An Empirical Analysis of Africa Continental Free Trade Area Economic Growth Prospects in the SADC Region: Evidence using Autoregressive Distributed Lag-PMG Estimation Techniques

Ngonidzashe Chiranga[1,2]*, Teboho J. Mosikari[3], Mulatu F. Zerihun[4]

[1]North-West University (NWU), Potchefstroom, South Africa, [2]Department of Economics, Faculty of Economics and Finance, Tshwane University of Technology (TUT), Polokwane, South Africa, [3]Department of Economics, Faculty of Economic and Management Sciences, North-West University (NWU), Mmabatho, South Africa, [4]Department of Economics, Faculty of Economics and Finance, Tshwane University of Technology (TUT), Ga-Rankuwa, South Africa. *Email: chirangan@tut.ac.za

ABSTRACT

Inter-SADC trade relations of indebted small countries and their potential of ushering economic growth from AfCFTA are unclear in both the short and long run. The study aims to empirically examine if there are AfCFTA economic growth prospects for SADC nations in the short and long term through an examination of the trade openness-economic growth nexus, and how the external debt impacts economic growth. A panel of eight SADC countries is used from a period spanning 1996-2022. The study employs Autoregressive Distributed Lag (ARDL) and the Pooled Mean Group (PMG) estimation techniques. The findings suggest that trade openness impacts economic growth positively at the 1% level in the long run, whereas external debt impacts economic growth negatively at the 1% level in both the long and short run. The study also finds that causality runs from economic growth to trade openness and is unidirectional. SADC nations are urged to minimise the overreliance on external debt in the funding of domestic consumption needs as it has negative consequences on economic growth in the long term.

Keywords: Africa Continental Free Trade Area, Autoregressive Distributed Lag, Economic Growth, Southern African Development Community
JEL Classifications: F140, F150, O4

1. INTRODUCTION

There has been a long-standing thought in academic circles that free trade is one of the leading factors towards long-term economic growth (Akinlo and Okunlola, 2021). This line of thought has motivated the signing and implementation of the Africa Continental Free Trade Area (AfCFTA) with the understanding that South-South trade has prospects of generating stable economic growth and pulling Africa from abject poverty through trade (Musila and Yiheyis, 2023). However, Musila and Yiheyis (2023), found that the successful implementation of AfCFTA lies in the balance due to economic, political, social, and geographic challenges. As such, this calls for a relook at the whole trade dynamic that the

Southern African Development Community (SADC) countries face as they trade with the rest of the world as opposed to an emphasis on intra-African trade which AfCFTA advocates. As alluded to by Akinlo and Okunlola (2021), developing countries are increasingly becoming a dumping ground for poor-quality goods from developed countries as a consequence of trade openness. However, not all inter-SADC trade relations result in negative outcomes, as there is a potential for small countries to reap the benefits of a wider market for their goods. As such, it remains unclear if AfCFTA can usher economic growth in the short and long run.

Studies by (Oo et al., 2019; Khan and Sattar, 2024; Musila and Yiheyis, 2023; and Chiwira et al., 2023), reported a positive

relationship between export growth and economic growth. However, (Mahmood et al., 2016; Mogashwa and Molele, 2023; and Mlambo 2021), have shown that Gross Domestic Product (GDP) per capita is negatively related to trade. These mixed conclusions in the literature on the long-run relationship between trade and economic growth open an opportunity to address the empirical gap in the literature on the SADC region trading with the rest of the world. Furthermore, most studies have so far considered the trade and growth nexus without considering the impact that control variables like population growth. Despite a study by Chiwira et al. (2023), attempting to introduce population growth as a control variable in their panel ARDL study of the Southern African Customs Union (SACU) region, SADC inter-region trade to the rest of the world has attracted limited empirical inquisition.

The novelty of this study first contributes to the literature by offering empirical evidence on the prospects that free trade has on economic growth because previous studies failed to consider the significant role that external debt has on economic growth prospects for small countries that are prevalent in the SADC region who are mostly reliant on external debt as opposed to foreign direct investment. Secondly, the paper contributes to the literature through an empirical analysis using ARDL and PMG estimating techniques of AfCFTA's economic growth prospects to SADC member states when corruption is prevalent, an area that so far has attracted minimal studies in the SADC region as AfCFTA negotiations proceed. The rest of the paper is structured as follows: The review of literature follows, and thereafter there is the methodology. Afterwards, there is a discussion of the results and lastly, there is a presentation of a conclusion and policy implications.

