TRADE OPENNESS AND POVERTY REDUCTION IN SOUTH AFRICA

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ABSTRACT

The study examined the impact of trade openness on poverty rate in South Africa. The ARDL bounds testing approach was used with annual data covering the period from 1990 to 2021. The study estimated four models, that is, an income-based model and a consumption-based model using two measures of trade openness which are total trade and exports as a percentage of GDP. For the income-based model 1, the findings confirmed that trade openness has a long-run negative impact on the poverty rate, while it has no significant impact in the short run. For model 3, it was found to be insignificant in the long run while in the short run, it was found that exports lead to a decrease in poverty rates. The finding confirmed that for the consumption-based model 2, trade openness leads to a decrease in the poverty rate in the long and short run. For model 4, in which exports are used as a measure for trade openness, it was found that it leads to a decrease in household consumption in the long run. Based on the results the study recommends that governments in developing countries should engage with other countries to increase their export capacity and in turn reduce their respective poverty levels.

1. INTRODUCTION

For developing countries, trade openness is important, as it gives them access to markets, technology, goods, services, as well as capital. However, the level of poverty in Africa, including South Africa, remains a cause for concern. In South Africa, the government has introduced initiatives to reduce poverty since 1994 through policies such as the Reconstruction and Development Programmean (RDP). Nevertheless, the number of people living in poverty has been on the

rise. In 2015, just about half of the adult population, which is 49.2%, were found to be living below the upper-bound poverty line (StatsSA, 2019). Therefore, the government aims to reduce poverty by 2030 through the National Development Plan (NDP).

The effect of trade openness on poverty reduction has attracted numerous studies in recent years. However, there is no clear consensus on the nature of the relationship between the two variables. Previous studies on trade openness and poverty have found support for trade openness to have a positive effect on poverty reduction (Ezzat, 2018; Anetor, Esho & Verhoef, 2020; Mbah et al. 2022). On the other hand, studies such as Onakoya Johnson & Ogundajo (2019) and Fauzel (2022), among others have found trade openness to have a negative impact on poverty.

In South Africa, several studies have examined the impact of trade openness on various economic variables, for example, Malefane & Odhiambo (2018), Udeagha, & Ngepah (2021) on economic growth, and Maluleke (2020) on government expenditure. However, very few studies have looked at the impact of trade openness on the poverty rate (see: Mabugu & Chitiga, 2007; Onakoya Johnson & Ogundajo, 2019; Gonese et al., 2023). Most of the studies in South Africa have used panel data, which may not satisfactorily address the country-specific issues as the countries included are at different stages of development and have different policies in place. Our study differs from these studies in that it employs a different estimation technique, which is the Autoregressive Distributive Lag (ARDL) method. In addition, their studies used one proxy for poverty, while the current uses two proxies, that is, a consumption-based proxy and an income-based proxy in a single-country study. In addition, the study also uses two measures of trade openness which are total trade (imports plus exports) and exports as a percentage of GDP.

In light of the aforementioned, the study aims to examine the effect of trade openness on poverty reduction in South Africa covering the period from 1990 to 2021 using the ARDL methodology. The study contributes to the existing literature by focusing on two aspects of poverty, that is income-based poverty and consumption-based poverty. By using more than one measure of poverty, it provides policymakers with a broad overview of how the openness of an economy affects poverty. Examining the impact of trade openness on poverty reduction is important for South Africa, as it is the objective of the government to eliminate poverty by 2030 as stated in its National Development Plan. Over the years, the country has developed policies with the aim of alleviating poverty and opening the economy. As South Africa is a relatively open economy with a trade

to GDP ratio of 56% (World Bank, 2021), the study aims to establish whether the openness of the economy has a significant impact on poverty in South Africa.

The remaining sections of the study are organised as follows: Section 2 presents the trends of openness and poverty in South Africa. The literature that focuses on the relationship between trade openness and poverty is presented in Section 3. Section 4 presents the empirical models, data sources as well as the estimation techniques. Section 5 provides the empirical analysis, while the last section provides a summary of the study and recommendations.

2. OVERVIEW OF TRADE OPENNESS AND POVERTY IN SOUTH AFRICA

Trade openness remains a critical component of South Africa's economic performance. Its prominence and contribution can be seen through the increase in the trade of goods and services as a percentage of the gross domestic product. This has almost doubled since the country's advent to democracy in 1994. The contribution of trade to economic growth increased from 37.1% in 1994 to 56.2% in 2021 (World Bank, 2021). This has, *inter alia*, been accelerated by the increase in the number of trade agreements that the country entered into over the years and the commitment to trade policy reforms. According to Malefane and Odhiambo (2017), trade liberalisation process in South Africa commenced in the early 1990s and involved the removal of import surcharges and the introduction of promotion policies that encouraged both imports and exports. Since then, the country has pursued a number of trade policy reforms and signed several regional, bilateral, and multilateral trade agreements with various countries and regions. This includes, *inter alia,* the SADC protocol, SA-EU Trade, Development and Co-operation Agreement, Preferential Trade Agreement between MERCOSUR and SACU, EFTA-SACU agreement, SADC-EAC-COMESA Tripartite Free Trade Area, SACU and MERCOSUR preferential agreement, EU-SADC Economic Partnership Agreement and SACU-Mozambique EPA (Vacu, 2019; Stern & Ramkolowan, 2021). The country has also become a member of the World Trade Organization (WTO).

Trade policy reforms in South Africa are part of the government's broader strategy to fast-track economic growth in a manner that addresses the socio-economic issues faced by the country's society, such as unemployment, poverty and inequalities, among other factors (Department of Trade, Industry and Competition, 2021). Furthermore, the theoretical literature also confirms that trade openness should reduce poverty as it leads to higher labour prices (Goff

& Singh, 2014). Figure 1 below presents the trends on trade openness and the percentage of people living below the poverty line in South Africa.

