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Article

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Article

The Impact of Corruption on Economic Growth in SADC

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Abstract: This study analyses the long-term impacts of corruption on economic growth within the Southern African Development Community (SADC) region, using data spanning 2005 to 2022. Through econometric modelling covering SADC countries, the research investigates the influence of corruption on the economic performance of the region. Employing descriptive statistics, panel unit root tests, and the autoregressive distributed lag pooled mean group model, the findings demonstrate that corruption, human capital, gross capital formation, trade openness, and government effectiveness significantly affect economic growth, whereas foreign direct investment does not. Corruption is believed to hinder economic progress by contributing to inefficient resource distribution, emphasising the need for robust anti-corruption strategies. Besides targeted anti-corruption measures, the research advises broader approaches such as enhancing institutional abilities, promoting transparency and accountability, and encouraging international cooperation. Advancing regional integration and leveraging technology to monitor and report corruption are also crucial. Moreover, promoting trade openness and human capital development can enhance economic growth. These comprehensive approaches aim to create a more transparent and efficient setting, ultimately boosting SADC's economic growth.

Keywords: economic growth; corruption; development; ARDL; SADC



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1. Introduction

The Southern African Development Community (SADC) came into existence in 1980 and is a regional community of 16 countries, namely Angola, Botswana, the Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, United Republic of Tanzania, Zambia, and Zimbabwe. SADC's main objective is to achieve politically stable, socially just, and sustainable economic development to benefit its people. Endowed with many natural raw materials, especially minerals, the large regional market offers important competitive advantages and enormous economic potential. Although SADC has already demonstrated some important gains, further development may be constrained by several factors (social, political, environmental, and economic). This study focusses on corruption as one such factor along the lines of the seminal works of Buchanan (1980), Mauro (1995), Bardhan (1997), and Aidt (2009), amongst others. The region's continually dismal performance on global corruption indices, such as the corruption perception index (CPI), demonstrates the gravity of the problem, with many member states placing below the worldwide average (Transparency International, 2025). Corruption is still a widespread and systemic problem that threatens sustainable development in the SADC area, despite its enormous economic potential.

The literature is filled with many definitions of corruption, including “The abuse of public power for private benefit” (Tanzi, 1998), “The intentional noncompliance with arm’s length relationships aimed at deriving some advantage from this behaviour for oneself or related individuals” (Tanzi, 1998), a form of rent seeking (Lambsdorff, 2006; Rose-Ackerman, 1999), “Corruption as the misuse of office for unofficial ends” (Klitgaard, 1998), and “The abuse of public power for personal gain or for the benefit of a group to which one owes allegiance” (Dye & Stapenhurst, 1998). The definition of corruption we use in this study is quite simple: an exchange of money or resources, or an attempt to perform such, between a private agent and a bureaucrat, to obtain some public product or service. By this definition, it is irrelevant who starts the bargaining to conclude the corruption contract, and just illegal payments or attempts at such can create corruption. Several scholars have taken opposing positions in their attempts to understand how corruption can affect economic development in an economy, the so-called “throw sand into or grease the wheels” hypotheses of development.

Under the throwing sand to the wheels hypothesis, scholars contend that corruption has distorting effects, raising costs, decreasing efficiency, and creating a barrier to economic growth because it lowers gross domestic product (GDP) (Mauro, 1995; Tanzi & Davoodi, 2002; Dreher & Herzfeld, 2005; Nguyen & Duong, 2021; Uddin & Rahman, 2023). Economic performance is hampered by corruption because it decreases the effectiveness of public spending, deters investment, and warps the dynamics of a competitive market (Mo, 2001; Acemoglu et al., 2001). Furthermore, corruption perpetuates poverty and impedes efforts toward sustainable development by worsening socioeconomic disparities, undermining governance, and taking funds away from vital public services and infrastructure (Bonga, 2021; Mahuni et al., 2020; Mtuwa & Chiweza, 2023). Proponents of the greasing the wheels hypothesis believe that corruption not only improves economic growth but also adds efficiency to the economy. The argument is that corruption serves as a lubricant to promote economic growth and expedite the bureaucratic process (Leff, 1964; Huntington, 1968; Bitterhout & Simo-Kengne, 2020; Lucarelli et al., 2024).