2. REVIEW OF LITERATURE

Much of the literature on free trade liberalisation emanates from classical contributions from Richado's theory as stated by Akinlo and Okunlola (2021), that with free trade there would be comparative advantage gains that are translated to economic growth. However, Guei and Le Roux (2019), argued that the classical Heckscher-Ohlin theory suggests that countries with similar supply structures would contribute less to bilateral trade, and this disadvantages developing countries who are exporters of mainly primary products. Snowdon and Vane (2005), provided some theoretical reasons why open economies grow faster than closed economies through their growth model explanation. Furthermore, they viewed trade liberalisation as having a temporary and not a permanent long-run effect on economic growth. Romer (1990), posited that there are ideas available for developing countries from the rest of the world. Equally, Chiwira et al. (2023), illustrated how exports are capable of boosting economies through productivity and externality increases based on the theoretical postulations of the export base theory. According to Guei and Le Roux (2019), the Neo-Classical Growth Model (NCG) illustrated that free trade is capable of speeding up economic growth. In the same vein, Nev et al. (2023), argued that much of the NCG emphasised the role of good institutions and technological transfers in improving developing countries' productivity.

Empirical evidence from studies from Africa found some similarities in findings on the relationship between trade and economic growth. For instance, a study by Musila and Yiheyis (2023), using ARDL and Vector Error Correction (VEC) estimation techniques on a panel of 42 African countries from 1995 to 2020 found a positive and significant long-run relationship between economic growth and proxies of inter-African trade. Similarly, Mogashwa and Molele (2023), did a study on the drivers of trade performance in the SADC region using nine countries from 1994 to 2020 using ARDL. They found that GDP per capita in the short run affected the trade balance positively but in the long run, GDP per capita negatively affected trade balance. Another study was done by Chiwira et al. (2023) on five SACU members using panel ARDL and Generalised Least squares (GLS) estimation techniques on a panel from 1980 to 2021. They found that exports positively impacted economic growth in both the short and long run. Similar results were found in a study by Oo et al. (2019) from the Association of Southeast Asian Nations (ASEAN) countries using a sample from 2000 to 2015 by applying ARDL. The study found that GDP had a significant and positive influence on export performance.

Mixed results on the impact of trade openness on GDP were also registered from a study by Mahmood et al. (2016) on Egyptian trade with 20 COMESA countries using the PMG method on a dataset from 1990 to 2015. The study found that the balance of trade had a negative and statistically significant impact on economic growth. Also, another study was done by Mlambo (2021) on ten African countries using panel ARDL on data from 2005 to 2018. The study found no evidence of any statistical relationship between GDP and trade openness. Guei and Le Roux (2019), found that trade openness had a negative impact on GDP per capita, in the long run, using panel ARDL for the ECOWAS. However, Nev et al. (2023), found trade openness to significantly impact economic growth using PMG-ARDL-VEC estimation techniques on a panel of 48 Sub-Saharan African countries (2000-2022). The mixed results from different empirical evidence from different regions of the world provide a basis for further probing when contextualised in the SADC region. Most studies considered used the log of total exports to GDP as the dependent variable except for the study by Mahmood et al. (2016) that used the balance of trade as the dependent variable. On the other hand, economic growth has been proxied as the annual growth rate of GDP, an approach that will be adopted in this study as the dependent variable.

Oyekale et al. (2024), found that external debt positively impacted economic growth in the short run but in the long run, it also impacted economic growth negatively. However, the study by Mogashwa and Molele (2023), on the SADC region using ARDL, found external debt impacted the trade balance positively in the short run. There have been some studies by (Conteh et al., 2021; Bardi and Hfaiedh, 2021; and Kong et al., 2021), from both developed and developing countries that have used Foreign Direct Investment (FDI) as one of the key drivers of economic growth. However, what has become apparent in the SADC region is there is insignificant FDI and at the same time external debt has increased. Another study on the public debt and economic growth nexus was conducted by Attard (2019), using data from

25 advanced and emerging economies in the European Union. The study found that public debt had a negative and significant impact on economic growth in both the short and long term. The findings from different regions motivate the need to use the external debt variable instead of the FDI variable to understand how this may impact AfCFTA in line with specifications by Oyekale et al. (2024), who used external debt as a percentage of Gross national income (GNI) as a proxy of external debt, an approach that will be adopted in this study.

A study was done by Khan and Sattar (2024), to analyse the economic implications of Pakistan's trade potential in Brazil, Russia, India, China, and South Africa (BRICS) region using data from 1990 to 2021 by applying PMG and ARDL estimation techniques. The study found that bilateral trade flows are positively related to economic growth in the long run. But in the short run, there is a negative correlation between population size and GDP. On the other hand, Guei and Le Roux (2019), did a study on 15 ECOWAS countries in an attempt to understand the potential of AfCFTA on the ECOWAS region using data from 1990 to 2016. The study found that the high labourforce positively impacted economic growth after trade liberalisation in the short run. The lack of consensus on how population growth influences economic growth is an area worth investigating in this study. The youthful technologically aligned population prevalent in the SADC region provides prospects to produce exports that may contribute positively towards economic growth, an issue mentioned in AfCFTA despite the lack of empirical evidence on the impact of relationships to international trade from both the long and short-run.

