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Channels of Poverty Reduction in South Africa

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Abstract: Poverty reduction is essential for economic development and is a key sustainable development goal that all nations must achieve by 2030. **Objectives:** The objectives of the study were to identify the mechanisms of poverty reduction in South Africa and analyze poverty trends. **Approach:** Data were gathered from the World Bank portal. Cointegration analysis, Error Correction Model and autoregressive distributed lag techniques were used to estimate the relationships between variables. **Results:** Our findings indicate that limited access to productive resources (due to past dispossession and segregation policies), ineffective governance, were significant drivers of poverty. The channels of poverty reduction go through stronger industrialisation and a stimulus to increase remittances and FDI and drive up the economic growth rate. **Implications:** Policy recommendations emphasized the need for South Africa to attract foreign direct investment, promote sustainable economic growth, and enhance industrialization efforts to effectively tackle poverty and improve living standards across the country. **Value:** The research offers evidence-based solutions to poverty reduction in South Africa.

Keywords: economic growth; poverty; sustainable development goals; unemployment

JEL Classification: D6; I32; O11; O20

1. Introduction

South Africa has high poverty rates: between 2015 and 2023 the total population exposed to poverty rose from 55% to 63% (Leibbrandt et al., 2018; Statistics South Africa, 2020; World Bank, 2023a). United Nations (2025) defined poverty as "lack

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of income and productive resources to ensure sustainable livelihoods; hunger and malnutrition; ill health; limited or lack of access to education and other basic services; increased morbidity and mortality from illness; homelessness and inadequate housing; unsafe environments and social discrimination and exclusion. It is also characterised by lack of participation in decision making and in civil, social and cultural life". These definitions show that poverty is multidimensional that can be viewed from either an income perspective or a human perspective where the former comprises extreme and relative poverty while the latter encompasses the lack of important human capabilities, for example, access to education, healthcare, and nutritious food (Musakwa and Odhiambo 2019; Statistics South Africa 2022d).

Rooted in colonial and apartheid discrimination, poverty in South Africa has persisted despite post-apartheid poverty-reduction strategies, which raises serious concerns about the effectiveness of the approaches taken to implement such strategies (Ramnath 2015; Maphumulo and Bhengu 2019; World Bank 2023b). Since the fall of the apartheid government, the country's poverty reduction strategies, including the Reconstruction and Development Programme (RDP), have targeted the symptoms of poverty rather than its root causes. Thorny poverty-related issues such as limited access to land and productive assets have remained unaddressed, preventing a significant decline in poverty levels and leaving many households at risk (Habiyaremye et al., 2022). The deployed measures left the country's economy battling with high poverty rates, which manifest in the form of lack of quality water and sanitation, quality healthcare, high infant mortality, high unemployment, limited access to education, and poor housing (Habiyaremye et al. 2022; Maphumulo and Bhengu 2019; Ramnath 2015). These poverty issues affecting South Africa are classified under the South African Multidimensional Poverty Index as forming a very serious constraint to the socioeconomic development of the country (Statistics South Africa 2022b). In 2014, an estimated 1.4 million households lacked water and sanitation services (South African Human Rights Commission (SAHRC) 2018). In addition, 45 million South Africans depend on the public healthcare system which unfortunately offers poor services (Pontsho et al., 2017; Statistics South Africa, 2017c). The debate about poverty in general is centered on diverse views, for example: structural views, individual views among others. According to structuralists, the main causes of poverty are systemic, including social and political arrangements that favor the wealthy while perpetuating economic inequality, and limited access to education to the majority of people (Sen, 1999; Krugman, 2007). On the other hand, individualists argue that personal decisions and actions are mostly to blame for poverty (Davis & Sanchez-Martinez, 2014). They contend that poor financial habits, a lack of work ethic, or low educational achievement are examples of poor decision-making that contribute to poverty. The individualistic view on poverty is frequently linked to classical economics, may be found in the writings of

economists such as Gary Becker (1964), who popularized the idea of human capital and its significance for personal economic results.

Research on poverty in South Africa has revealed a complex interplay of economic, social, and political factors that perpetuate poverty (Faluyi & Olitola, 2024; Ngubane et al., 2023). A thematic study which covered the years 2006-2009 by Sitshange (2024) pointed out that programs aimed to eradicate multidimensional poverty in South African communities have shown mixed degrees of success, which suggests the need for targeted interventions. Fofana et al (2024) researched on ending poverty and accelerating growth in South Africa. Research findings indicated that conditional poverty-alleviation social transfers foster growth while unconditional redistribution towards lower-income earners can hinder economic growth (Fofana et al., 2024). This study does not explain the long-term sustainability of social transfers in poverty reduction. Francis & Webster (2021) used qualitative research to investigate poverty and inequality in South Africa. The study's findings revealed that South Africa's high poverty rates are closely related to policy stagnation and long-standing structural impediments erected under apartheid. However, the research is silent on poverty reduction ways that can be used in the country. Gumede (2021) used National Income Dynamics Data from 2008-2017 to examine poverty in South Africa. From the study it was established that there is need to restructure the South African economy to effectively reduce poverty. However, the study does not clearly explain how the economy should be restructured and the transmission mechanism needed to transfer the gains of restructuring towards poverty alleviation. To add more, Leibbrandt, Woolard and Argent (2010) used national survey data from 1993, 2000 and 2008 to examine the trends in South African income distribution and poverty since the fall of Apartheid. Results from the study indicated that social assistance grants alter the levels of inequality only marginally but have been crucial in reducing poverty among the poorest households (Leibbrandt et al., 2010). From these findings it shows that social grants do not effectively eradicate poverty and poverty levels remain high in South Africa despite the existence of social grants.