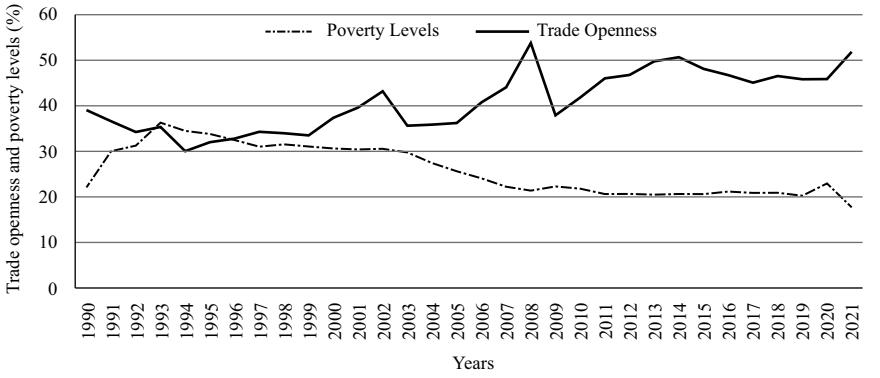

Figure 1: Trade Openness and Poverty Rate in South Africa (1990-2021)
Source: Authors' computation using data from World Bank (2021) and Quantec Easy Data (2021)

Although the South African government has made strides in reforming trade policies and integrating the country's economy into the global environment, poverty alleviation seems to have been moving at a very slow pace. As shown in Figure 1 above, there has been a significant increase in trade openness over the past 16 years, from 39% in 1990 to 52% in 2021. However, poverty levels have remained stubborn, at an annual average of 26%. The number of people living in extreme poverty or food poverty line1 increased from 22% in 1990 to 36% in 1993. In 1994, this started declining to 35% and further declined to 18% in 2021. Over this period, trade openness increased at an average annual rate of 1.4%, while poverty levels declined at an annual average annual rate of 0.3% (see World Bank 2021; Quantec Easy Data, 2021).

3. LITERATURE REVIEW

Over the years, the literature has shown that the effect of trade openness on poverty levels is mixed and inconclusive. There have been three outcomes, namely positive, negative and no impact. The empirical evidence indicates that the effect of trade openness on poverty differs from developed to developing countries. Using the GMM technique and dynamic panel data for Middle East and North Africa (MENA) countries for the period from 1995 to 2015, Ezzat (2018) examined the effect of trade openness on poverty intensity and

1 The amount of money that an individual will need to afford the minimum required daily energy intake (StatsSA, 2021)

multidimensional poverty. The findings from the study established that trade openness has a positive effect on both poverty severity and multidimensional poverty. Anetor, Esho & Verhoef (2020) examined how FDI, trade, and foreign aid affects poverty reduction using the Feasible Generalized Least Square (FGLS) methodology for 29 countries in sub-Saharan Africa for the period from 1990 to 2017. The study found that trade has a positive and significant impact on poverty reduction, especially in low-income countries. Mbah et al. (2022) studied the link between trade openness and the poverty rate in Nigeria. The study used the ARDL technique and quarterly data from 1986Q1 to 2019Q4. The results indicate that in the long- and short-run, trade openness has a positive and significant effect on the poverty rate in Nigeria.

Gnangnon (2019) examined the effect of multilateral trade liberalisation on poverty in developing countries. The study found that multilateral trade liberalisation is conducive to reducing poverty. In a study on 21 African countries, Onakoya, Johnson & Ogundajo (2019) examined the link between trade liberalisation and poverty using data for the period from 2005 to 2014. The findings of the study revealed that trade openness has a negative and significant relationship with the poverty rate. In Mauritius, Fauzel (2022) explored how trade affects poverty reduction for the period from 1990 to 2017. The study used the vector error correction model and found that in the long-run trade reduces poverty.

In Indonesia, Agusalim (2017) studied the dynamic effect of trade liberalisation on the poverty of Indonesians for the period from 1978 to 2015 using the vector error correction mechanism (VECM). The study revealed that trade liberalisation insignificantly impacted poverty in the short run while in the long run, it was found to lead to a reduction in poverty. Yameogo and Omojolaibi (2021) investigated the relationship between trade openness, economic growth and poverty level from 1990 to 2017 in 40 countries in sub-Saharan Africa using the Panel Autoregressive Distributed Lag and the System of Generalised Method of Moment Technique. The findings from the study revealed that trade openness has adverse effects on poverty in the short run while it has a positive effect in the long run.

In a study for developing countries, Santos-Paulino (2017) investigated the effect of trade specialisation on poverty. The study found that in low-income countries, manufacturing exports contribute to poverty reduction. On the other hand, agricultural exports were found to have a more significant effect on poverty. The findings further confirm that trade specialisation led to poverty reduction; however, this is only under specific trade specialisation patterns and policy conditions.

In another study on sub-Saharan African countries, Sunge, Kumbula & Makamba (2021) explored the link between trade and poverty by disaggregating trade by sources. Using data from 2003 to 2017 and the GMM estimation technique, the study found that the positive influence of trade openness on poverty varies depending on the source of trade. Trade within SSA and from MENA countries were found to offer more gains while poverty gains from trade were found to be reinforced with improved institutional quality. The study recommended the promotion of intra-Africa trade and trade with MENA countries to accelerate poverty gains from trade openness.

The reviewed studies have shown that the empirical evidence on the impact of trade openness on poverty reduction is inconclusive. This can be due to the sample period, specific countries and the estimation methods used.