The varying levels of governance arrangements and implementation structures in the SADC countries offer a compelling opportunity to investigate the precise relationship between corruption and economic growth. Some nations, such as Botswana and Mauritius, have seen steady growth due to good governance and economic diversification, while others, such as Zimbabwe, Angola, and the Democratic Republic of Congo, still experience stagnation due to institutional flaws and widespread corruption (World Bank, 2025).

Despite the large body of research on corruption and economic expansion, few empirical studies focus exclusively on the SADC region. There is a knowledge vacuum regarding the regional dynamics of corruption and its economic implications because most of the studies have either looked at corruption globally or on specific nations. This gap hinders the understanding of how corruption affects economic outcomes in a region with different economies, governance institutions, and developmental constraints. This study aims to determine whether corruption significantly impedes economic growth by analysing its effects on the economic growth of SADC member nations. Understanding and quantifying these processes will allow research to provide evidence-based suggestions for policy measures to reduce corruption and improve economic performance in the area. The main objective of this article is to explore the impact of corruption on economic growth using the ARDL PMG methodology. The study adds to the body of knowledge on the relationship between corruption and economic growth by using this sound technique and by giving decision makers accurate estimates of how corruption affects economic growth.

2. Literature Review

New institutional economics has traditionally approached the issue of corruption by looking at two streams of contract theory. The first part—looking into the incentive structure of economic actors and its impact on their interaction—was covered by principal–agent theory. Transaction cost theory (rent seeking) served for the second part, i.e., investigating different modes of structuring economic relationships. On this basis, there are two major explanations for the existence of corruption; the first one treats it as a principal–agent problem, and the other as a rent-seeking problem. Under the principal–agent approach, the point of departure is from the fact that generally nobody can do everything by herself, be it due to costs or complexity of a business, and that specialisation and cooperation can produce various additional benefits. Consequently, tasks are often delegated to somebody else, for example, through hiring. The actor who does this by offering a contract is called the principal; the actor who accepts or rejects the offer is the agent. The principal–agent problem is found in most employer–employee (principal–agent) relationships and reflects the difficulties that arise in the absence of perfect information. [Meckling and Jensen \(1976\)](#) define an agency relationship as a contract under which one or more persons (the principal) engage another person (the agent) to perform some service on their behalf, which involves delegating some decision-making authority to the agent. If both parties to the relationship are utility maximisers, there is good reason to believe that the agent will not always act in the best interests of the principal. Asymmetry of information which causes changes implies that the agent entertains some informational advantage over the principal, either *ex ante* (precontractual: adverse selection) or *ex post* (postcontractual: moral hazard). Thus, opportunistic behaviour of the agent is possible. With respect to moral hazard, hidden information and hidden actions are relevant. In the first case, the agent acquires more information than the principal, and in the second case the agent's efforts cannot be observed by the principal. Consequently, securing a so-called “plain vanilla” contract is not achievable at all, or is at least not desirable due to the excessively high costs that would go along with searching for information or measuring efforts. If, as a last requirement, the objective functions of the two actors differ, moral hazards arise as a problem. The principal–agent problem as it relates to corruption (e.g., in public procurement) can be framed as follows. A procurement problem is most likely to occur in a case in which the good to be procured is not homogeneous, but can be produced at different quality levels, and in which the public agent has superior information about delivered quality. As a result, in exchange for a bribe, the agent can assign the project to a private services provider he favours and hide the fact that the provider delivered lower quality than promised.

Rent seeking is the attempt to enrich oneself by increasing one's share of a fixed amount of wealth rather than trying to create wealth. Since resources are expended but no new wealth is created, the net effect of rent seeking is to reduce the sum of social wealth. In the public sector rent seeking may be initiated by agents through soliciting bribes or other favours from the individuals or firms that stand to gain from having special economic privileges, which opens up the possibility of exploitation of the consumer. It has been shown that rent seeking by bureaucracy can push up the cost of production of public goods. It has also been shown that rent seeking by tax officials may cause a loss in revenue to the national treasury.

The main insight that distinguishes the transaction cost approach from principal–agent theory is that there are relevant costs for bargaining after a contract has been signed. These (transaction) costs are triggered by events that had not been anticipated when the original contract was drafted. This new institutional economics has led to many studies.