The research by Bhorat, Leibbrandt, Maziya and van der Berg (2022) highlighted the intricate relationship between labor markets and inequality in South Africa, emphasizing the need for transformative policies to combat poverty. The findings suggest that while economic growth can reduce poverty, it is often undermined by persistent inequality, necessitating a dual approach that addresses both growth and equality. Ngepah (2024) used National Income Data Survey from 2008, 2012, 2014 and Quantec data from 1993-2020 to research on asymmetric response of poverty to growth and inequality in South Africa. Research findings underscore the complicated interplay between economic growth, inequality, and poverty, highlighting the need for comprehensive policies that address these issues simultaneously to effectively support the poor in South Africa.

Although multiple studies dome by diverse scholars, such as (Bhorat, et al., 2022; Francis & Webster, 2021; Fofana et al., 2024; Gumede, 2021; Ngepah, 2024; Leibbrandt et al., 2010) were devoted to analysing various facets of poverty issues in South Africa, evidence-based insights that would help policymakers put in place effective poverty-reduction programmes remain largely wanting. The present study seeks to provide a more rigorous analysis focused on underlying mechanisms that can be acted upon to effectively change the country's poverty dynamics. The main shortcoming of previous studies was based on the validity of the data they used. The distinctive aspect of this current study resides in the utilization of a unique time span from 1989 to 2019 in the econometric calculations, allowing for new discoveries on the subject. The failure of the successively adopted poverty reduction policies to lower the high rates of poverty calls for novel approaches targeted to address the structural roots of the problem. To that end the study aimed to identify the mechanisms of poverty reduction in South Africa. The second objective of the study was to analyze and preview poverty trends in South Africa.

This study is significant because it contributes to a better understanding of the mechanisms and strategies that can help to eliminate poverty in South Africa. The study's findings could help influence policy in similar rising or developing economies. The rest of the paper is organized as follows: Section 2 describes the theoretical and empirical consideration of poverty reduction strategies as well as analysis of existing literature. Section 3, 4, 5 and 6 presents an overview of the poverty reduction programmes in South Africa, the research methodology and reviews the findings, and policy recommendations for a more targeted poverty reduction strategy development respectively.

2. Theoretical and Empirical Consideration of Poverty Reduction Strategies

This segment presents a discussion on the classical theory of poverty and the Marxist Theory.

2.1. Classical Theory of Poverty

According to classical economics, poverty results from bad decisions made by individuals and households (Ricardo, 1817). This claim is similar to the individual factor of poverty (Gans, 1995; Sameti et al., 2012). The theory is built on the assumption that people believe that their poor decisions are what ultimately pushes them into poverty or the welfare trap and that disparities in genetic aptitude may contribute to poverty in a person (Davis and Sanchez-Martinez, 2014; Mhlanga, 2022). The classical theory of poverty aligns with the behavioral theory in that they

both assume that poor people are poor due to their poverty increasing behavior (Brady 2019: Bradshaw 2007). Brady (2019) also posited that structural factors can also cause poverty. Some of these structural factors are: lack of access to education, unemployment, poor public service delivery and low rates of expansion of industries. These structural factors also affect South Africans.

In practical terms, South Africa's high poverty levels cannot be necessarily attributed to poor people making poor decisions. The structures that led to the current patterns of poverty include the denial of access to land and productive resources, economic exploitation of labor by settler colonists, and segregation legislations such as the Group Areas Act that explicitly dispossessed the autochthone population and attributed land and resources only to those identified as White Europeans (Strauss 2019). Brady (2019) and Bradshaw (2007) concur with Strauss (2019) on the view that inadequate political systems and policies can perpetuate poverty. The Group Areas Act forced Blacks into areas with no economic opportunities, adequate infrastructure, or productive resources (Marutlulle, 2022). Poverty in South Africa is therefore racialized and has been largely created and institutionalized by the colonial and apartheid government, while the African National Congress government, by reproducing the same neoliberal doctrine of the National Party, failed to reverse the effects of past discriminatory policies that created racialized poverty in the first place. Mfete (2020) supports the above sentiment and asserts that the neoliberal policies in post-apartheid South Africa increased social inequality among the citizens.

