International Energy Agency, (2021) Renewables 2021: Analysis and Forecast to 2026. [Online]
Available at: https://www.iea.org/reports/renewables-2021
[Accessed 01 March 2024].

Kartal, M. T. (2024) Role of energy transition in easing energy security risk and decreasing CO2 emissions: Disaggregated level evidence from the USA by quantile-based models. *Journal of Environmental Management*, 359: 120-971.

Kuznets, S., (1995) Economic Growth and Income Inequality. *The American Economic Review,* 45: 1-28.

Ling, G. et al., (2022) Asymmetric and time-varying linkages between carbon emissions, globalization, natural resources and financial development in China. *Environ. Dev. Sustain,* 24: 6702-6730.

Marques, A. C., Fuinhas, . J. A. & Miguel, . L., (2019) Are there spillovers from China on the global energy-growth nexus? Evidence from four world regions. *Economies*, 7: 59.

Massagony, A. & Budiono, B., (2022) Is the Environmental Kuznets Curve (EKC) hypothesis valid on CO2 emissions in Indonesia? *International Journal of Environmental Studies*, 80: 20-31.

Mukhtarov, S., Aliyev, F., Aliyev, J. & Ajayi, R., (2023) Renewable Energy Consumption and Carbon Emissions: Evidence from an Oil-Rich Economy. *Renew Energy,* 15(1): 134-141.

Ngcobo, R. & De Wet, M. C., (2024) The Impact of Financial Development and Economic Growth on Renewable Energy Supply in South Africa. EconPapers, pp. 1-24.

Odihiambo, M. N., (2023) Asymmetric Impact of Energy Consumption on Economic Growth in South Africa: New Evidence from Disaggregated Data. Energy Nexus.

Rahman, M. M. et al., (2022) Powering agriculture: Present status, future potential, and challenges of renewable energy applications. *Renewable Energy,* 188(7): 31-49.

Saba, C. S., (2023) Nexus between CO2 emissions, renewable energy consumption, militarisation, and economic growth in South Africa: Evidence from using novel dynamic ARDL simulations. *Science Direct,* 205: 349-365.

Susilowati, I. et al., (2023) Nexus Between Economic Growth, Renewable Energy, Industry Value Added and CO2 Emissions in ASEAN. *Jurnal Ekonomi Pembangunan,* 24(2).

Udeagha, M. C. & Muchapondwa, E., (2022) Investigating the moderating role of economic policy uncertainty in environmental Kuznets curve for South Africa: Evidence from the novel dynamic ARDL simulations approach. *Environmental Science and Pollution Research,* 29(77): 199-237.

Xie, H. & Bui, W.K.-T., 2024. Impact of globalization and energy consumption on CO2 emissions in China: Implications for energy transition. *Finance Research Letters*, 67(B): 105939.

Zambrano-Monserrate, M. A., 2023. Clean energy production index and CO2 emissions in OECD countries. *Science of The Total Environment,* 907: 167852.

The Impact of Foreign Direct Investment on Economic Growth in South Africa

Ralarala OSO
Sol Plaatjie University, South Africa
&
Malatji NM
University of Limpopo, South Africa

Abstract

Numerous investigations have explored the impact of foreign direct investment (FDI) on economic growth, yielding a landscape of contrasting findings. This paper aimed to investigate the impact of FDI on economic growth in South Africa from 1994Q1 to 2023 Q4 employing secondary time series data. The practical importance of this study lies in its ability to inform policymakers about the critical relationship between FDI and economic growth, emphasizing the need to create a conducive environment that attracts and retains investment, thereby fostering sustained economic growth. To ensure the data's stationarity, both the Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) tests were applied. The analysis utilized the Autoregressive Distributed Lag (ARDL) model to examine dynamic relationships between variables in both the short run and long run. An ARDL bounds test for cointegration was conducted to explore the long-term relationships, and a Granger causality test was used to determine causal relationships. The ARDL bounds test confirmed a long-term relationship among the FDI and economic growth. However, the Granger causality test indicated no causal link between economic growth and FDI, suggesting that changes in economic growth do not predict changes in FDI. This study contributes to the literature by underscoring the importance of stable economic environments and infrastructure development to maximize the benefits of FDI, with future research needed to explore additional factors influencing this dynamic.

Keywords: Foreign direct investment, Economic growth, ARDL, Exchange rates, South Africa

INTRODUCTION

In recent years, South Africa has attracted a significant amount of foreign direct investment (FDI) compared to other developing countries in Africa, reflecting its relatively more developed infrastructure and diversified economy (Makhoba & Zungu, 2021). The impact of FDI on economic growth in South Africa is a topic of considerable interest and debate among economists and policymakers. FDI has been pivotal in many African economies, with policymakers widely believing it boosts host country productivity and fosters development (Antwi, Mills, Mills & Zhao, 2013). At the heart of this discussion lies the question of how FDI inflows affect the overall economic performance of the country. In the past, developing countries had laws that limited trade, but with the rise of globalization, they all began to recognize the benefits of trade liberalization (Zaman, Donghui & Yazin, 2018). The global pandemic has led to recessions in many economies worldwide, resulting in a decrease in FDI flows to African countries (Chibalamula, Evans & Kachelo 2023). The behaviour of economic growth in South Africa, within

the framework of FDI reveals a multifaceted dynamic shaped by diverse internal and external factors.