4. MATERIALS AND METHODS

4.1 Model Specification and Definition of Variables

The study examines the impact of trade openness on poverty levels in South Africa over the period from 1990 to 2021. The study followed the model used in Mbah et al (2022), which specified poverty as a function of trade openness, total output, inflation rate, and institutional quality. Due to data availability issues in the case of South Africa, the model is modified to exclude the corruption perception index variable used as a proxy for institutional quality. Following Goff and Singh (2014) and Yameogo and Omojolaibi (2021), the model is further modified to include financial development and labour force, respectively. Unlike previous studies, the study estimated four models, that is, an income-based poverty model (Model 1) and a consumption-based poverty model (Model 2). In the income-based poverty model (POV1), poverty is measured through the number of people living below the poverty line, while it is measured through household consumption in the consumption-based model (POV2). The same Models 1 and 2 are also estimated in Models 3 and 4, however, in this case, trade openness is measured through exports as a share of economic growth. The use of exports as a proxy is meant to determine whether exports as a single factor would have a significant impact on poverty levels in South Africa as it has the potential to drive employment and income levels. The models are specified as follows:

Model 1: Income-based poverty model

$$POV1 = f(TOP, GDP, FD, INFR, LF) \quad \text{.....(1)}$$

$$POV1 = \alpha_0 + \alpha_1 TOP_{it} + \alpha_2 GDP_{it} + \alpha_3 FD_{it} + \alpha_4 INFR_{it} + \alpha_5 LF_{it} + \varepsilon_t \quad \text{.....(2)}$$

Model 2: Consumption-based poverty model

$$POV2 = f\left(TOP, GDP, FD, INFR, LF\right) \quad \text{.....(3)}$$

$$POV2 = \alpha_0 + \alpha_1 TOP_{it} + \alpha_2 GDP_{it} + \alpha_3 FD_{it} + \alpha_4 INFR_{it} + \alpha_5 LF_{it} + \varepsilon_t \quad \text{.....(4)}$$

Model 3: Income-based poverty model with exports as a proxy for trade openness

$$POV1 = f\left(EXP, GDP, FD, INFR, LF\right) \quad \text{.....(5)}$$

$$POV1 = \alpha_0 + \alpha_1 EXP_{it} + \alpha_2 GDP_{it} + \alpha_3 FD_{it} + \alpha_4 INFR_{it} + \alpha_5 LF_{it} + \varepsilon_t \quad \text{.....(6)}$$

Model 4: Consumption-based poverty model with exports as a proxy for trade openness

$$POV2 = f\left(EXP, GDP, FD, INFR, LF\right) \quad \text{.....(7)}$$

$$POV2 = \alpha_0 + \alpha_1 EXP_{it} + \alpha_2 GDP_{it} + \alpha_3 FD_{it} + \alpha_4 INFR_{it} + \alpha_5 LF_{it} + \varepsilon_t \quad \text{.....(8)}$$

The variables are converted to logarithms to obtain elasticity coefficients on these variables and minimise the impact of outliers. Therefore, equations of the four models are specified as follows:

Model 1: $lPOV1 = \alpha_0 + \alpha_1 lTOP_{it} + \alpha_2 lGDP_{it} + \alpha_3 lFD_{it} + \alpha_4 lINFR_{it} + \alpha_5 lLF_{it} + \varepsilon_t$ .....(9)

Model 2: $lPOV2 = \alpha_0 + \alpha_1 lTOP_{it} + \alpha_2 lGDP_{it} + \alpha_3 lFD_{it} + \alpha_4 lINFR_{it} + \alpha_5 lLF_{it} + \varepsilon_t$ ...(10)

Model 3: $lPOV1 = \alpha_0 + \alpha_1 lEXP_{it} + \alpha_2 lGDP_{it} + \alpha_3 lFD_{it} + \alpha_4 lINFR_{it} + \alpha_5 lLF_{it} + \varepsilon_t$ ...(11)

Model 4: $lPOV2 = \alpha_0 + \alpha_1 lEXP_{it} + \alpha_2 lGDP_{it} + \alpha_3 lFD_{it} + \alpha_4 lINFR_{it} + \alpha_5 lLF_{it} + \varepsilon_t$ ...(12)

Where POV1 is the income-based poverty level, POV2 is the consumption-based poverty level, TOP is trade openness, EXP is exports, GDP is the gross domestic product, FD is the financial development, INFR is the inflation rate, LF is the labour force and εt is the white noise error term. Table 1 provides a description of the variables used and sources of data.