Classical economics contends that there is a cutoff point below which government aid supports the impoverished and averts destitution. The theory, therefore, suggests government social security programmes as a solution to poverty. However, since poverty is multidimensional, social security alone cannot be the solution to address poverty especially in South Africa. In addition, the idea presupposes that when poverty rates rise, government involvement becomes imperative. In South Africa, despite diverse actions and programmes by the South African government, poverty is still a challenge affecting 30.3 million people (World Bank 2023c). Therefore, there is a need to examine possible ways to reduce poverty in South Africa because, despite government interventions with different poverty reduction programmes, poverty remains high.

2.2. Marxist Theory

Marxists believe that poverty is a structural problem of capitalism that results from the unequal distribution of power and resources as well as the exploitation of the w orking class by the bourgeoisie (Marx & Friedrich, 1848). This theory is pertinent to the current study because apartheid's historical legacy, which included unequal

control of economic opportunities and critical resources such as land and mining, among other things, resulted in many South Africans living in poverty. Lephakga (2017) supports the above sentiment and mentioned that colonia apartheid caused poverty and high levels of inequality in South Africa. This study therefore is hinged on determining the channels of poverty reduction in South Africa which has its roots from the apartheid system.

2.3. Poverty Reduction Strategies used by other Countries

This section discusses the strategies used by China, and Vietnam.

2.3.1. China

Between 1981 and 2013, China lifted 850 million people out of poverty based on a $1.9 poverty line (Weiping, 2018). Key strategies included industrialisation and social security. China addressed poverty holistically by integrating economic growth with social, cultural, political, and environmental policies, as well as using instruments such as targeted interventions and database systems.

2.3.2. Vietnam

In 1992, over 34 million Vietnamese lived in extreme poverty, but poverty rates dropped by 80% due to these measures (UNDP 2023; World Bank 2023e). Vietnam effectively reduced poverty through strong policies in healthcare, education, industrial and agricultural productivity, foreign direct investment, and trade liberalization, creating numerous jobs. Based on this discussion of the success stories of poverty reduction in countries like China as well as Vietnam, South Africa can identify key policies and mechanisms that could be adapted to its own context.

2.4. Empirical Literature

The causes of poverty can vary from one nation to another. Ownership of resources, such as land and natural resources, can provide a platform for others to become richer by using the land for productive purposes, such as farming or setting up industries. Banerjee et al. (2006) used regression analysis to examine the development paths of colonized and non-colonized economies. The major data used was a cross-country examination of colonial institutions' effects on actual economic performance. Banerjee et al. (2006) posited that historical differences and inequalities from the colonial era made the colonisers rich in natural resources, and some of the colonised were left poor. Lephakga (2017) used documentary to points out that the apartheid system led to poverty in South Africa because Black people were denied access to land, quality healthcare and education.

Globally, governments offer social grants to alleviate poverty, but these measures are not sustainable in the long-term. Chipfupa and Wale (2020) found that while social grants help reduced poverty in South Africa, their sustainability remains unclear. Beneficiaries can meet basic needs, but if grants are cut, they revert to previous poverty levels. Thus, social grants provide temporary relief but do not effectively lower overall poverty levels, making them a short-term solution.

Economic growth through industrial expansion creates jobs and reduces poverty, as noted by Ramnath (2015). The study highlights employment creation as vital for poverty alleviation but lacks a clear poverty eradication strategy.

Odhiambo (2009) found that financial and economic development reduced poverty in South Africa from 1950 to 2005, aligning with Myovella et al. (2020). However, poverty continued to increase post-2005; this may signal that the pursued poverty alleviation strategies were ineffective in poverty reduction in South Africa. The relationship between South Africa's poverty-reduction strategies and existing theories of poverty can be understood through assessing the alignment between policy design and the theoretical frameworks that inform poverty reduction. From a structural perspective, poverty is primarily caused by social, economic, and political disparities that hinder people from having access to resources and opportunities (Sarlo, 2019). South Africa's post-2005 policies may have focused on redistributive measures, but structural issues for example, high inequality, unemployment, and insufficient access to excellent education and healthcare may not have been adequately addressed.

David and Webster (2019) explored a variety of factor affecting poverty and inequality in South Africa. Their findings indicate that municipalities with higher levels of inequality also have higher incidences of poverty (David and Webster. 2018). However, their study did not provide any practical proposals on how to solve or alleviate poverty problems in the South African context.

Fiseha and Oyelana (2017) found that small and medium enterprises (SMEs) in South Africa create employment opportunities, improving living standards and aiding poverty reduction. Access to credit facilities is crucial. Similarly, Eton et al. (2021) noted that loan access for SMEs in Uganda created 2.5 million jobs, lifting many out of poverty.

Mahembe and Odhiambo (2019) assert that aid can effectively reduce poverty when directed towards pro-poor public expenditures like agriculture, education, and healthcare. The theoretical factor addressed by aid in this context is structural. They emphasize that the effectiveness of aid is influenced by economic and political freedom, supporting Kosack's (2003) findings in democratic developing economies. To add more, Mahembe and Odhiambo (2019) highlight that aid for production sectors and infrastructure effectively reduces poverty. In South Korea, government

loans to agriculture boosted exports by 255% from 1967 to 1971, contributing to poverty reduction (Bharali & Gill, 2021).

