr>
<tr>
<td>No. of countries</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parentheses;
‘***’, ‘**’, and ‘*’ signify 1%, 5% and 10% significance levels, respectively
External debt is inversely related to unemployment and is significant in the aggregate SADC and non-SACU results in the FM-OLS model. There is insufficient evidence to suggest that it could be a significant determinant of unemployment in SACU member states. The significant inverse relationship in non-SACU countries suggests that external debt can have a positive impact on an economy and help to maintain existing jobs and create new ones. According to Cahydin & Ratwaningsih (2020), proper management of external debt can boost economic growth and reduce the unemployment rate. The dynamics and composition of public debt in the SADC region have changed significantly since 2012 when debt in SADC member countries started to rise again after a steady decline of almost a decade (Muriungi, 2021).

Table 4: Estimation results (non-SACU)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Fixed effects</th>
<th>Random effects</th>
<th>Pooled OLS</th>
<th>Panel fully modified OLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.0114</td>
<td>-0.0114</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>GDPgr</td>
<td>-0.0002</td>
<td>-0.0001</td>
<td>-0.0001</td>
<td>-0.0006</td>
</tr>
<tr>
<td>Inf</td>
<td>-0.0000</td>
<td>-0.0000</td>
<td>-0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>FDI</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>-0.0000</td>
</tr>
<tr>
<td>Labprod</td>
<td>0.4582***</td>
<td>0.4571***</td>
<td>0.4570***</td>
<td>0.4820***</td>
</tr>
<tr>
<td>Extdebt</td>
<td>-0.2125</td>
<td>-0.2138**</td>
<td>-0.2140</td>
<td>-0.2749***</td>
</tr>
<tr>
<td>Pop</td>
<td>0.1358</td>
<td>0.1325</td>
<td>0.1322</td>
<td>0.4370***</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.506</td>
<td>0.509</td>
<td>0.509</td>
<td></td>
</tr>
</tbody>
</table>

Note: Robust standard errors in parentheses; 
'***', '**', and '*' signify 1%, 5% and 10% significance levels, respectively.

There has been huge borrowing for infrastructure development and to finance fiscal deficits from domestic and foreign sources, a shift from multilateral creditors to bilateral and private creditors, a decline in concessional credit, access to international bond
markets and commercial credit, and increased external borrowing from China. The financing of unproductive activities through external debt may explain why external debt has not had a significant impact in some member countries in the region.

As expected, the relationship between population and unemployment rate is positive in both SACU and non-SACU member states. Population is also significant in the model FM-OLS. The positive interaction between population and unemployment is also consistent with the findings of Motsatsi (2019) and Folawewo & Adeboje (2017). Although the rapidly growing population can be an opportunity to drive Africa’s socio-economic development, it also poses a challenge as the number of young people out of work is staggeringly high (IOM-UN Migration, 2018). The SADC region is no exception, with an increase in the number of young people entering the labour force in recent years, and youth unemployment averaging 25.1 per cent in 2017 (SADC, 2020). Slowing population growth through the implementation of policies that bring about a decline in the birth rate can reduce the burden of dependency and alleviate social pressures on development. The decline in population growth results in fewer new entrants to the labour force, thus facilitating the task of job creation (Bloom & McKenna, 2015). The region must therefore hasten to implement the planned programmes to improve human capacity for socio-economic development (SADC, 2020).

5. CONCLUSION AND RECOMMENDATIONS

The study examined the macroeconomic determinants of unemployment rates in the SADC region given the observed differences in unemployment rates between the southernmost countries and others. The study used panel data estimation techniques to examine the determinants of unemployment in the region, which is divided into two subgroups: SACU and non-SACU member states. The study used a Johansen cointegration test to determine the long-run relationship between unemployment and the other variables. The results show that labour productivity, external debt and population as a regional block are significant determinants of the unemployment rate in SADC. However, it is worth noting that according to the study, inflation is a significant determinant of unemployment in SACU member states while it is insignificant in non-SACU member states. External debt is a significant determinant in the non-SACU
member states and not significant in the SACU sub-region. SACU countries have a higher average unemployment rate compared to non-SACU countries.

There was insufficient evidence of the impact of GDP growth on unemployment as the relationship was not found to be significant. While the relationship in SACU was positive, the inverse relationship in non-SACU member states confirmed Okun's Law, although GDP growth was not sufficient to cause a decline in unemployment. The findings are in line with earlier studies by Folawewo & Adeboje (2017). The inflation rate in SACU member states is positively related to the unemployment rate, suggesting that the unemployment rate remains below its natural rate (Labonte, 2016). In non-SACU member states, the relationship is negative, confirming the Phillips curve hypothesis. The inverse relationship between FDI and unemployment is very weak in the region. Labour productivity turns out to be a significant determinant of the unemployment rate in the region and the two variables are positively related, suggesting that an increase in labour productivity may not improve the employment situation in the region. The significant inverse relationship between external debt and unemployment in non-SACU countries suggests that external debt could help create new jobs if invested in productive sectors (Cahyadin & Ratwaningsih, 2020). The rising population in the region has so far been more of a burden, leading to more unemployment, than a pool of productive human resources.