[Quazi \(2014\)](#) asserts that corruption predates modern civilisation and is therefore nothing new. This supports [Noonan's \(1984\)](#) claim that corruption and bribery have

a lengthy history dating back millennia in many different societies. This was further emphasised by [Ketkar et al. \(2005\)](#) through the “hisbah” system, which was used in Islamic countries during the Middle Ages to control issues like social and economic corruption. Following [Leff’s \(1964\)](#) study, research on corruption in investments and business gained traction. According to the author, corruption could promote investment by minimising uncertainty. It was argued that a lack of data makes it difficult to make future forecasts for underdeveloping nations. The findings of the researcher indicate that bureaucracy may be lagging rather than leading in many developing nations. Second, long-term solutions will be needed to eradicate deeply ingrained social, psychological, and social problems.

[Leff \(1964\)](#) proposed the concept of “grease the wheels”, which has been supported by numerous academics, including [Huntington \(1968\)](#). This phenomenon demonstrates how corruption can be used by economic agents to overcome the inefficiencies caused by sub-par institutions. This is reinforced by scholars who argue that corruption promotes economic efficiency and access to markets in highly regulated economies. [Huntington \(1968\)](#) asserts that corruption typically increases when a nation transitions from an authoritarian to a democratic system of governance. This is because institutions in recently established governments are typically underdeveloped. He reasoned that many groups collect bribes less effectively than under the previous authoritarian regime because new administrations typically lack the capacity to maintain control over the bribe-collecting process. This theory is supported by [Shleifer and Vishny \(1993\)](#), who claimed that corruption in the Philippines increased from the bottom up under Marcos’ rule. However, following his removal from power, the number of independent bribers has increased, likely reducing resource allocation efficiency.

One of the primary causes of corruption, according to [Rose-Ackerman \(2006\)](#), is bad policies that create corrupt incentives for decision makers, bureaucrats, and the public at large. Corruption is caused by several problems, including low pay in the public sector, a lack of economic flexibility at necessary times, and unchecked bureaucracy ([Coetzee & Kleynhans, 2017](#)). In a similar vein, [Broadman and Recanatini \(1999\)](#) hypothesised that higher levels of corruption are caused by higher barriers to admission.

Corruption also creates costs by distorting the aggregate economy to generate rewards. Distortions can take the form of government contracts, the licencing of low-quality or unsafe goods and services, production delays, and inefficient privatisation. The second school of thought, referred to as the “sand the wheels” hypothesis, contends that corruption contributes to costs by decreasing efficiency and creating a barrier to economic growth by having a negative impact on GDP per capita. In addition, corruption affects international trade, transactions, investment activity, and price stability, which in turn affects politics ([Shleifer & Vishny, 1993](#); [Tanzi, 1998](#); [Rose-Ackerman, 1999](#)). This is backed by [Mauro’s \(1995\)](#) empirical model, which shows that corruption is like an income tax and reduces economic growth. In addition to increasing prices and degrading the quality of investments, increased corruption also leads to the rise of the informal economy and the distortion of the tax burden, since it makes it more difficult for the government to collect taxes and tariffs.

Poor regulation, corruption, and weak institutions, for example, have been suggested to be harmful to economic progress and, consequently, development ([Mauro, 1995](#); [Rose-Ackerman & Palifka, 2016](#); [Tanzi, 1998](#)). These studies emphasise that corruption and inadequate laws can deter private and international investment by boosting the cost of doing business or introducing uncertainty into investment settings. In addition, corruption alters the objectives of governments and often results in the misuse of public funds for private gain. According to [Mahmood \(2005\)](#), corruption is also predicted to drive businesses underground, undermine the state’s capacity to collect taxes, and result in ever-higher tax rates being imposed on an ever-decreasing number of taxpayers. These factors ultimately

hinder the performance of aid flows and the state's ability to provide necessary public goods and services, such as law enforcement.