Work-related migration allows individuals to earn income and send payments home, which improves household finances for needs like housing, education, and healthcare. Khanal (2020) notes that remittances contributed to a 20-50% reduction in Nepal's poverty during political turmoil from 1995 to 2004. UNCTAD (2011) found that a 10% increase in remittances as a GDP share reduces poverty by 1.6%. In El Salvador, remittances lowered the national poverty rate (NPR) by 4.2% in 2000, while in Tajikistan, labor migration to Russia resulted in $2.5 billion in remittances in 2019, helping reduce the national NPR from 34.3% in 2013 to 26.3% in 2019/2020. These examples highlight the positive, albeit marginal, impact of remittances on poverty reduction.

3. An Overview of the Poverty Reduction Programmes in South Africa

This segment discusses some of the programmes and policies introduced by the South African government between 1989 and 2019. All the there are many policies, to avoid bulkiness, the discussion will be restricted to the following only: Reconstruction and Development Programme Growth Employment and Redistribution (GEAR) and Growth Employment and Redistribution.

3.1. Reconstruction and Development Programme (RDP)

RDP is a socio-economic policy framework implemented in 1994 to address the adverse effects of apartheid (Centre for Affordable Housing Finance in Africa, 2024; Ramnath, 2015).

However, the main drawback of this policy was that it lacked a clear focus on economic growth; rather, it focused on infrastructure development, hence, multidimensional poverty was not alleviated. This policy also failed because in the Eastern Cape, 5461 houses were of poor quality, 2200 had major defects and poor sanitation (Bailey, 2013; Department of Housing, Eastern Cape Provincial Government, 2009). Corruption also led to the misappropriation of funds intended for RDP housing, leaving low- and middle-income earners unable to afford these homes and this lead to the failure of the programme (Nokulunga et al., 2018).

3.2. Growth Employment and Redistribution

It was launched in 1996 as a policy framework for addressing economic growth and unemployment (Le Roux, 1997). GEAR aimed the creation of 1 to 3 million jobs within five years, but the South African economy realised 800,000 job losses

between 1996 and 2000. The policy failed to meet the target as unemployment increased above 30% (Dotto, 2019; Ramnath, 2015). The policy failed because the economy did not attract meaningful foreign direct investment (FDI) to use in creating jobs together with a skills mismatch in the labour market (Dotto, 2019).

The overall conclusion is that the policies legislated by the South African government to reduce poverty were discussed and admittedly some were partially successful. However, South Africa still needs ways to reduce poverty because these policies did not effectively address the root causes of poverty.

4. Methodology

The study used quantitative regressions to examine how poverty reacts with respect to the following variables: foreign direct investment, industrialisation, private domestic credit, development aid, economic growth, social security and remittances. All these factors can help in poverty reduction (Chipfupa & Wale, 2020; Mahembe & Odhiambo, 2019; Ramnath, 2015).

As discussed, prior, poverty is a complex phenomenon and there is no single way that can be used to measure it (Yang, 2017). Poverty in this research was measured using the Human Development Index (HDI). HDI is the proxy of the reverse of poverty in that, low HDI indicates poor living standards, poor access to health and education. When people lack access to quality healthcare, education and better living standards they are exposed to poverty (O' Donnell, 2024). Additionally, countries with low human development levels tend to have higher levels of poverty (United Nations Development Programme & Oxford Poverty and Human Development Initiative, 2024). This shows how HDI is linked to poverty. The HDI index is useful for poverty measurement as it incorporates dimensions of income, education, and healthcare. Research shows that it produces reliable estimates as far as poverty measurement is concerned (Beja, 2021; Korankye et al., 2020). Moreover, health and education factors included in the HDI are also part of the multidimensional poverty index, which is one of the most robust proxies for poverty measurement (United Nations Development Programme (UNDP), 2022; Vollmer & Alkire 2022). Although there are other poverty measures can be used such as multidimensional poverty, they do not have data for the period covered in the study. Therefore, HDI was used on the fact that it has data available which can be used for econometric analysis (Gumede, 2021; Klasen, 2018 & Ogujuba et al., 2018). It is crucial to note that low levels of HDI shows a high likelihood of poverty or lower living standards and it is also on this basis that the HDI was used to estimate poverty levels in this study (Amaluddin et al., 2018; Edsel, 2021). Finally, HDI gives a balanced view by incorporating economic, social, and health factors, which aids in demonstrating the state of poverty from a holistic perspective (Lind, 2004).

The research used seven (7) independent variables as explained prior: The rationale for using these factors which can potentially reduce poverty is based on the explanation provided below:

High rates of economic growth can help lower poverty levels as was in the case of South Korea (Balasubramanian et al., 2023). For this reason, economic growth was introduced as a variable and it was measured using annual percentage. High rates of economic growth if they are accompanied by an expansion of industries, help in employment creation and as people get employed their level of poverty is lessened to some extent.