The study found that inflation and external debt significantly affect unemployment in SACU and non-SACU countries respectively, while labour productivity and population are important determinants in the SADC region. The study concludes that output growth in the region is not sufficient to offset the imbalance created by the entry of new workers into the labour market. The study, therefore, recommends that countries need to increase their GDP through sustained productive investment and the promotion of greenfield investment. Governments should also adopt policies that promote labour-absorbing FDI and ensure that foreign investment inflows are channelled into labour-intensive sectors with high labour absorption capacity such as horticulture and floriculture (Mkombe, et al., 2021). The region can also take the reverse causality approach by implementing policies to create decent work for citizens. If a higher proportion of the population is engaged in decent work, fertility is likely to decline further (Bloom & McKenna, 2015). This is particularly true if a high proportion of women are
in decent work, as they have less incentive to drop out of the labour force due to the quality of jobs they hold. When fertility decreases, the pressure on social services decreases and welfare improves. Overall, empirical analyses suggest that the macroeconomic determinants of the unemployment rate do not provide sufficient evidence to explain the observed difference in unemployment levels between SACU and non-SACU countries. Therefore, the study proposes further research to establish why such unemployment disparity persists between SACU and non-SACU countries.

6. REFERENCES


## 7. APPENDICES

### Appendix 1: Variable definition and data source

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unemployment Rate</strong></td>
<td>The number of the labour force that is without work but available for and seeking employment, expressed as a percentage.</td>
<td>World Bank (2022)</td>
</tr>
<tr>
<td><strong>GDP Growth</strong></td>
<td>Annual percentage growth rate of the GDP at market prices based on constant local currency. Aggregates are based on constant 2010 US$.</td>
<td>World Bank (2022)</td>
</tr>
<tr>
<td><strong>Inflation Rate</strong></td>
<td>Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.</td>
<td>World Bank (2022) Reserve Bank of Zimbabwe (2022) Statista (2022)</td>
</tr>
<tr>
<td><strong>Foreign Direct Investment</strong></td>
<td>Net inflows (direct investment equity flows less disinvestment: BoP, US$) in the reporting economy from foreign investors.</td>
<td>World Bank (2022)</td>
</tr>
<tr>
<td><strong>Labour Productivity</strong></td>
<td>The total volume of output (measured in terms of Gross Domestic Product, GDP) produced per unit of labour (measured in terms of the number of employed persons or hours worked) during a given time reference period.</td>
<td>ILO (2022)</td>
</tr>
<tr>
<td><strong>Total External Debt Stock</strong></td>
<td>The sum of public, publicly guaranteed, and private nonguaranteed long-term debt (US$), use of IMF credit, and short-term debt owed to nonresidents repayable in currency, goods, or services.</td>
<td>World Bank (2022) IMF eLibrary (2022)</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>All residents regardless of legal status or citizenship.</td>
<td>World Bank (2022)</td>
</tr>
</tbody>
</table>
Appendix 2: Johansen panel cointegration test

<table>
<thead>
<tr>
<th>Trace Statistic Test</th>
<th>Maximal Eigenvalue Statistic Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>test</td>
</tr>
<tr>
<td>r &lt;= 6</td>
<td>151.40</td>
</tr>
<tr>
<td>r &lt;= 5</td>
<td>311.34</td>
</tr>
<tr>
<td>r &lt;= 4</td>
<td>479.29</td>
</tr>
<tr>
<td>r &lt;= 3</td>
<td>653.28</td>
</tr>
<tr>
<td>r &lt;= 2</td>
<td>833.14</td>
</tr>
<tr>
<td>r &lt;= 1</td>
<td>1148.56</td>
</tr>
<tr>
<td>r = 0</td>
<td>1509.31</td>
</tr>
</tbody>
</table>

\(H_0\) : There are no cointegrating variables

\(H_a\) : There is cointegration

where \(r\) is the number of cointegrating vectors

Appendix 3: List of countries

<table>
<thead>
<tr>
<th>No.</th>
<th>Aggregate SADC countries</th>
<th>SACU countries</th>
<th>Non-SACU countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Botswana</td>
<td>Botswana</td>
<td>Congo, D.R.</td>
</tr>
<tr>
<td>2</td>
<td>Congo, D.R.</td>
<td>Lesotho</td>
<td>Comoros</td>
</tr>
<tr>
<td>3</td>
<td>Comoros</td>
<td>Eswatini</td>
<td>Madagascar</td>
</tr>
<tr>
<td>4</td>
<td>Lesotho</td>
<td>South Africa</td>
<td>Mauritius</td>
</tr>
<tr>
<td>5</td>
<td>Madagascar</td>
<td></td>
<td>Malawi</td>
</tr>
<tr>
<td>6</td>
<td>Mozambique</td>
<td></td>
<td>Tanzania</td>
</tr>
<tr>
<td>7</td>
<td>Mauritius</td>
<td></td>
<td>Zambia</td>
</tr>
<tr>
<td>8</td>
<td>Malawi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Eswatini</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Tanzania</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>South Africa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Zambia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Other SADC member states (Angola, Namibia, Seychelles and Zimbabwe) were not included in the model application due to unavailability of adequate data.
### Appendix 4: Regression Diagnostics

<table>
<thead>
<tr>
<th>Test</th>
<th>P-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-P/LM test for a balanced panel (Random effects vs Pooled OLS)</td>
<td>0.688</td>
<td>There is no panel effect</td>
</tr>
<tr>
<td>F test for individual effects (Fixed effects vs Pooled OLS)</td>
<td>0.5425</td>
<td>There are no significant effects</td>
</tr>
<tr>
<td>Autocorrelation</td>
<td>0.8494</td>
<td>There is no autocorrelation</td>
</tr>
<tr>
<td>Heteroscedasticity</td>
<td>0.000</td>
<td>Variance in residuals is not constant (i.e. data is heteroscedastic). The study used robust standard errors.</td>
</tr>
<tr>
<td>B-P/LM test for cross-sectional dependence in panels.</td>
<td>0.000</td>
<td>Residuals across countries are correlated. The study used Driscoll-Kraay standard errors.</td>
</tr>
<tr>
<td>Pesaran CD test for cross-sectional dependence in panels.</td>
<td>0.053</td>
<td>There is no cross-sectional correlation in residuals.</td>
</tr>
</tbody>
</table>