Al Qudah et al. (2020) used annual time series data to assess the long-term link between corruption and economic progress in Tunisia from 1995 to 2014. Their empirical findings demonstrated that corruption has a detrimental impact on Tunisia's GDP per capita. In their study, Obamuyi and Olayiwola (2019) examine how corruption impeded development in Nigeria and India between 1980 and 2015. Furthermore, Amin et al. (2013) find that corruption lowers investment effectiveness and hinders Pakistan's economic growth because the two have an inverse relationship. Similarly, in his article, Pulok (2012) demonstrates the direct and indirect effects on economic development as well as the cointegration between them from 1984 to 2008. The findings highlighted that corruption had a negative impact on Bangladesh's economic growth. The results demonstrated that, when corruption grows by 1%, it has an influence on GDP, resulting in a 10% fall in per capita GDP. Equally important is the Grabova (2014) study which finds a negative relationship between corruption and growth in the economy. This supports the findings of Egunjobi (2013) that corruption has a detrimental impact on Nigerian workers' productivity. Furthermore, there is a negative correlation between corruption and human capital (Mauro, 1995; Gupta et al., 2001; Tanzi & Davoodi, 2002). This is supported by the findings of Kasuni et al. (2022) that reducing corruption has significant and positive impact on economic growth in SADC. This makes it more difficult for corrupt states to adopt new technology from developed nations. According to Delgado et al. (2014), workers are less inclined to relocate from international companies where their payoffs are greater than local ones in highly corrupt nations. As a result, the impact of FDI on GDP is diminished, and there is less technology transfer from foreign to domestic companies.

Using FMOLS, Noor and Siddiqi (2010) discovered that capital production has a beneficial impact on economic growth in five South Asian nations between 1971 and 2006. According to the findings of Awodumi and Adewuyi's (2020) NARDL model, capital production has a long-term positive effect on economic growth in both Angola and Egypt, but only in Egypt's short term. On the other hand, Muhammad and Khan's (2019) findings show that capital significantly and negatively affects economic growth in Asian host nations.

Rani and Kumar (2018) examined the aggregate and disaggregate effects of trade openness on the growth of the BRICS countries between 1991 and 2016 using an absolute time-series analysis and econometric analysis. Their research revealed that the postliberalisation period contributed to the rapid growth of the BRICS countries. Tahir and Azid (2015) discovered that there is a positive and statistically significant association between trade openness and economic growth in emerging nations. Furthermore, using secondary data from 1970 to 2016 Ajayi and Araoye (2019) assessed the impact of trade liberalisation on Nigeria's growth using the cointegration test and the Engle and Granger test. The results demonstrated a favourable long-term economic relationship.

Most of the previous research on corruption and economic growth has concentrated on evaluations of individual nations, continents, or the world at large, frequently ignoring the dynamics of regional blocs like SADC. This study addresses a vacuum in the existing literature by focussing on the SADC region, which has similar economic, political, and institutional issues. The study's focus on SADC provides region-specific knowledge which might inform focused policy initiatives to prevent corruption and improve economic growth. The next section examines the methodology of the study.

3. Methodology

3.1. Methodology and Data Specifications

An econometric regression study is used to investigate the long-term association between corruption and economic growth. Combining time series with cross-sectional data, panel data allow for the investigation of dynamic interactions and account for unobserved heterogeneity, yielding more reliable conclusions. Incorporating both time-varying and time-invariant variables reduces bias, increases sample size and statistical power, and improves model flexibility. These characteristics make it more trustworthy and efficient than using only time series or cross-sectional data. The effect of independent variables (government effectiveness, trade openness, FDI inflows, human capital, gross capital formation, and corruption perception) on the dependent variable (GDP per capita) in SSA is examined using the panel data analysis method.

The study employs data for the period 2005–2022 from the [World Bank \(2025\)](#), [UNCTAD \(2025\)](#) for the human capital index, and [Transparency International \(2025\)](#) for the corruption perception index to investigate the long-run link between corruption and economic growth. The indices are derived from the [World Bank \(2025\)](#), and their meta-data indicate that gross capital formation is made up of net changes in the level of inventories as well as expenditures on adding to the economy's fixed assets. Trade openness is indicated by the sum of exports and imports of goods and services expressed as a percentage of GDP. Government effectiveness measures perceptions of the quality of public services, the civil service's independence from political constraints, the quality of policy creation and implementation, and the government's adherence to such policies. Foreign direct investment is defined as net inflows from foreign investors into the reporting economy, divided by GDP. The [UNCTAD \(2025\)](#) human capital index incorporates the population's education, skills, and health conditions, as well as the total integration of research and development into the fabric of society via the number of researchers and research expenditure. The CPI, published by [Transparency International \(2025\)](#), reflects perceptions of corruption during the previous two years and is based on data from 13 different sources across 12 different institutions. The data sources are standardised on a scale of 0 to 100, where 0 indicates the highest perceived level of corruption and 100 indicates the lowest.