In summary, there have been mixed outcomes on the impact that trade has on economic growth. As shown from study findings by (Musila and Yiheyis, 2023; Mogashwa and Molele, 2023; Chiwira et al., 2023; and Oo et al., 2019), that trade positively influences economic growth. However, studies by (Guei and Le Roux, 2019; Nev et al., 2023; and Mlambo 2021) found that trade negatively impacts economic growth. From these studies, an empirical gap emerges that little empirical consideration has been placed on the significant role that external debt has on inter-SADC trade relations and economic growth under AfCFTA free trade rules in both the short and long run, an issue that this paper attempts to fill empirically.

3. METHODOLOGY

The New Growth Theory by Grossman and Helpman (1991), forms the theoretical framework adopted in this paper. The model derives from the Cobb-Douglas function as specified below.

$$Y_t = f(C_t, K_t, L_t) \tag{1}$$

Where Y_t refers to the output at a time t, C_t is the country's technology at a time t, and L_t is the labourforce at the time t. According to Musila and Yiheyis (2023), the model by Grossman and Helpman (1991), shows that C_t is influenced by factors such as trade openness, regional integration, and the quality of institutions. Following the work by (Musila and Yiheyis, 2023; Guei and Le

Roux, 2019; Akinlo and Okunlola, 2021; and Nev et al., 2023), the baseline equation to be adopted in this study is specified as follows.

$$Y_t = f(TOP_t, PGR_t, ED_t, CC_t) \tag{2}$$

3.1. Data Sources

Table 1 below presents data types and offers variable descriptions from secondary annual data sourced from the World Bank database (WDI). This study sampled eight SADC countries based on data availability over 26 years from 1996 to 2022. The variables used were selected from the following SADC countries (Botswana, Eswatini, Malawi, Mauritius, Mozambique, South Africa, Zambia, and Zimbabwe) based on data availability. The choice is motivated by theoretical and empirical motivation. The GDP per capita growth rate (Y_t), is a dependable variable and specified in studies by Odhiambo (2021). The independent variables used in this chapter include the population growth rate (PGR_{it}) which is adopted from specifications by Akimov et al. (2009) and Chiwira et al. (2023). TOP_t is adopted in line with specifications by Mogashwa and Molele (2023). Also, ED_t is adopted from Akinlo and Okunlola (2021)'s specification.

3.2. Estimation Technique and Model Specification

The estimated model adopted in this paper is the ARDL model utilised which according to Mlambo (2021), exhibits the following properties. Firstly, ARDL combines a combination of variables integrated of order I (0) and I (1). Also, it is suitable for estimating small sample sizes. Furthermore, Olayungbo and Quadri (2019), noted that ARDL allows free independent groups, and potential homogeneity between groups is not considered. Panel Mean Group (PMG) is also considered for estimation in this study which was developed by Pesaran et al. (1999), which according to Guei and Le Roux (2019), has its usefulness in estimating regressors for each observation and averaging them across groups so that in the short run the coefficients, error term, and intercept are similar across groups yet different across units. Also, PMG has the added advantage that estimators are less sensitive to regression outliers, and thus homogeneity of parameters is withheld. The ARDL and PMG models are illustrated below.

3.3. ARDL Model Specification

Mogashwa and Molele (2023) proposed the use of ARDL in their study and the modified ARDL model adopted for this study for estimation of the long-run coefficient is shown in equation 3 as follows.

$$\Delta Y_{it} = \propto_{it} + \beta_1 ED_{it} + \beta_2 PGR_{it} + \beta_3 TOP_{it} + \sum_{it=1}^{p} \beta_4 it \Delta Y_{t-1} +$$
$$\sum_{it=1}^{q} \beta_5 it \Delta ED_{t-1} + \sum_{it=1}^{r} \beta_6 it \Delta PGR_{t-1} + \sum_{it=1}^{s} \beta_7 it \Delta TOP_{t-1} + \varepsilon_{it} \tag{3}$$

3.4. PMG Model Specification

According to Mlambo (2021), the Pooled Mean Group (PMG) was proposed by Pesaran et al. (1999), where cross-sectional unit coefficients are averaged and pooled. Furthermore, PMG is chosen because both non-stationary and stationary variables are combined in their traditional form as shown in equation 4 below.

$$\Delta Y_{it} = \varnothing_i \left(Y_{i,t-1} - \beta_{x_{i,t-1}}^t \right) + \sum_{j=1}^{r-1} \delta_{ij} \Delta Y_{i,t-j} + \sum_{j=1}^{s-1} \partial_{ij}^I \Delta X_{i,t-j} + u_i + \varepsilon_{it} \tag{4}$$