Development aid was included in this study due to its potential effect to enhance agricultural productivity. India received development aid to fund the Green Revolution between 1960 -1970 and this led to increased agricultural output. According to Sudha and Jansirani (2019) and Suresh (2022), by the end of the 1970s, wheat production had increased from 12 million tonnes in 1965 to over 20 million tonnes by 1970, showcasing a growth of approximately 67%. This increase in output helped to reduce food poverty (Nelson et al., 2019). Research by Khan et al. (2022) and Mahembe and Odhiambo (2021) shows that aid can deliver social services and direct benefits, contributing to poverty reduction. This variable was, therefore, added to establish its effect on poverty reduction and it was measured using current US$.

Jobs can be created via foreign direct investment which can be availed to productive sectors of an economy (Tobondo et al., 2021). This can lead to the expansion of business and job creation. In China, between 1991-1991, FDI inflows led to the expansion of the manufacturing sector and creation of 6 million jobs (Tseng & Zebregs, 2002). People's poverty levels gradually decline when they gain employment, thus FDI was added as a variable in this study and it was measured using current US$.

Various government programmes and policies are included in social security to lower poverty levels and this is the reason social security was added as a variable (Mediaty et al., 2015). Alvis (2023) stated that in Brazil social security programmes such as the Bolsa Familia, which provides cash transfers, lifted 3 million people from poverty. Due to its effect on reducing poverty, social security was added as a control variable and it was measured as a percentage of revenue (Yu & Li, 2021). Remittances were included as a control variable because it has a positive effect on poverty reduction and proved useful in Nepal and Tajikistan. They were measured using current US$. When people receive remittances, these help their families and dependents with money to buy some of the basic goods and services needed for human survival, thus reducing poverty to some extent (Barkat et al., 2023).

The study included private domestic credit since it affects lowering poverty. It was measured as a percentage of GDP. According to Nsiah et al. (2021), private domestic

credit can be used for investment, which in turn generates employment and lowers poverty levels. In Bangladesh, private domestic credit contributed more than 10% of the entire reduction in extreme poverty in rural areas between 2000 and 2010 (Khandker & Samad, 2014).

Finally, industrialisation was added as a variable because as industries grow and businesses expand, employment is created, and this allows people to earn an income from the jobs they secure (De Vries & Erumban, 2022). It was measured using the Manufacturing value added (% GDP). This then leads to poverty reduction as the employed people can afford certain goods and services required for survival. Industrialisation worked in China in poverty reduction. The belief is that this variable can also be useful in the case of South Africa.

4.1. Econometric Approach

Cointegration analysis, Error Correction Model and autoregressive distributed lag were used to estimate the relationships between variables. The Error Correction Model was employed because it aids in modeling the short-term adjustments required to return to equilibrium following a shock, and cointegration was chosen because it captures long-term relationships between variables (Christian, 2020; Yussuf, 2021). The Autoregressive Distributed Lag model (ARDL) was developed by Pesaran et al. (2001). This model is useful to capture the arguments presented in the literature review. The period covered in the study was between 1989 to 2019. ARDL is applicable when the variables are integrated of order 1 or 0 (Giles, 2013; Mamvura & Sibanda 2020). The model was selected because it enables the estimation of short-run and long-run parameters and is regarded as a useful model in econometric analysis (Mamvura & Sibanda, 2020; Shin et al., 2014). ARDL was used because it helps reduce the chances of spurious regression (Gholami et al., 2006). ARDL is also regarded as a robust model for econometric analysis and based on these reasons this model was employed in the research (Latif et al. 2014). The general model is stated below:

$$\Delta Y_{i,t} = \alpha_1 + \sum_{i=1}^{p} \beta_i \Delta Y_{i,t-i} + \sum_{i=0}^{q} \delta_i \Delta X_{i,t-i} + \varphi_1 Y_{i,t-1} + \varphi_2 X_{i,t-1} + \varepsilon_{it} \quad (1)$$

Where ΔY_{it} represent poverty as measured through HDI, i is the index for the lags, Δ captures differences in operator, X_1, y_1 are the independent variables for every i = 1 which are: DA = development aid, SS = social security, FDI = foreign direct

investment, PDC= private domestic credit, EG = economic growth, REM = remittances and IND = industrialisation. β_i and δ_i represents the short-run coefficients of the model explaining the short-run relationships between the variables, φ_1, φ_2 represents the long-run relationship, p and q represent the lags of the dependent variable and the independent variables respectively and ε_{it} is the error term.

The ARDL model in functional form is specified below:

$$\Delta HDI_t = \alpha_0 + \sum_{i=1}^{p} \delta_1 \Delta HDI_{t-i} + \sum_{i=0}^{q} \delta_2 \Delta DA_{t-i} + \sum_{i=0}^{q} \delta_3 \Delta SS_{t-i} + \sum_{i=0}^{q} \delta_4 \Delta FDI_{t-i} + \sum_{i=0}^{q} \delta_5 \Delta PDC_{t-i} + \sum_{i=0}^{q} \delta_6 \Delta EG_{t-i} + \sum_{i=0}^{q} \delta_7 \Delta REM_{t-i} + \sum_{i=0}^{q} \delta_8 \Delta IND_{t-i} + \varphi_1 HDI_{t-1} + \varphi_2 DA_{t-1} + \varphi_3 SS_{t-1} + \varphi_4 FDI_{t-1} + \varphi_5 PDC_{t-1} + \varphi_6 EG_{t-1} + \varphi_7 REM_{t-i} + \varphi_8 IND_{t-1} + \varepsilon_t \quad (2)$$