Table 1: Description of Variables and data sources

Variable	Description and a priori expectation	Data source
POV1	POV1 represents the income-based poverty rate. This variable is measured through the number of people living below the income poverty line as a share of the total population. The income poverty line is defined as the extreme poverty line plus the average amount derived from non-food items of households whose total expenditure is equal to the food poverty line (StatsSA, 2021). This study used the poverty headcount index (percentage of population) as a proxy for poverty rate. The use of this study is supported in studies such as Yameogo & Omojolaibi (2021); Gnangnon (2019).	Quantec EasyData
POV2	POV2 represents the consumption-based poverty rate and is measured by the household consumption per capita in this study. The variable has been used as a proxy for poverty by other studies such as Magombeyi & Odhiambo (2018), Maluleke (2018) and Togo (2020). This variable is viewed to be a good proxy for poverty levels as an increase in trade openness is expected to lead to a rise household consumption through the expansion of labour or the export channel (Vo & Nguyen, 2021).	World Bank database
TOP	Trade openness is measured as the sum of imports and exports as a share of GDP. This variable is expected to have a negative impact on poverty levels and has been used in previous studies such as (Togo, 2020)	Quantec EasyData
EXP	Exports are measured as the total of goods and services exported to other countries in the world as a share of GDP. This variable is expected to have a negative impact on the poverty rate as it is associated in increased employment and income levels.	Quantec EasyData
GDP	Gross domestic product per capita is used as a measure of total output. The variable is used to capture economic development and is expected to have a positive impact on the poverty rate. It has been used in other studies such as Goff & Singh (2014) and Onakoya, Johnson & Ogundajo (2019), among others.	World Bank database
INFR	The inflation rate is used to measure macroeconomic stability (Gnangnon, 2019). In this study, inflation as measured by the consumer price index. The variable is expected to lead to an increase in the poverty rate as it leads to a decline in the purchasing power of a household.	Quantec EasyData
FD	Financial development is a measure of financial deepening, which provides a perspective into a country's performance in terms of access to financial services. This variable is measured by domestic credit provided by the financial sector as a percentage of GDP. The variable is expected to have a negative effect on the poverty rate. This variable is supported by literature, as it has been used in studies such as Goff & Singh (2014).	South African Reserve Bank
LF	Labour force is measured as the total number of employed persons and unemployed persons that are actively seeking employment. This variable is used to capture the county's population of working age. The use of this variable is supported by literature and has been used in studies such as Yameogo & Omojolaibi (2021). It is expected to lead to a decline in poverty levels.	World Bank database and the South African Reserve Bank

4.2 Estimation Techniques

To examine the impact of trade openness on poverty levels in South Africa, the study uses the ARDL technique developed by Pesaran, Shin & Smith (2001). The ARDL approach requires that the estimated variables should not be integrated of I(2). To ascertain this, it is important to first test for unit root (see Presaran et al, 2001). Furthermore, testing for unit root is important because time series data is known for unit root problems, which may lead to spurious results (Mbah et al., 2022). The Dickey-Fuller Generalised Square (DF-GLS) and Phillips-Perron (PP) tests are used to test stationarity in this study. After confirming stationarity, the next step is to determine the long-run relationship. To test the long-run relationship between trade openness and poverty, the study employs the ARDL method. This method is preferred over other econometric cointegration methods because of its numerous advantages. Firstly, it can be used even if the variables are integrated with a mix of I(0) and I(1) (Pesaran, Shin & Smith, 2001). Secondly, the model can be applied regardless of the sample size and on variables that have different optimal lags. The ARDL model for both models 1 and 2 are specified as follows:

Model 1: Income-based poverty model

$$\begin{aligned} LPOV1_t = {} & \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV1_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LTOP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} \\ & + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} \\ & + \alpha_1 LPOV1_{t-1} + \alpha_2 LTOP_{t-1} + \alpha_3 LFD_{t-1} + \alpha_4 LINFR_{t-1} + \alpha_5 LLF_{t-1} \\ & + \alpha_6 LGDP_{t-1} + \mu_{1t} \end{aligned} \quad ..(13)$$

Model 2: Consumption-based poverty model

$$\begin{aligned} LPOV2_t = {} & \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV2_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LTOP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} \\ & + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} \\ & + \alpha_1 LPOV2_{t-1} + \alpha_2 LTOP_{t-1} + \alpha_3 LFD_{t-1} + \alpha_4 LINFR_{t-1} \\ & + \alpha_5 LLF_{t-1} + \alpha_6 LGDP_{t-1} + \mu_1 t \end{aligned} \quad .(14)$$

Model 3: Income-based poverty model with exports as a proxy for trade openness

$$\begin{aligned} LPOV1_t = {} & \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV1_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LEXP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} \\ & + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} \\ & + \alpha_1 LPOV1_{t-1} + \alpha_2 LEXP_{t-1} + \alpha_3 LFD_{t-1} + \alpha_4 LINFR_{t-1} + \alpha_5 LLF_{t-1} \\ & + \alpha_6 LGDP_{t-1} + \mu_{1t} \end{aligned} \quad ..(15)$$

Model 4: Consumption-based poverty model with exports as a proxy for trade openness

$$\begin{aligned} \Delta LPOV2_t = {} & \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV2_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LEXP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} \\ & + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} \\ & + \alpha_1 LPOV2_{t-1} + \alpha_2 LEXP_{t-1} + \alpha_3 LFD_{t-1} + \alpha_4 LINFR_{t-1} + \alpha_5 LLF_{t-1} \\ & + \alpha_6 LGDP_{t-1} + \mu_{1t} \end{aligned} \quad .(16)$$

Where Δ is the first difference, L is the logarithm, where: Δ is the first difference, L is the logarithm, u_t is the white noise error term, Ω_0 is a constant, $\Omega_1 - \Omega_6$ are the coefficients of the long-run ARDL model, and $\alpha_1 - \alpha_6$, are short-run coefficients.

After confirmation on the cointegration relationship, the next stage of the ARDL procedure involves the estimation of the short-run relationships. The short-run coefficients will be obtained by estimating error-correction model (ECM) associated with long-run estimates. The error correction models in this study are specified as follows:

Model 1: Income-based poverty model

$$\begin{aligned} \Delta LPOV1_t = {} & \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV1_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LTOP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} \\ & + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} \\ & + \pi_1 ECM_{t-1} + u_t \end{aligned} \quad .(17)$$

Model 2: Consumption-based poverty model

$$\Delta LPOV2_t = \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV2_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LTOP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} + \pi_1 ECM_{t-1} + u_t \quad (18)$$

Model 3: Income-based poverty model with exports as a proxy for trade openness

$$\Delta LPOV1_t = \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} LPOV1_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LEXP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} + \pi_1 ECM_{t-1} + u_t \quad ..(19)$$