Table 1: Data types and variable description

Variable	Symbol	Type	Variable definition	Expected sign	Data source
GDP growth rate	Yt	Dependent	GDP per capita growth (%)		WDI (1996-2022)
Trade openness	$TOPt$	Independent	(Export-Imports) (%) GDP	+	WDI (1996-2022)
Population Growth rate	$PGRt$	Independent	Population growth rate (%)	+	WDI (1996-2022)
External debt	EDt	Independent	External debt as a % of GNI	-	WDI (1996-2022)
Control of Corruption	CCt	Independent	Control of corruption estimate	-	WDI (1996-2022)

Source: Authors compilation

The error term is shown by $\emptyset_i$, which is expected to be negative and statistically significant, if it is insignificant then there is no long-run equilibrium (Masih and Majid, 2013). According to Guei and Le Roux (2019), the PMG has the advantage that it tends to be less sensitive to outliers and this helps reduce the bias of the estimates. Also, PMG considers the heterogeneity of the coefficients. Where Δ is a symbol for the first difference in the exports, while $\propto_{it}$ is the constant and ε_{it} is the disturbance error term. Also, parameters β_1 to β_7 represents short-run relationships between variables of the model. For testing for short-run estimates. The PMG estimator specified for this study is shown in equation 5 as follows.

$$\Delta Y_{it} = \propto_0 + \beta_1 \left[Y_{it} - \propto_{x_{2,1}}^I \left(TOP_{it} + PGR_{it} + ED_{it} \right)^I \right] + \sum_{it=1}^{p} \beta_2 it \Delta Y_{it-1} +$$
$$\sum_{it=1}^{q} \beta it \Delta TOP_{it-1} + \sum_{it=1}^{r} \beta_4 it \Delta PGR_{it-1} + \sum_{it=1}^{s} \beta_5 it \Delta ED_{it-1} u_i + \varepsilon_{it} \qquad (5)$$

4. DISCUSSION

An understanding of the cross-sectional dependence is important in any econometric analysis. This is tested using the Breusch- Pagan LM, Pesaran Scaled LM, and the Bias-corrected Scaled LM as presented in Table 2.

H_0: There is no cross-sectional dependence
H_1: There is cross-sectional dependence

From Table 2, the P-values for the Breusch- Pagan LM, Pesaran Scaled LM, and Bias-corrected Scaled LM <0.05, reject H_0 indicating that there is cross-section dependence among the selected SADC countries. According to Nev et al. (2023), a shock in one of the countries selected will be transmitted to other countries within the region.

The existence of unit roots in panel data is reported in Table 3 using the Levin, Lin, and Chu (LLC) test and the Im, Pesaran, and Shin (IPS) unit root test. LLC results are presented in the upper part of the table, whereas IPS results are presented in the bottom part of the table as follows.

H_0: Panels are not stationary
H_1: Panels are stationary

From the Table 3, H_0 is rejected, this implies the unit root results from both LLC and IPS suggest that the variables Y_t and PGR_t are stationary at levels I(0). On the other hand, unit root results from variables TOP_t and ED_t suggest that they are stationary at the first difference I(1) as shown in Table 3.

Table 4 reports the Panel Granger causality results of the Johansen -Fisher Panel Cointegration test. The first column shows

Table 2: Cross-sectional dependence test results

Symbol	Breusch-Pagan LM	Pesaran Scaled LM	Bias-corrected Scaled LM
Y_t	96.418***	9.143***	8.989***
TOP_t	141.231***	15.131***	14.977***
PGR_t	180.737***	20.410***	20.256***
ED_t	152.526***	16.640***	16.487***

****significant at 1% level of significance and () are the P values
Source: Authors compilation with E-Views 13

the hypothesised number of cointegration vectors. The second column shows the Fisher statistics from the trace test and the last column is the probability values, as presented below.

H_0: Panels are not cointegrated
H_1: Panels are cointegrated

From Table 4, the Johansen -Fisher Panel Cointegration test result, reject H_0. The cointegration results indicate that in the Fisher trace test, there is one cointegration vector in the system at 1%, and the Fisher maximum eigen test indicates that there exist 2 cointegration vectors at 1% and 10% as shown in Table 4. This implies there exists long-run panel cointegration between the GDP growth rate, trade openness, external debt, and the population growth rate. According to Mosikari (2017), the Johansen-Fisher Panel Cointegration assumes more than one cointegration vector and provides superior results to the Pedroni and Kao tests. However, it will be worthwhile to also investigate the cointegration results from the Pedroni tests presented in Table 5 to reinforce findings from the Johansen-Fisher Panel Cointegration results as follows.

From Table 5 it can be observed from the top part of the table that illustrates the within-dimension statistics that all the test statistics are significant at the 1% level. Also, from the bottom part of the table, all test statistics are significant at the group level. It can be concluded from the results that in the long run there is panel cointegration between the GDP growth rate, trade openness, external debt, and the population growth rate.