GDP per capita serves as the dependent variable in this research, and the independent factors anticipated to impact FDI inflows are carefully chosen based on data availability and current literature for the timeframe in question. Each component included in this study is derived from secondary or quantitative data. The study covers 10 of the 16 SADC nations: Angola, Botswana, Democratic Republic of Congo, Madagascar, Mauritius, Mozambique, Namibia, South Africa, Tanzania, and Zimbabwe. Other SADC countries were not included in the analysis due to missing data.

3.2. Model Specification

This study follows the work of [Ozturk and Radouai \(2020\)](#) and [Iheanacho \(2016\)](#) and uses the ARDL approach. The research model for this study is as follows:

$$\begin{aligned}
 GDPC_{it} = & \sum_{j=1}^p \lambda_{ij} GDPC_{it-j} + \sum_{j=0}^q \delta'_{1ij} CPI_{it-j} + \sum_{j=0}^q \delta'_{2ij} HCI_{it-j} + \sum_{j=0}^q \delta'_{3ij} FDI_{it-j} \\
 & + \sum_{j=0}^q \delta'_{4ij} GCF_{it-j} + \sum_{j=0}^q \delta'_{5ij} TO_{it-j} + \sum_{j=0}^q \delta'_{6ij} GE_{it-j} + \mu_i + \varepsilon_{it} \\
 & i = 1, \dots, 7; t = 2005, \dots, 2022
 \end{aligned} \tag{1}$$

where:

- $GDPC_{it}$: GDP per capita growth index (annual %) for country i at time t .

All independent variables are defined on the right-hand side of the specification model as follows:

- CPI_{it} : corruption perception index for country i at time t .
- HCI_{it} : human capital index for country i at time t .
- FDI_{it} : inflows as a percentage of GDP for country i at time t .
- GCF_{it} : gross capital formation percentage of GDP (annual %) index for country i at time t .
- TO_{it} : trade openness index (% of GDP) for country i at time t .
- GE_{it} : government effectiveness index for country i at time t .
- μ_i : unobserved heterogeneity.
- ε_{it} : idiosyncratic term.

In the event of a long-run relationship, Equation (1) can be rewritten as an error correction representation of the following form:

$$\Delta y_{it} = \Phi_i(y_{it-1} - \theta'_i x_{it}) + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta y_{it-j} + \sum_{j=0}^{q-1} \delta_{ij}^* \Delta x_{it-j} + \mu_i + \varepsilon_{it} \quad (2)$$

In this case, λ_{ij}^* and δ represent the short-term economic and independent variable characteristics (Isiksal & Assi, 2022; Rafindadi & Yosuf, 2013). The long-term parameters are denoted by θ_i , the rate of adjustment to the long-term equilibrium by Φ_i , and the time-varying disturbance term by ε_i . The long-term parameters of the independent variables of the economic growth regression are contained in the term enclosed in square brackets in Equation (2).

3.3. Estimation Strategy

The autoregressive distributed lag (ARDL) model was chosen for this investigation based on the results of the IPS and CIPS unit root tests. The results demonstrated that the dataset contained stationary variables (I(0)) and stationary variables with first difference (I(1)). Conventional cointegration methods, such as the Johansen cointegration test, are inappropriate for this dataset, since they demand that all variables be integrated of the same order. However, this variability is considered by the ARDL model, which guarantees a reliable and accurate assessment of both short- and long-term associations.