Model 4: Consumption-based poverty model with exports as a proxy for trade openness

$$\Delta LPOV2_t = \Omega_0 + \sum_{i=1}^{n} \Omega_{1i} \Delta LPOV2_{t-i} + \sum_{i=0}^{n} \Omega_{2i} \Delta LEXP_{t-i} + \sum_{i=0}^{n} \Omega_{3i} \Delta LFD_{t-i} + \sum_{i=0}^{n} \Omega_{4i} \Delta LINFR_{t-i} + \sum_{i=0}^{n} \Omega_{5i} \Delta LLF_{t-i} + \sum_{i=0}^{n} \Omega_{6i} \Delta LGDP_{t-i} + \pi_1 ECM_{t-1} + u_t \quad .(20)$$

5. RESULTS

5.1 Descriptive statistics

The results for the study are discussed in this section. The descriptive statistics results show that POV1 (income-based poverty rate) has a maximum and minimum values of 36.243 and 17.830 respectively and has a mean value of 25.919. POV2 (consumption-based poverty rate) has a mean of 167.724 and a standard deviation of 47.849. It also has a higher value of minimum and maximum when compared to POV2, which are 100.831 and 235.033, respectively. The descriptive statistics of the data are presented in Table 2.

Table 2: Descriptive statistics

	FD	GDP	INFR	LF	TOP	POV1	POV2	EXP
Mean	61.74	5285.380	6.848	19960313	40.960	25.919	3312.235	21.254
Median	64.158	5705.899	5.8315	20205324	40.230	23.517	3452.896	22.855
Maximum	75.886	8799.477	15.153	24142656	53.659	36.243	4067.991	29.333
Minimum	47.777	126.027	1.387	15502719	30.291	17.830	2414.485	16.155
Std. Dev.	8.514	1953.706	3.237	2678934	6.469	5.387	616.819	3.336
Skewness	-0.128	-0.341	1.098	-0.103	0.197	0.317	-0.159	0.089
Kurtosis	9.006	2.746019	3.787	1.824516	1.853	1.592	1.330	2.265

Source: Authors' compilation

5.2 Unit Root Test

The stationarity tests results show that none of the variables used in the study are integrated of order of more than I (1), and this allows for the use of the ARDL model. The stationarity test results are presented on Table 3.

Table 3: Unit Root Test

DF-GLS Test					
Variable	**Levels**		**First Difference**		**Stationarity**
	Without Trend	With Trend	Without Trend	With Trend	
POV1	-0.721	-5.460***	-6.144***	-6.100***	I(1)
TOP	-1.609	-4.259**	-7.073***	-7.001***	I(1)
GDP	-2.800*	-2.157	-4.045***	-3.924***	I(1)
INFR	-3.585**	-3.949	-5.377***	-5.771***	I(1)
LF	-0.980	-2.491	-6.286***	-6.268***	I(1)
FD	-1.286	-1.565	-4.251***	-4.199***	I(1)
POV2	-0.024	-1.386	-4.074***	-4.167***	I(1)
EXP	-1.758	3.143	-6.336*	-6.762*	I(1)
PP Test					
Variables	**Levels**		**First Difference**		
	Without Trend	With Trend	Without Trend	With Trend	
POV1	-0.9594	-4.915***	-6.357***	-6.219***	I(1)
TOP	-1.379	-4.316**	-13.380***	-15.280***	I(1)
GDP	-2.756*	-3.015	-6.173***	-6.173***	I(1)
INFR	-3.157**	-2.827	-5.527***	-8.587***	I(1)
LF	-0.997	-2.491	-6.283***	-6.265***	I(1)
FD	-1.286	-1.760	-4.238***	-4.221**	I(1)
POV2	-0.897	-2.044	-3.537**	-3.322**	I(1)
EXP	-0.680	-1.546	-4.263***	-4.218**	I(1)

Note: *, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively.
Source: Authors' compilation

5.3 Cointegration Test

Having confirmed that all the variables are integrated of order one I(1), the next step is to examine the long-run and short run relationship between the dependent variable and the explanatory variables using the ARDL bounds test. To test this, the F-statistics for Models 1 and 2 are first computed. The results are then compared to the two asymptotic critical values provided by Pesaran, Shin & Smith (2001). The results for the F-statistics for the two models are presented in Table 4 below.

Table 4: Cointegration Results

	Dependent Variable	Function	F-Statistic	Cointegration Status
Model 1	POV1	F(POV1/TOP, GDP,FD,INFR,LF)	19.172***	Cointegrated
Model 2	POV2	F(POV2/TOP, GDP,FD,INFR,LF)	8.732***	Cointegrated
Model 3	POV1	F(POV1/EXP, GDP,FD,INFR,LF)	15.783***	Cointegrated
Model 4	POV2	F(POV2/EXP, GDP,FD,INFR,LF)	10.866***	Cointegrated

Asymptotic Critical Values						
	1%		5%		10%	
Critical Values	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
	3.410	4.680	2.620	3.790	2.260	3.350

Note: *** denotes statistical significance level 1%
Source: Authors' compilation

The results presented in Table 4 show that a cointegration exists between the dependent variable and the explanatory variables. The F-statistics for Models 1, 2, 3 and 4 are 19.172, 8.732, 15.783 and 10.866, respectively. Given that the variables are cointegrated, the study proceeds to estimate the long-run and short-run relationships. The results for the long-run coefficients are presented in Table 5.