Table 6 reports the results from the Kao panel cointegration results. According to the results, the Kao ADF t-statistic is −3.449 and is significant at the 1% level. The null hypothesis of no panel cointegration amongst variables is rejected. Therefore, based on the Kao test results, it means that there is a long-run equilibrium between the GDP growth rate, trade openness, external debt, and the population growth rate

4.1 Panel Pooled Mean Group Results
Table 7 reports the short-run and long-run coefficients of the Panel Pooled Mean Group estimation technique (PMG).

Table 3: Panel unit roots results for variables Y_t, TOP_t, PGR_t and ED_t

LLC	Levels		1st Difference		Remark
	Individual intercept	Individual intercept+trend	Individual intercept	Individual intercept+trend	
Y_t	−5.253***	−4.638***	−10.234***	−8.451***	I (0) Stationary
TOP_t	−0.958	−0.159	−5.985***	−4.193***	I (1) Stationary
PGR_t	−3.196***	−2.454***	−3.196***	−3.317***	I (0) Stationary
ED_t	0.881	0.275	−4.960***	−4.074***	I (1) Stationary
IPS	Individual intercept	Individual intercept+trend	Individual intercept	Individual intercept+trend	Remark
Y_t	−5.031***	−4.406***	−12.345	−10.579***	I (0) Stationary
TOP_t	−1.392	−0.900	−7.408***	−5.535***	I (1) Stationary
PGR_t	−2.645***	−0.922***	−2.646***	−4.853***	I (0) Stationary
ED_t	1.016	0.574	−5.824***	−4.604***	I (1) Stationary

***1%, ** 5%, and *1% are statistically significant with values in () P values

Source: Authors compilation with E-Views 13

Table 4: Johansen -Fisher panel cointegration results

Hypothesised No. of CE (s)	Fisher Stat* (from trace test)	Probability
None	104.6	0.000***
At most 1	57.53	0.000***
At most 2	39.41	0.000***
At most 3	47.13	0.000***
Hypothesised No. of CE (s)	Fisher Stat* (from max-eigen test)	Probability
None	66.90	0.000***
At most 1	35.07	0.004***
At most 2	23.61	0.098*
At most 3	47.13	0.000***

***1%, ** 5% and * 10% statistically significant

Source: Authors compilation with E-Views 13

Table 5: Pedroni panel cointegration results

Within-dimension statistics	Panel t-statistics	Panel P value
Panel v-statistic	2.423	0.008***
Panel rho-statistic	−3.648	0.000***
Panel PP-statistic	−8.4800	0.000***
Panel ADF-statistic	−3.386	0.000***
Within-dimension statistics	Panel t- statistics	Panel P value
Group rho-statistic	−2.715	0.003***
Group PP-statistic	−9.914	0.000***
Group ADF-statistic	−3.727	0.000***

***1%, ** 5% and, *10% statistically significant

Source: Authors compilation with E-Views 13

Table 6: Kao panel cointegration results

Statistics methods	t-statistic	P-value
ADF	−3.449	0.000***
Residual variance	24.932	
HAC variance	7.455	

***1% statistically significant, **5% statistically significant and *10% statistically significant

Source: Authors compilation with E-Views 13

Table 7: ARDL estimation results of full panel: Pooled mean estimator

Dependent variable: Y_t (GDP growth rate)				
Variable	Coefficient	Std. Error	T-statistic	Prob
Long run				
TOP_t	114.369	43.661	2.619	0.001***
PGR_t	−1.068	0.447	−2.392	0.018**
ED_t	−0.040	0.010	−3.932	0.000***
C	4.439	0.915	4.851	0.000***
Short run				
COINTEQ	−0.722	0.317	−2.275	0.024**
TOP_t	927.546	1399.50	0.663	0.508
PGR_t	3.022	12.324	0.245	0.807
ED_t	−0.098	0.046	−2.123	0.035**

***1% statistically significant, ** 5% statistically significant and * 10% statistically significant

Source: Authors compilation with E-Views 13

From the PMG results shown in Table 7, the short-run speed of adjustment of the error term (COINTEQ) is −0.722 and significant at the 5% level which suggests convergence in the long run after a shock. Furthermore, the results suggest that there is a positive and significant relationship between economic growth and trade openness at a 1% level of significance. This result agrees with the findings by Musila and Yiheyis (2023). Also, in the short run, the relationship between trade openness and GDP is positive but insignificant. Furthermore, the results from Table 7 agree with the findings by Chiwira et al. (2023), who found that the economic growth of 5 SACU member states had a trade-enhancing effect on trade.

However, in the long run, the population growth rate has a negative and significant impact on economic growth at the 1% level of significance. This result suggests that a 1% increase in the population growth rate is accompanied by a fall in economic

growth by 1.07% which agrees with findings by Khan and Sattar (2024), who after using PMG estimation on Pakistan's trade with BRICS economies found the population of Pakistan impacted trade and subsequently economic growth negatively in the long run. However, in the short run, the population growth rate is positive though insignificant in influencing economic growth. This implies that as an economy grows, the domestic demand for goods increases which may lead to less excess consumer goods available for exports.