The ARDL is used in this study to examine the short- and long-term relationships between corruption and economic growth in the ten SADC countries between 2005 and 2022 (Pesaran et al., 2001). Within a panel data framework, the ARDL can be estimated using three estimation methods, namely, PMG, the mean group (MG) estimator, and the dynamic fixed effects (DFE) estimator. The PMG is appealing due to its ability to allow heterogeneity in short-run dynamics including the speed of adjustments while constraining the long-run slope to be homogeneous across countries. This makes the PMG estimator more favourable compared to other estimators such as the MG estimator and the DFE estimator. This feature is desirable given that SADC countries are likely to exhibit heterogeneity in macroeconomic environments due to differences in macro policies and regulatory factors but converge to a similar steady state in the long run as predicted by the economic theory of income convergence. In contrast, the MG estimator estimates distinct long-run coefficients for every nation, which is ineffective in the event of long-run homogeneity (Blackburne & Frank, 2007). However, the DFE estimator is excessively limiting for heterogeneous panels, since it implies both short-term and long-term homogeneity across nations (Loayza & Ranciere, 2006). The next section presents the findings of the study.

4. Findings and Discussion

4.1. Findings

4.1.1. Descriptive Statistics

Descriptive analysis of the dataset is presented in this section. To transform raw data into information that can be utilised to evaluate the viability of an economic hypothesis, it is crucial to first create a collection of descriptive statistics. The descriptive statistics are highlighted in Table 1 below. Although descriptive statistics cannot draw meaningful conclusions on their own, they are an important first step for data presentation and analysis. From 2005 to 2022, GDP per capita in the ten SADC countries averaged 1.56%. The high standard deviation demonstrates that growth rates vary greatly among nations and over time, with significant contractions of up to -18.65% and substantial growth of up to 19.51% . There is moderate to high perceived corruption, as shown by the average CPI score of 35.6. The scores highlight a minimum of 15 and a maximum of 65. Although there are significant variations between nations, the average HCI score is 28.36. While some nations have comparatively higher scores, others have extremely low human capital, as low as 8.4 points.

Table 1. Descriptive statistics.

Variable	Observation	Mean	Std. Dev.	Min	Max
GDP	180	1.5605	4.822372	-18.6543	19.50834
CPI	180	35.59944	13.8891	15	65
HCI	180	28.36389	9.519106	8.4	49.2
GCF	180	24.16917	9.691044	1.525177	56.39581
FDI	180	4.062501	6.828637	-10.0384	38.94286
TO	180	77.49947	25.51645	17.22512	135.2796
GE	180	36.08003	26.40522	1.421801	84.61539

Typically, countries allocate roughly 24.17% of their GDP to capital formation as highlighted in the table above. However, there is a notable disparity, with some nations investing almost half of their GDP (56.40%) and others contributing relatively little (1.53%). FDI inflows typically amount to 4.06% of GDP. Although the greatest value indicates that some countries attracted large foreign investment, negative values suggest net outflows in some circumstances. TO averages roughly 77.5% of GDP, showing a generally open trading economy with significant differences between countries. Significant variability is indicated by the high standard deviation of 26.40522 and the average GE score of 36.08003. Scores vary between 1.421801 and 84.61539.

4.1.2. Panel Unit Roots

Before using an ARDL model on panel data, it is critical to assess the variable's stationarity features. A combination of $I(0)$ (stationary) and $I(1)$ (nonstationary) variables can be handled by ARDL models (Pesaran et al., 2001). Im, Pesaran, and Shin (IPS) and cross-sectional augmented IPS (CIPS) tests are often used to validate the ARDL technique. As a first-generation panel unit root test, the IPS test assumes that countries are cross-sectionally independent (Im et al., 2003). It contrasts the alternative that at least some panels are stationary with the null hypothesis that all panels contain a unit root. However, the IPS test may generate skewed results when there is cross-sectional reliance, which is prevalent in economically integrated regions such as SADC.

This restriction is addressed by Pesaran's CIPS test, which strengthens the unit root testing process against cross-sectional dependence by introducing cross-sectional averages of the variables (Pesaran, 2007). Although the CIPS test guarantees robustness by taking

cross-sectional dependence into account, the IPS test offers fundamental knowledge of stationarity. Panel unit root tests, such as IPS and CIPS, which account for cross-sectional dependence, are essential in panel data analysis, especially when preparing for ARDL models. This is because, if neglected, cross-sectional dependency can lead to biased assumptions about variable stationarity, affecting the validity of later econometric findings. Robust tests, such as CIPS, are required to provide correct identification of integration orders, which is necessary for effective estimation and interpretation of ARDL. When combined, they verify that the variables satisfy the requirements for ARDL modelling, guaranteeing the accuracy and dependability of the findings.