Table 5: Long-Run Results

Panel A: Long- Run Results				
Regressor	**Model 1**	**Model 2**	**Model 3**	**Model 4**
LTOP	-0.136 [-2.244]*	0.177 [0.2601]**	_	_
LEXP	_	_	0.054[0.493]	-0.161 [-3.413]***
LGDP	-0.252 [-10.060]***	0.184 [7.152]***	-0.284[8.004]***	-0.082 [-3.505]***
LINFR	0.022 [1.160]	-0.014 [-0.872]	0.0001[0.008]	0.660 [7.942]***
LLF	-0.411 [-3.828]***	0.624 [5.748]***	-0.634[-4.238]***	0.260 [3.083]***
LFD	-0.421 [-4.454]***	0.169 [1.742]*	-0.338[-2.651]**	0.203 [10.151]***
C	14.264[12.202]***	-3.941 [-8.030]***	17.545[11.153]***	-4.596 [-9.727]***

Note: *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.
Source: Authors' compilation

As shown in Table 5, the findings for Model 1 confirm a negative long-run impact of trade openness on poverty rate in the long run. The long-run coefficients of this variable suggest that 1% increase in trade openness leads to 0.14 % decrease in poverty rate in South Africa. The negative long-run relationship between the two variables is expected as trade openness is likely to boost exports and in turn lead to an increase in income levels (Mohsen, 2015; Gnangnon, 2019; Tsai & Huang, 2007). The findings also confirmed that total output, labour force and financial development have a negative long-run impact on poverty rate. The long-run coefficients confirmed that 1% increase in each of these variables leads to 0.25%, 0.41% and 0.42% decrease in poverty levels, respectively. Inflation rate is also found to have no significant effect on the poverty rate. The findings are consistent with the results from Togo (2020) and Onakoya, Johnson & Ogundajo (2019).

For Model 2, the long-run results confirmed that trade openness has a positive and significant impact on the poverty rate when the household consumption proxy is used. The long-run coefficients of this variable suggest that 1% increase in trade openness leads to 1.77% increase in household consumption (decline in poverty rate). The positive link between household consumption and trade openness is consistent with theory. The long-run results also confirm that total output, labour force and financial development positively affect household consumption. The coefficients of these variables suggest that 1% increase in GDP, labour force and financial development leads to 1.84%, 6.24% and 1.69% increase in household consumption (decrease in poverty levels), respectively. Inflation rate has no significant effect on poverty rate when household consumption is employed as a proxy. The results for the short-run coefficients are presented in Table 5.

For Model 3, the results confirm that trade openness has no significant long-run impact on poverty levels when exports as a share of economic growth are used as a proxy for openness. In terms of control variables, the findings confirm that economic growth, labour force and financial development have a negative impact on poverty rate. The coefficients of these variables confirm that 1% increase in each lead to 0.28%, 0.63% and 0.33% decline in poverty levels. These findings are in line with the theoretical expectations. Inflation rate is also found to have no long-run significant impact on poverty levels under Model 3. The long-run findings for Model 4 also confirm that when export as a share of economic growth is used as a proxy, trade openness has a negative significant impact on household consumption. This suggests that an increase in exports will lead to a decline in household consumption. For control variables, the results confirm a positive impact of both labour force, inflation and financial development, on household consumption, which implies that these variables lead to a decline in

poverty levels. The long-run coefficients for economic growth confirm that 1% increase in poverty rate leads to a decrease in household consumption.

Table 6: Short-Run Results

	Model 1	Model 2	Model 3	Model 4
DLPOV(-1)	-0.325 [5.074]***	0.358 [2.947]***	-0.384 [-5.343]	_
DLTOP	0.001 [0.030]	0.132 [2.534]**	_	_
DLEXP	_		-0.091[-2.379]**	-0.032 [-1.600]
DLEXP(-1)			-0.069[1.727]*	-0.051 [-2.406]**
DLGDP	-0.221 [-7.194]***	0.137 [5.656]***	-0.234[-6.739]*	0.081 [4.597]***
DLGDP(-1)	0.116 [3.218]***		0.113[2.945]***	_
DLINFR	-0.006 [-5.611]	-0.010 [-0.911]	0.0001[0.008]	0.015 [2.496]**
DLINFR(-1)	_			0.072 [8.252]***
DLINFR(-2)	_			0.048 [6.109]***
DLLF	-1.025 [-5.611]***	0.465 [3.919]***	-1.258[-6.176] ***	0.959 [9.124]***
DLLF(-1)				0.154 [1.481]
DLFD	-0.075 [-0.882]***	-0.010 [-0.137]	0.005[-0.050]	-0.146 [-3.341]***
DLFD(-1)				-0.548 [-7.018]***
DLFD(-2)			_	-0.227 [-4.464]***
ECM(-1)	-0.616 [-10.912]***	-0.745 [-8.054]***	-1.080[-11.148]***	-0.893 [-9.738]***
R-Squared	0.930	0.740	0.924	0.952
DW-statistic	1.823	1.821	2.034	2.857
F-Statistics	41.902 [0.000]	24.686 [0.000]	31.772[0.000]	34.324[0.000]
Serial Correlation	0.438[0.653]	1.088 [0.357]	0.278 [0.761]	3.743[0.067]
Normality	0.799[0.671]	1.452 [0.484]	1.481 [0.477]	1.230 [0.541]
Heteroscedasticity	1.654[0.438]	1.723 [0.151]	0.658 [0.774]	1.883[0.144]

Note: *, ** and *** denote statistical significance at 10%, 5% and 1%, respectively.
Source: Authors' compilation

The findings presented in Table 6 confirm that for Model 1, trade openness has no significant short-run effect on the poverty rate. The findings also confirmed that total output, labour force and financial development have a negative significant impact on the poverty rate, in the short run. In the short run, coefficients confirmed that 1% increase in total output, labour force and financial development leads to 0.23%, 1.02% and 0.07% decline in poverty levels, respectively. The findings also confirmed that the poverty rate is also negatively affected by its lagged values and the lagged values of the total output, suggesting that 1% increase in the lagged values of poverty levels and total output leads to 0.33% and 0.12% decrease in poverty levels. Signs of the coefficients of these variables are in line with theory and are supported by the results in studies such as Yameogo & Omojolaibi (2021) and Onakoya, Johnson & Ogundajo (2019). The inflation rate is also found to have no significant impact on poverty in the short run. The

findings are consistent with the results from Togo (2020) and Onakoya, Johnson & Ogundajo (2019).