From the PMG study findings, an increase in external debt has a negative significant impact on economic growth at the 1% level. Specifically, a 1% increase in external debt results in a fall in economic growth by 0.04% in the long run. Also, in the short run, the result is negative and significant at the 5% level which agrees with findings by Akinlo and Okunlola (2021) and Attard (2019). Whereas in the short run, the negative significant result of external debt to economic growth suggests that most SADC countries are burdened by debt servicing costs and may be experiencing debt overhang that Helpman and Krugman (1987), posited occurs when

future public debt may increase beyond the country's ability to pay back which may be stifling economic growth in the SADC region.

4.2. Robustness Check

Table 8 presents a robustness check of the variables used. In both estimations, the dependent variable remains the GDP growth rate, but the trade openness variable is measured differently. In the estimated ARDL estimated model in this study (TOP_t), is measured as ($\frac{(Exports - Imports)}{GDP}$) but in estimation (1) the trade openness variable ($TOPX_t$) is measured as ($\frac{(Exports + Imports)}{GDP}$) which is widely used in most empirical trade openness studies though in the case of countries that are more net importers than exporters like the SADC case, it may not give a correct trade openness picture. In estimation (2), the population growth rate variable (PGR_t), is replaced by the control of corruption variable (CC_t).

The robustness results from Table 8 suggest that estimating trade openness either using TOP_t or $TOPX_t$ has no change in the direction and significance of the impact on economic growth in the long run, as trade openness remains positive and significant as with the original ARDL estimated results. But only in the short run does trade openness ($TOPX_t$) impact economic growth positively and significantly at the 10% level. On the other hand, introducing the control of corruption into estimation 2 has a negative but insignificant impact on economic growth in the long run but the result is significant in the short run. However, from Table 8, the trade openness in estimation 2, will still positively impact economic growth though insignificantly in the long run. The robustness ARDL estimated results for the full panel are presented in Table 8 as follows.

Table 9 presents the individual PMG cross-sectional results in the short run. The results suggest that trade openness (TOP_t), has a negative impact on economic growth for most SADC countries in this study, except for Botswana and Malawi which had a positive impact on economic growth. More specifically, in Botswana, trade openness is significant at the 5% level. This may be due to Botswana exporting mostly diamonds whose prices have increased over time and are mostly exported to international destinations and the economy is not that diversified away from diamond exports which significantly contributes to economic growth. However, if you consider the results from Table 9 for South Africa, the biggest SADC economy in GDP and population terms, South Africa's trade openness impacted economic growth negatively in agreement with findings by Mahmood et al. (2016), who found Egypt's trade had a negative and statistically negative impact on economic growth in the short run. Furthermore, South Africa is not that open an economy in comparison with SADC counterparts and external trade does not account for a significant component of GDP.

On the other hand, the short-run PMG results from Table 9 found that the population growth rate has an insignificant negative impact on economic growth for most SADC countries sampled in agreement with findings by Khan and Sattar (2024), who found that population impacted economic growth negatively in the short run. However, Malawi and Mozambique registered a positive yet insignificant impact of population growth on economic growth. Also, most SADC countries in the study had a negative yet insignificant impact of external debt on economic growth. This result may suggest that Zambia of all SADC countries sampled, had a significant negative impact of debt on economic growth. This implies a 10% increase in external debt results in a fall in economic growth by 0.15% in the short run, this result is in agreement with findings by Attard (2019), that public debt impacts economic growth negatively in the short run. The results are presented in Table 9 as follows.

In general, from the study findings, the nexus between economic growth and trade suggests a positive relationship between economic growth and trade openness in the long run. However, the population growth and external debt a have negative impact on economic growth in the long run. In the short run, trade openness and population growth rate enhance economic growth except for external debt that discourages economic growth. In this regard, there is a need to find out the direction of causality of economic growth, trade openness, population growth rate, and external debt to better understand their influence on each other which is presented in the next section.

Table 8: Robustness check results for ARDL estimated results for full panel

Dependent variable (GDP Growth rate)					
Estimation (1)			Estimation (2)		
Variable	Coefficient	Prob	Variable	Coefficient	Prob
Long run			Long run		
TOP_t			TOP_t	16.794	0.641
$TOPX_t$	−47.333	−0.000***	$TOPX_t$	-	-
PGR_t	−0.076	0.609	PGR_t	-	-
ED_t	−0.021	0.000***	ED_t	−0.051	0.000***
CC_t	-	-	CC_t	−0.113	0.747
Short run			Short run		
COINTEQ	−0.977	0.000***	COINTEQ	−0.841	0.022***
TOP_t	-	-	TOP_t	−1838.53	0.158
$TOPX_t$	315.084	0.071***	$TOPX_t$	-	-
PGR_t	−0.011	0.9985	PGR_t	-	-
ED_t	−0.172	0.137	ED_t	−0.080	0.029**
CC_t	-	-	CC_t	−6.511	0.084*