For the IPS tests in Table 2 below, GDPC and FDI Z-t-tilde-bar statistics are stationary at all significance levels since they are less than all critical values. This also applies to GE, which is stationary at the 5% significance level. CPI, HCI, GCF, and TO are nonstationary in their levels but become stationary after the first difference. The table above shows that the variables are nonstationary at levels, as the CIPS statistic for levels is greater than the critical values for all variables except HCI, FDI, and TO. When the other variables GDP, CPI, GCF, and GE are differentiated, the CIPS statistics fall below the critical thresholds, suggesting that they are stable in first-order differences I(1). The next section provides a discussion of the ARDL results and discusses the limitations of the study.

Table 2. Panel Unit Roots IPS and CIPS Test Results.

	IPS		CIPS	
	Levels	Difference	Levels	Difference
GDPC	−4.2092 ***		−2.266	−4.419 ***
CPI	−1.0096	−5.9455 ***	−1.653	−3.706 ***
HCI	0.4232	−5.6789 ***	−2.429 **	
GCF	−1.2184	−5.6408 ***	−1.764	−3.836 ***
FDI	−2.8938 ***		−2.467 **	
TO	−1.0399	−4.8783 ***	−2.366 **	
GE	−1.7942 **		−1.582	−4.454 ***

Note: ** significant at 5% level (2.34); and *** denotes 1% (2.6) level of significance for CIPS values.

4.2. Discussion

4.2.1. ARDL Results

This study uses the ARDL PMG approach to generate long-term estimates for the model equation and examines the long-term relationship between GDP per capita and government effectiveness, trade openness, FDI inflows, human capital, gross capital formation, and perception of corruption from 2005 to 2022. The study analysis begins by demonstrating how the panel series integrates in I(0) and I(1). The results of the ARDL estimation are highlighted in Table 3 below.

Table 3. Panel ARDL estimation.

Long Run	Dependent Variable: GDPC		Probability
	Coefficient	Standard Errors	
ec	−0.877	(0.1899)	***
CPI	0.0857	(0.0498)	*
HCI	−0.420	(0.069)	***
GCF	−0.0939	(0.0403)	**
FDI	−0.115	(0.0733)	
TO	0.0335	(0.0202)	*
GE	−0.0549	(0.025)	**
Constant	11.57	(2.954)	***

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In the long run, the coefficient for the CPI is 0.0857, which implies that a 1-unit increase in the CPI (reduced corruption) corresponds to a 0.086-unit gain in economic development. However, at the 10% level, this finding is only marginally significant. This is in line with the findings of [Al Qudah et al. \(2020\)](#) that increased corruption has a detrimental effect on economic growth. This follows the concept of “sand the wheels” that means corruption impedes business activities and investment by increasing costs, and this could reduce economic growth by chasing away investors ([Grabova, 2014](#); [Obamuyi & Olayiwola, 2019](#); [Pulok, 2012](#)).

The coefficient of HCI is -0.4201 , meaning that an increase of 1 unit in HCI leads to a drop of 0.42 units in long-term economic growth. This finding is statistically significant at the 1% level, although the negative sign may require further research. This is in line with the findings of [Gupta et al. \(2001\)](#) and [Tanzi and Davoodi \(2002\)](#) that corruption results in an inefficient use of human capital. The results may indicate that, because of inefficiencies or poor management, gains in human capital may not be producing the anticipated growth results ([Delgado et al., 2014](#)).

A 1-unit increase in the GCF is related to a 0.094-unit decline in long-term economic growth, according to the GCF coefficient, which is -0.0939 . This is statistically significant at the 5% level, but the negative sign is unusual and may require additional investigation. This finding differs from the theoretical expectations that increases in GCF result in increased economic growth ([Awodumi & Adewuyi, 2020](#); [Noor & Siddiqi, 2010](#)). However, this finding is in line with that of [Muhammad and Khan \(2019\)](#), who found that capital has a large detrimental impact on Asian host countries' economic growth.

The coefficient for TO is 0.0335, which implies that a 1-unit increase in trade openness corresponds to a 0.034-unit increase in economic growth. At the 10% level, this result is marginally significant. This is in line with the findings of [Tahir and Azid \(2015\)](#) and [Ajayi and Araoye \(2019\)](#), who found a positive impact of trade openness on economic growth. This emphasises how crucial trade openness is to fostering economic growth by making it easier to access global markets and strengthening economic integration ([Rani & Kumar, 2018](#)).