The short-run results for Model 2 confirm that trade openness has a positive impact on the poverty rate when household consumption is used as a proxy. The short-run coefficients of this variable suggest that 1% increase in trade openness leads to 0.132% increase in household consumption (decrease in poverty rate). The short-run results further show that total output and labour force have a positive effect on household consumption (negative effect on poverty). This is consistent with the theory. The inflation rate and financial development are found to have a negative impact on household consumption.

The short-run results for Model 3 confirm that trade openness has a negative short-run impact on the poverty rate when export as a share of economic growth is used as a proxy of trade openness. The coefficient of trade openness in Model 3 suggests that 1% increase in this variable leads to 0.09% decrease in poverty levels. For Model 4, the results show that export has a statistically insignificant effect on household consumption. The findings further confirm that 1% increase in trade openness in the previous period leads to 0.05% decrease in consumer households (increase in poverty rate). In terms of control variables under Model 3, the findings confirm that labour force and economic growth have a negative impact on poverty levels. The coefficients of these variables suggest that 1% increase in each of them leads to 1.25% and 0.23% decline in poverty, respectively. The coefficients of these variables carry the theoretically expected signs. Inflation rate and financial development are found to have no significant impact on poverty levels under Model 3. For Model 4, total output, inflation and inflation are found to have a positive impact while financial development has a negative effect on household consumption in South Africa.

In all Models 1-4, the error correction terms are negative and statistically significant at 1% level of significance. This confirms that there is a long-run relationship between poverty and the explanatory variables. To further confirm the reliability of the ARDL results, diagnostic tests were conducted, and the results are presented in Table 4 above. The result of the normality test shows that the estimates are normally distributed. The diagnostic tests also show that there is no serial correlation in the model and that it passes the heteroscedasticity test. The Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) results confirm that the estimated models are stable. The CUSUMSQ and CUSUM tests are presented in Figure 2.

Model 1: Income-based poverty model

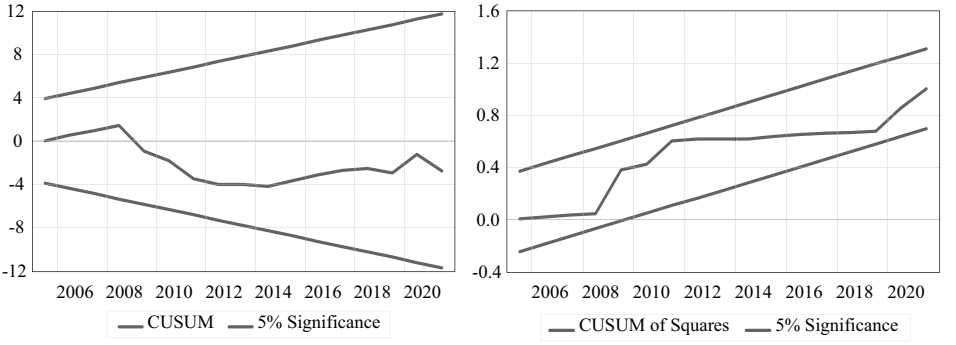

Figure 2A: CUSUM and CUSUMSQ tests for Model 1
Source: Authors' compilation

Model 2: Consumption-based poverty model

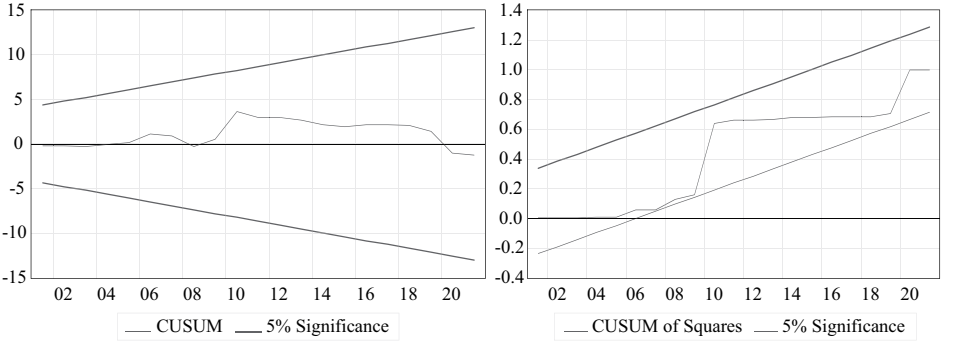

Figure 2B: CUSUM and CUSUMSQ tests for Model 2
Source: Authors' compilation

Model 3: Income-based poverty model with exports as a proxy for Trade openness

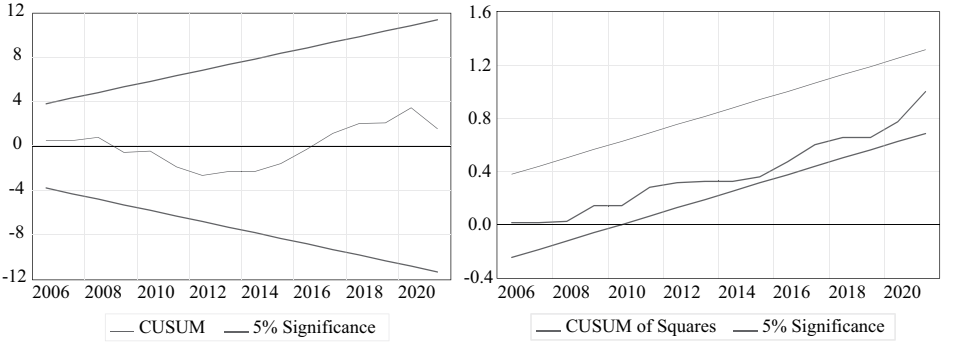

Figure 2C: CUSUM and CUSUMSQ tests for Model 3

Model 4: Consumption-based poverty model with exports as a proxy for trade openness