The ARDL Bounds test for cointegration is presented below:

$$HDI_t = \alpha_0 + \alpha_1 HDI_{t-1} + \alpha_2 DA_{t-1} + \alpha_3 SS_{t-1} + \alpha_4 FDI_{t-1} + \alpha_5 PDC_{t-1} + \alpha_6 EG_{t-1} + \alpha_7 REM_{t-1} + \alpha_8 IND_{t-1} + \varepsilon_t \quad (3)$$

4.2. Summary of Dataset

The data was sourced from the World Bank. In Table 1, the first column shows the variable, and the second and third columns show the indicators and the variable description, respectively. The last column shows the data source.

Table 1. Summary of the dataset

Variable	Indicator	Variable description
Poverty (PO)	Human Development Index (HDI)	The absence of opportunities, coupled with high levels of undernourishment, hunger, illiteracy levels, lack of access to education, physical and mental diseases, and socio-economic instability (UNDP, 2023).
Industrialisation (IND)	Manufacturing value added (% GDP)	Value added is the net output of a sector after adding all outputs and subtracting intermediate inputs (World Bank, 2024)
Foreign direct investment (FDI)	Current US$	An aggregated value comprising equity capital, reinvestment of earnings, long-term and short-term capita (World Bank, 2024)
Development aid (DA)	Current US$	An aggregated value comprising disbursements of loans made on concessional terms, and grants by official agencies of the members of the Development Assistance

		Committee (DAC), by multilateral institutions (World Bank, 2024)
Economic growth	Annual percentage	Refers to an increase in an economy's GDP value annually (World Bank, 2024)
Social security (SS)	Percentage of revenue	Social contributions are from employees, employers, self-employed individuals, and other contributions whose source cannot be determined. They also include actual or imputed contributions to social insurance schemes operated by governments (World Bank, 2024)
Private domestic credit (PDC)	% GDP	This incorporates all financial resources provided to the private sector, such as loans, purchases of non-equity securities, trade credits, as well as accounts receivable (World Bank, 2024)
Remittances (REM)	Current US$	Comprise current transfers in cash or in kind made or received by resident households to or from nonresident households and compensation of employees (World Bank, 2024)

5. Findings

This section presents a discussion of the results that relate to the key variables used in the study.

5.1. Descriptive Statistics

This section presents the descriptive statistics.

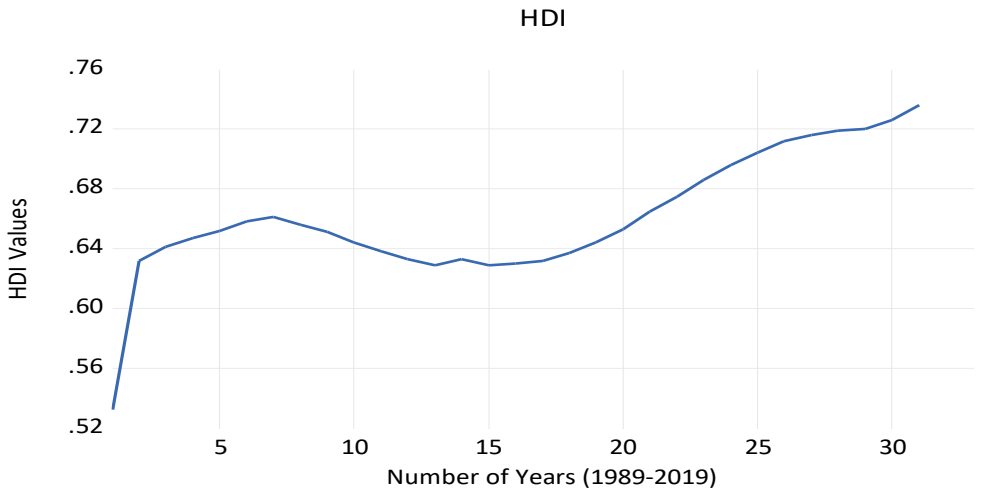

Figure 1. HDI Pattern in South Africa

Figure 1 above shows the HDI trends in South Africa between 1989 and 2019. These years are presented from 5 years to 30 years and this covers the period in question. In the first five years, there was a sharp increase in HDI levels which were slightly above 0.64; this implies that poverty reduced. In the next 10 to 20 years there was a decline in HDI levels; this signifies an increase in poverty levels in South Africa. The lowest HDI recorded for this period was 0.63. At the end of the 20 years, there was a steady increase in HDI levels to slightly above 0.72. Overall, although the HDI levels at the end of 2019 proved to be high, the economy is still battling with high poverty levels. The above description answers the second research objective of the study which aimed to preview the poverty trends in South Africa.

5.2. Diagnostic Tests and Lag Selection

Unit root test

To test for a unit root in the research, the Augmented Dickey-Fuller and Phillips-Perron tests were used.