The GE coefficient is -0.0549 , indicating a statistically significant negative link between government effectiveness and long-term economic growth. A 1-unit increase in GE results in a 0.055-unit decline in economic growth. This finding differs from *a priori* expectations that an effective government results in increased economic growth. The negative coefficient for GE indicates that inefficiencies in governance may be limiting growth. This emphasises the importance of stronger institutions and better policy implementation, even when government effectiveness is critical for creating a growth-friendly environment ([Broadman & Recanatini, 1999](#); [Rose-Ackerman, 2006](#); [Rose-Ackerman & Palifka, 2016](#)).

The short-term error correction term (ec) coefficient is -0.8775 and is statistically significant. This means that around 87.75% of the long-run equilibrium deviation is rectified in each cycle. The negative and substantial ec confirms the existence of cointegration between variables. The constant term, 11.5676, is also statistically significant. This is the level of economic growth at which all independent variables are zero. Only FDI is insignificant in the long term.

4.2.2. Limitations

Although it is frequently used to analyse dynamic interactions in panel data, the ARDL PMG technique has some drawbacks. One major concern is that it assumes homogeneity in long-term correlations among cross-sectional units, which may not be true in different contexts such as SADC, potentially producing biased conclusions. The model is also susceptible to omitted variable bias, which could result in inconsistent or misleading results

if pertinent variables affecting the dependent variable (GDPC) are left out. Furthermore, cross-sectional dependence, which is frequently observed in regional studies, can impair the credibility of the PMG estimator if not addressed adequately. Moreover, it is less useful for short time series, since it needs a sufficiently wide time dimension for accurate estimation. These restrictions emphasise the importance of proper model formulation and robustness testing to obtain accurate and reliable findings. The next section presents the findings of the study.

5. Conclusions

The primary goal of this study is to assess the long-term impact of corruption on SADC's economic growth. The data were analysed over an 18-year period, from 2005 to 2022, and included 180 observations. The “sand the wheels” theory is supported by the fact that lowering the CPI enhances GDP somewhat. On the other hand, inefficiencies in the use of investments and human capital are suggested by unexpected negative consequences of HCI and GCF. Growth is positively impacted by trade openness, while government effectiveness exhibits a negative relationship with economic growth, highlighting potential governance inefficiencies. Quick adjustment to long-term equilibrium is confirmed by the considerable error correction term (-0.877). These revelations highlight the necessity of institutional reforms and anti-corruption initiatives in SADC.

To achieve these goals, the study uses an economic model. The paper uses an econometric analysis using descriptive statistics, panel unit root tests, and the ARDL PMG model to establish the direct and indirect effects of these variables on FDI, offering a more nuanced understanding of their functions. Econometric investigation shows that, with the exception of FDI, the regression coefficients CPI, HCI, GCF, TO, and GE are statistically significant.

Increasing human capital alone may not be enough to support economic growth in the SADC area, as indicated by the detrimental long-term effects on HCI. Ineffective utilisation of education or skilled labour migration may also be to blame. It could be necessary to implement complementary policies such as improved governance and infrastructure. The benefits, both immediate and long-term, emphasise how crucial trade openness (TO) is to economic expansion. The long-term detrimental impact on GE highlights the need for effective resource allocation and raises the possibility that excessive government spending could impede growth. Long-term FDI insignificance could be a symptom of measurement errors or bias in missing variables, as well as possible inefficiencies in capital allocation. The less resilient short-run dynamics points to the necessity of additional research or different model assumptions.

Policymakers should improve legal frameworks with harsher punishments and whistleblower protections, as well as strengthen anti-corruption organisations, to fight corruption and spur economic growth in the SADC area. Future studies should examine how corruption growth is influenced by external factors, sector-specific effects, and political stability. More detailed conclusions can be drawn from comparative regional studies. Incorporating more detailed measures of governance and corruption and addressing data limitations may potentially offer deeper insights into the patterns of economic growth in the SADC area.

Future studies could explore other econometric models of the ARDL framework, each bringing unique insights and solving specific shortcomings, such as the generalised method of moments (GMM).

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