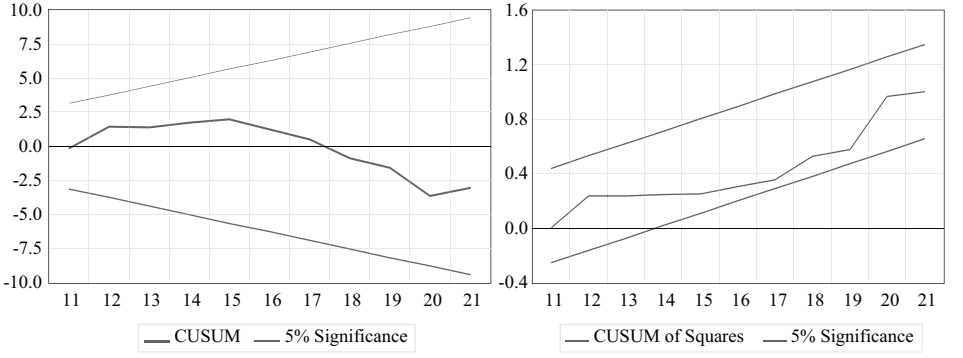

Figure 2D: CUSUM and CUSUMSQ tests for Model 4

6. CONCLUSIONS

The objective of the study was to investigate the effect of trade openness on poverty in South Africa using annual data for the period from 1990 to 2021. Although many studies have been conducted to establish how trade openness affects poverty, the findings have been mostly varied and inconclusive. The study used the ARDL bounds testing approach, which has the best small sample size properties to study the impact of trade openness on poverty. The overall findings from Models 1 and 2 of the study confirmed that trade openness leads to a long-run reduction in poverty levels when the number of people living below the poverty line is used as a proxy while it has no significant effect in the short run. On the other hand, when household consumption is used as a proxy for poverty rate, the results showed that poverty levels are positively impacted by trade openness both in the long run and short run. In terms of the control variables, the findings confirmed that total output and labour force lead to a reduction in the long and short run under both Models 1. Financial development leads to a decline in poverty levels both in the long and short run while inflation rate is found to have no significant effect in Model 1. For Model 2, the long-run results confirmed that trade openness has a positive and significant impact on the poverty rate when the household consumption proxy is used. The long-run results also confirm that total output, labour force and financial development positively affect household consumption. Inflation rate has no significant effect on poverty rate when household consumption is employed as a proxy.

For Model 3, the results confirm that trade openness has no significant long-run impact on poverty levels when exports as a share of economic growth are

used as a proxy for openness. In terms of control variables, the findings confirm that economic growth, labour force and financial development have a negative impact on poverty rate. Inflation rate is also found to have no long-run significant impact on poverty levels under Model 3. The long-run findings for Model 4 also confirm that when exports as a share of economic growth are used as a proxy, trade openness has a negative significant impact on household consumption. For control variables, the results confirm a positive impact of both labour force, inflation and financial development on household consumption, which implies that these variables lead to a decline in poverty levels. The long-run coefficients for economic growth confirm that 1% increase in poverty rate leads to a decrease in household consumption.

The study recommends that governments in developing countries should engage with other countries to increase their export capacity and in turn reduce their respective poverty levels. Governments should make it easier for businesses to import machinery and equipment needed for production through the reduction of tariffs. Since economic growth and labour force have been found to lead to an increase in household consumption, more resources should be channeled towards infrastructure development and encourage job creation.

Conflict of interests

The authors declare there is no conflict of interest.

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ОТВОРЕНОСТ ТРГОВИНЕ И СМАЊЕЊЕ СИРОМАШТВА У ЈУЖНОЈ АФРИЦИ

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САЖЕТАК

Студија је испитала утицај отворености трговине на стопу сиромаштва у Јужноафричкој Републици. Приступ тестирању граница АРДЛ коришћен је са годишњим подацима који покривају период од 1990. до 2021. Студија је процијенила четири модела, односно модел заснован на приходу и модел заснован на потрошњи користећи двије мјере отворености трговине: укупна трговина као проценат БДП-а и извоз као проценат БДП-а. За модел 1 заснован на приходима, налази су потврдили да отвореност трговине има дугорочни негативан утицај на стопу сиромаштва, док на кратак рок нема значајан утицај. За модел 3 утврђен је безначајан утицај на дуги рок, док је краткорочно утврђено да извоз доводи до смањења стопе сиромаштва. Резултати су потврдили да за модел 2 заснован на потрошњи, отвореност трговине доводи до смањења стопе сиромаштва на дуги и кратки рок. За модел 4, у којем се извоз користи као мјера за трговинску отвореност, утврђено је да доводи до смањења потрошње домаћинстава у дугом року. На основу резултата, студија препоручује владама земаља у развоју сарадњу са другим земљама како би повећале своје извозне капацитете и заузврат смањиле нивое сиромаштва.

Кључне ријечи: *отвореност трговине, стопа сиромаштва, приход, потрошња, АРДЛ, Јужна Африка*.