Table 2. Unit Root Tests

	ADF test		PP test	
Variable	**Level**	**1st Diff**	**Level**	**1st Diff**
HDI		**(-16.19)** 0.00		0.00
IND		**(-4.58)** 0.00		0.00
DA		**(-8.87)** 0.00		0.00
REM		**-3.08)** 0.00		0.00

t-	**FDI**	**(-3.38)** 0.00		0.00	
	PDC		**(-4.81)** 0.00		0.00
	EG	**(-2.69)** 0.00		0.00	
	SS		**(-5.03)** 0.00		0.00

statistical values are in brackets. Table 2 shows that HDI, DA, REM, IND, PDC and SS were stationary at first difference. FDI and EG were stationary at level.

5.3. Lag Length Selection

The VAR model was used to determine the optimal lag length in this study. The results are presented below.

Table 3. VAR Model for Optimal Lag Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1953.47	NA	7.74e+48	135.27	135.65	135.39
1	-1766.90	257.34	1.96e+45	126.82	130.21	127.88
2	-1649.66	97.02*	1.65e+44*	123.14*	129.56*	125.15*

The Akaike criterion was used for decision purposes on the appropriate lag length. Table 3 shows that lag 2 was selected because it had the lowest Akaike information criterion (AIC) value of 123.14.

5.4. Bounds Test

To test for co-integration, the Bounds test (Pesaran et al., 2001) was used and the F-statistic of 39.36 was more than the I(1) value of 2.17.

Table 4. Bounds Test Results

Test statistics	Value
F- statistic	39.36
I(1)	2.17

Table 4 above shows that there is cointegration because the F-statistic of 39.36 was greater than the I (1) value of 2.17; this implies that there is a long-run relationship between the variables used in the study, which are HDI, industrialisation, remittances, development aid, economic growth, private domestic credit, foreign direct investment and social security.

5.5. Estimation Results

5.5.1. Error Correction Model

The Error Correction Model was run because there was a long-run relationship between variables used in the study. The results are presented below.

Table 5. Error Correction Model

Variable	Coefficient	t-Statistic	Probability
IND	0.01	8.11	0.00***
DA	8.91	3.37	0.00***
REM	7.77	3.03	0.00***
FDI	-5.02	-3.27	0.00***
PDC	0.02	7.9	0.00***
EG	-0.01	-7.35	0.00***
SS	0.02	1.19	0.00***
ECM	1.00	1.08	0.00***

****, ** and * stand for significance at the 1%, 5% and 10% levels, respectively*

Table 5 shows that all the variables were statistically significant at 1% level because they had p-values less than 1%. The previous period's deviation from long-run equilibrium is corrected in the current period at an adjustment speed of 1%. A 1% increase in IND is associated with a 1% increase in HDI on average, *ceteris paribus*, in the short run. A 1% increase in DA is associated with a 2.43% increase in HDI in the short-run. A 1% increase in REM is associated with an 8.91% increase in HDI in the short-run. A 1% increase in REM is associated with a 7.77% increase in HDI in the short-run. A 1% increase in FDI is associated with a 5.02% decrease in HDI in the short-run. This implies that FDI has a negative relationship with HDI. A 1% increase in EG is associated with a 1% decrease in HDI in the short term. A 1% increase in SS led to a 2% increase in HDI in the short-run. An ECM of 1 implies that system adjusts perfectly to deviations from the long-term equilibrium. From these research findings, it can be concluded that IND, DA, REM, PDC and SS have a positive effect on poverty reduction in the short-run.

5.5.2. Auto Regressive Distributed Lag Results

This section presents the results of the Auto Regressive Distributed Lag model long-run results.

Table 6. Auto Regressive Distributed Lag Long-Run Results

Variable	Coefficient	t-Statistic	Probability

IND	0.02	2.17	0.06*
DA	2.92	4.67	0.00**
REM	2.81	3.10	0.01***
FDI	7.9	3.55	0.00***
PDC	-0.03	-5.5	0.00***
EG	0.03	5.52	0.00***
SS	-0.02	-5.5	0.00***

****, ** and * stand for significance at the 1%, 5% and 10% levels, respectively*

The above results are discussed in detail after the post-estimation tests.

5.6. Post Estimation Tests

Table 7 shows the results of the different post-estimation tests done on the study.

Table 7. Post Estimation Test Results

Type of Test	P-value
Normality test	0.75
Breusch Godfrey Serial Correlation LM test	0.27
Breusch-Pagan Godfrey test	0.31

5.6.1. Normality Test

The Jarque-Bera test yielded a p-value of 0.75, exceeding the 5% significance level, leading to the acceptance of the null hypothesis and confirming that the data is normally distributed.

5.6.2. Serial Correlation Test

The model was tested for serial correlation using the Breusch Godfrey Serial Correlation LM test and a p-value of 0.27 was obtained as shown in Table 8. It was concluded that the model was free from serial correlation as the p-value of 0.27 was above the 5% level.