***1%, ** 5% and * 10% statistically significant
Source: Authors compilation with E-Views 13

**Table 9: Short-run Pooled mean group of Individual
SADC countries cross-section estimation**

Countries	Independent variable		
	TOP_t	PGR	EDt
Botswana	358.521** (0.041)	−33.637** (0.034)	−0.388 (0.183)
Eswatini	−16.124 (0.934)	−9.110 (0.528)	−0.015 (0.945)
Malawi	10631.59 (0.330)	81.841 (0.161)	−0.082 (0.129)
Mauritius	−1169.802 (0.557)	−2.251 (0.868)	−0.179 (0.180)
Mozambique	−379.473 (0.283)	14.897 (0.263)	−0.009 (0.666)
South Africa	−901.781** (0.047)	−0.057 (0.631)	−0.057 (0.631)
Zambia	−65.857 (0.162)	−20.146 (0.116)	−0.051** (0.018)
Zimbabwe	−1036.7* (0.097)	−5.279 (0.582)	−0.002 (0.968)

***, **, and * denote the level of significance at 1%, 5%, and 10% respectively
Source: Authors compilation with E-Views 13

Table 10: Pairwise granger causality test results

Null hypothesis	F-statistic	P-value
TOP does not Granger cause Y	1.594	0.206
Y does not Granger cause TOP	0.036**	0.965
PGRT does not Granger cause Y	0.035**	0.966
Y does not Granger cause PGRT	1.770	0.173
ED does not Granger cause Y	2.046	0.132
Y does not Granger cause ED	1.066	0.346
PGRT does not Granger cause TOP	1.492	0.228
TOP does not Granger cause PGRT	0.6307	0.533
ED does not Granger cause TOP	5.504	0.005***
TOP does not Granger cause ED	1.697	0.186
ED does not Granger cause PGRT	0.141	0.663
PGRT does not Granger cause ED	0.400	0.645

*10%, ** 5% and ***1% statistically significant
Source: Authors compilation with E-Views 13

4.3. Panel Causality Test Results

Table 10 presents Panel Granger Causality results for SADC countries considered in this study. The study finds that causality runs from economic growth to trade openness and is unidirectional. Also, the population growth rate has a causality on economic growth. Furthermore, the study finds that there is causality running from external debt to trade openness, but the causality is unidirectional. Furthermore, the study findings suggest that no causality exists between economic growth and trade openness. However, the population growth rate has no causality with trade openness and the study findings suggest that no causality exists between the external debt and economic growth.

5. CONCLUSION AND POLICY IMPLICATIONS

The study aimed to empirically examine how economic growth was impacted by trade openness, population growth rate, and external debt in the short and long term. The ARDL-PMG findings suggest that trade openness impacts economic growth positively in the long run. However, the population growth rate and external debt have a negative impact on economic growth. On the other hand, in the short run, trade openness and the population have a positive impact on economic growth, but external debt hurts economic growth. Also, the study found that external debt has a significant positive impact on trade openness. From the findings, there is evidence that countries that are already enjoying economic growth can benefit from enhanced trade openness.

The study recommends that SADC countries need to prioritise policies meant to boost economic growth as there is a multiplier effect on exports in both the short and long run an issue that AfCFTA considers. Given trade openness impacts economic growth positively in the short and long run, SADC countries should harness the benefits of free trade that AfCFTA offers and strive to diversify their export baskets to benefit from inter-SADC trade. Also, the population growth rate has a positive impact on economic growth in the short term, but evidence suggests that in the long term, this may hurt economic growth. The study recommends that SADC's youthful population should harness skills and innovate and produce goods that can be traded globally. The new goods that may emerge with AfCFTA's full implementation require skilled manpower, that must emerge from within AFRICA which may also help alleviate the youth unemployment problem.

The external debt that most SADC countries have may prove to be a deterrent to AfCFTA's successful implementation given external debt has a significant negative impact on economic growth in both the short and long run. The recommendation is nations should minimise the temptation of borrowing externally to fund domestic consumption needs as this has negative consequences on economic growth in both the short and long run. Indebted SADC nations may not have much freedom to pursue AfCFTA provisions which may at times clash with recommendations from international lenders. Also, the control of corruption should get more focus on continued AfCFTA negotiations and in member states' policy formulation as it positively impacts economic growth and subsequently trade in the long run and may have a bearing on AfCFTA's successful implementation. At present there is the African Union (AU) funded Pan African Parliament, it may be empowered by member states to craft universally agreed trade-related corruption control legislation that may be debated, agreed upon, and adopted by AfCFTA members with the hope that Africa is not shunned as a trade destination by international trade partners due to high corruption levels.