5.6.3. Heteroskedasticity Test

To test for heteroskedasticity, the Breusch-Pagan Godfrey test was used. Results proved that the p-value of 0.31 is greater than at α = 0.05, hence, there was no heteroskedasticity. This implies that there was homoscedasticity. Overall, the results of the post-estimation tests confirm the validity of the basic estimation. There is no

evidence of non-normality, serial correlation, or heteroscedasticity, which strengthens the reliability of the model's estimates.

5.6.4. Stability Tests

To test for stability the CUSUM of squares test was used. The results are presented below.

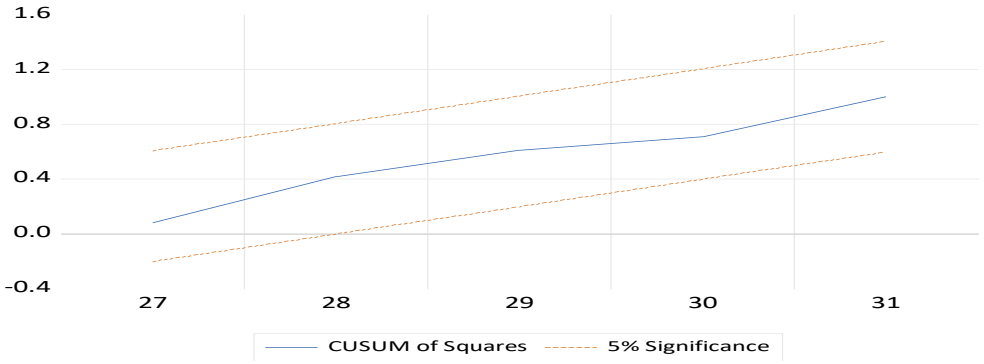

Figure 2. CUSUM of Squares Test

Figure 2 above shows insignificant structural deviation from 5%, but shows structural break, the model was stable afterwards.

5.7. Discussion of Findings

Table 6 shows that DA, REM, FDI, EG and SS were statistically significant at a 1% level. IND was statistically significant also as the p-value was below the 10% level. A 1% increase in IND leads to a 2% increase in HDI levels in the long-run. An increase in HDI levels implies a decrease in poverty levels. These results are supported by the fact that industrialisation coupled with innovation is necessary for economic growth and employment creation; this allows people to live a better life as they earn an income (Habiyaremye et al., 2022; Tregenna, 2023).

A 1% increase in DA will lead to an increase in HDI by 2.92 % in the long run. An increase in HDI levels implies a reduction in poverty levels. If DA and FDI are combined they contribute to creating the type of economic dynamics that address the root causes of poverty when it is channelled towards productive sectors of an economy; this leads to job creation and poverty reduction (Kassim & Beceren, 2022; Leibbrandt et al., 2010).

A 1% increase in FDI will lead to an increase in HDI by 7.9% in the long run. FDI can be associated with the expansion of industries. Thus, as industries expand, more people are employed, and they earn an income and wages which enable them to buy

goods and services to survive (Anetor et al., 2020; Magombeyi & Odhiambo, 2017). This leads to poverty reduction. Furthermore, when people are employed, they can also help their extended families with remittances and to some extent this helps in poverty reduction.

A 1% increase in EG leads to a 3% increase in HDI levels. This shows that economic growth helps in poverty reduction. The rationale is that high levels of economic growth may be achieved due to the increased production of goods and services requiring labour. As more labour is required, people get jobs and are alleviated from poverty (Zhu et al., 2022; Balasubramanian et al., 2023).

Table 6 also shows that a 1% increase in REM leads to a 2.81% decrease in HDI levels. This shows a positive relationship between REM and HDI. Remittances are useful for poverty alleviation as people can use the money they receive for spending, as well as engaging in income-generating projects that may enable earnings in the long run (Barkat et al., 2023).

Finally, a 1% increase in SS leads to a 2% decrease in HDI levels in the long run. This shows that SS does not reduce poverty in the long run. This is justified by the beneficiaries of social security not using the income they earn for investment. Rather some may devote such money to expenses or negative purchases, for example, alcohol (Zikhali, 2021). Social security is also viewed to have a dependency effect on beneficiaries who rely on such grants and are unable to come up with other income-generating projects. It can be concluded that development aid, foreign direct investment and economic growth can be used for effective poverty reduction in South Africa. This answers the overall objective of this study.

6. Conclusion

This research identified the following channels of poverty reduction: development aid, foreign direct investment and economic growth. To effectively reduce poverty, the study recommends implementing growth-enhancing policies, promoting labor-intensive industrialization, and leveraging development aid and foreign direct investment. Additionally, it suggests crafting sound economic policies that support entrepreneurship and job creation to foster sustainable economic growth. The study's findings underscore the need for effective policy formulation to reduce poverty in South Africa. A multifaceted approach is essential, combining measures to boost economic growth with targeted foreign development assistance for poverty-reducing projects. Attracting direct investments should focus on growth-enhancing initiatives with poverty reduction benefits. Strengthening industrialization and supporting small and medium-sized enterprises (SMEs) are crucial, as they play a vital role in job creation, thereby contributing to sustainable poverty alleviation.

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