REFERENCES

Akimov, A., Wijeweera, A., Dollery, B. (2009), Financial development and economic growth: Evidence from transition economies. Applied Financial Economics, 19(12), 999-1008.

Akinlo, T., Okunlola, C.O. (2021), Trade openness, institutions and economic growth in Sub-Saharan Africa. Jurnal Perspektif Pembiayaan Dan Pembangunan Daerah, 8(6), 541-560.

Attard, J. (2019), Public Debt and Economic Growth Nexus: A Dynamic Panel ARDL Approach. MPRA Paper 96023. Germany: University Library of Munich.

Bardi, W., Hfaiedh, M.A. (2021), International trade and economic growth: Evidence from a panel ARDL-PMG approach. International Economics and Economic Policy, 18(4), 847-868.

Chiwira, O., Muchingami, L., Jambani, L. (2023), Exports and economic growth: Relationships and threshold analysis for the Southern Africa customs union. International Journal of Research in Business and Social Science (2147-4478), 12(8), 274-288.

Conteh, S.B., Yijun, Y., Sesay, B. (2021), Economic growth effects of the interaction of trade openness and institutions quality: Empirical evidence from Sub-Saharan Africa. International Journal of Economics and Financial Issues, 11(1), 34-48.

Grossman, G.M., Helpman, E. (1991), Trade, knowledge spillovers, and growth. European Economic Review, 35(2-3), 517-526.

Guei, K.M., Le Roux, P. (2019), Trade openness and economic growth: Evidence from the economic community of Western African States region. Journal of Economic and Financial Sciences, 12(1), a402.

Helpman, E., Krugman, P. (1987), Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition, and the International Economy. United States: MIT Press.

Khan, A., Sattar, A. (2024), Economic implications of BRICS economies for Pakistan; Evidence from nonlinear ARDL cointegration approach. Remittances Review, 9(1), 1835-1860.

Kong, Q., Peng, D., Ni, Y., Jiang, X., Wang, Z. (2021), Trade openness and economic growth quality of China: Empirical analysis using ARDL model. Finance Research Letters, 38, 101488.

Mahmood, H., Alkhateeb, T.T.Y., Maalel, N. (2016), Egyptian intra agriculture trade with common market for Eastern and Southern Africa trading partners: A gravity model. International Journal of Economics and Financial Issues, 6(6), 177-182.

Masih, M., Majid, H.A. (2013), Stock Price and Industrial Production in Developing Countries: A Dynamic Heterogeneous Panel Analysis. MPRA Paper 58308. Germany: University Library of Munich.

Mlambo, C. (2021), The impact of port performance on trade: The case of selected African states. Economies, 9(4), 135.

Mogashwa, P., Molele, S.B. (2023), Documenting major drivers of trends in trade balance for SADC region amid the full implementation of the African Continental Free Trade Area (AFCFTA). International Journal of Research in Business and Social Science (2147-4478), 12(3), 286-296.

Mosikari, T.J. (2017), An Analysis of Manufactured Exports and Economic Growth in Southern African Development Community (SADC). South Africa: North-West University (South Africa) Mafikeng Campus.

Musila, J., Yiheyis, Z. (2023), South-South Trade and Economic Growth: Panel Data Evidence from Africa's Market Integration. Research Square. doi.org/10.21203/rs.3.rs-1908614/v2

Nev, T.T., Sidi, C.P., Adofu, I., Gimba, O.J. (2023), Trade balance, institutions and economic growth in sub-Saharan Africa. Polac International Journal of Economic and Management Science (2756-4428), 9(3), 78-89.

Odhiambo, N.M. (2021), Is export-led growth hypothesis still valid for sub-Saharan African countries? New evidence from panel data analysis. European Journal of Management and Business Economics, 31(1), 77-93.

Olayungbo, D.O., Quadri, A. (2019), Remittances, financial development and economic growth in sub-Saharan African countries: Evidence from a PMG-ARDL approach. Financial Innovation, 5(1), 9.

Oo, T., Kueh, J., Hla, D.T. (2019), Determinants of export performance in ASEAN region: Panel data analysis. International Business Research, 12(8), 1-14.

Oyekale, O., Tella, S., Awolaja, O. (2024), Public debt, corruption control and economic development in Ecowas countries. Applied Journal of Economics, Management and Social Sciences, 5(2), 16-27.

Pesaran, M.H., Shin, Y., Smith, R.P. (1999), Pooled mean group estimation of dynamic heterogeneous panels. Journal of the American statistical Association, 94(446), 621-634.

Romer, P.M. (1990), Endogenous technological change. Journal of political Economy, 98(5), S71-S102.

Snowdon, B., Vane, H.R. (2005), Modern Macroeconomics: Its Origins, Development and Current State. United Kingdom: Edward Elgar Publishing.