According to Strauss (2015), foreign direct investment (FDI) is generally viewed as a major driver of economic growth in South Africa, contributing to increased production capital, technological advancements, and job creation. However, its impact is not always positive. Marandu (2018) argues that FDI can also result in negative outcomes due to adverse spillovers, highlighting the complexity of its relationship with economic growth. This ongoing debate underscores the need to better understand the various factors influencing the effects of FDI on South Africa's economy. The complexity arises from various factors, such as domestic policies, global market conditions, and socio-political stability, which complicate the causal link between FDI and economic growth. This study aims to examine FDI inflows in South Africa from 1994 to 2023, assessing their effects on economic growth.

PROBLEM STATEMENT

FDI may result in positive significant growth because of an increase in available capital for production, or negative growth because of the harmful spill overs (Marandu, 2018). The correlation between FDI and economic growth in South Africa is a subject of considerable interest and discussion. While FDI is often viewed as a catalyst for economic growth, the precise mechanisms through which it influences the economy, and the extent of its impact remain uncertain. FDI is widely regarded as a catalyst for economic growth, offering potential benefits such as increased capital for production, technological advancements, and job creation (Strauss, 2015). However, the impact of FDI is not uniformly positive and can vary significantly across different countries and economic contexts. In South Africa, a developing economy with ambitious growth targets, the relationship between FDI and economic growth is particularly complex and multifaceted. While FDI is seen as a critical driver of economic development, the exact mechanisms through which it influences growth, and the extent of its impact, remain subjects of considerable debate and uncertainty.

Complicating the analysis are numerous influential factors, such as domestic economic policies, global market conditions, socio-political stability, and potential endogeneity, where FDI and economic growth may simultaneously affect each other. These factors make it challenging to establish a clear and definitive causal relationship between FDI and economic growth in South Africa. This study aims to address these complexities and uncertainties by thoroughly examining the trends and patterns of FDI inflows into South Africa from 1994 to 2023. It will evaluate their effects on key economic indicators, such as GDP growth and employment rates, and explore sectoral variances to identify which industries benefit most from FDI. Additionally, the study will consider policy implications to optimize the advantages of FDI, ensuring it contributes to sustainable and inclusive economic growth in South Africa. By providing a detailed and

insightful analysis, this research seeks to fill critical gaps in the literature and offer evidence-based recommendations for maximizing the positive impacts of FDI on South Africa's economy.

LITERATURE REVIEW

Literature review provides both the theoretical and empirical literature review for this study. Its purpose is to establish a conceptual framework for the investigation and situate it within the context of existing knowledge

Theoretical Framework

The examination of the impact of foreign direct investment on economic growth in South Africa is based on the following theories:

Microeconomic theory of international production

Hymer (1976) introduced the microeconomic theory of international production, which is regarded as a cornerstone in the examination of Foreign Direct Investment (Kurtishi-Kastrati, 2013). One can argue that FDI plays a crucial role in enhancing economic growth by facilitating the transfer of capital, technology, managerial expertise, and market access from multinational enterprises to host countries. MNEs often bring advanced technology and managerial know-how, which can lead to productivity gains and efficiency improvements in the host economy. Additionally, FDI can stimulate domestic investment, create job opportunities, and contribute to the development of local industries through backward and forward linkages.

Therefore, in this case, the absence of any improvements into the political risk of South Africa does not lead to a stagnation of FDI. For example, Blomström and Kokko (1998) argue that the FDI will have positive spillover in the host economy via productivity increase and competition. In the case of South Africa, Kumo (2012) suggests that foreign direct investment should promote growth even faster because FDI increase industrial development and trading opportunities. Also, Fedderke and Romm (2006) studied this situation in South Africa and came to the same conclusion further revealing that FDI has had effects on the economic development positively more so the technology and skill base. All these studies are confirmation of Hymer's arguments letting for a gap due to cash deficits where the sunk selling point was mitigated as importantly through FDI, in this case South Africa's economic development to enhance productivity and the size of manufacturing sector.

The Export-led Growth Hypothesis

The concept of economic advancement through increasing exports, termed as Export-Led Growth (ELG) is greatly emphasized in this assertion that states that properly crafted and focused policies that target the boosting of exports can be economic growth drivers by broadening the export base

which not only raises the general level of a nation's output but also aids in economic growth through better allocation of resources, better utilization of capacity, attainment of economies of scale and fostering of technological innovations through competition in international markets (Awokuse, 2003). This assertion is equally shared by many empirical studies which have sought to explain the link between exports and economic growth. An essential aspect in making the strategies for growth through exports more effective is FDI. Foreign market access can be enhanced through FDI by assisting in both building up the exports with the foreign firms' distribution structures and their market knowledge. For example, where foreign direct investment takes place, it fosters economies of scale which make production cheaper and therefore lead to better competitiveness in the exports (Buckley & Casson, 1997). What is more, Foreign Direct Investment can lead to spillover effects on domestic companies and industries which help the emergence of industries aimed at exports.

These spillover effects may include the diffusion of technologies and managerial, and productive skills which enhance the efficiency and competitive ability of the locally owned companies (Hymer, 1976). Consequently, FDI should be seen as a tactical consideration for nations that seek to improve the level of their international trade performance. Besides, the incorporation of FDI within the ELG framework suggests the necessity to investigate both the primary and secondary effects of the inflow of FDI on the economic development of the nation. Earlier research reviewed by Asiedu, (2005), confirmed that FDI tends to exert a positive impact in increasing domestic investment, providing employment, and building local industries through backward and forward integration (Dunning, 1980). For example, within the sub-continent of Asia, foreign direct investment is significantly and positively related to gross domestic products alongside exports (Shirazi, Ali & Manap, 2005). This demonstrates the ability of foreign direct investment to augment the growth strategies that are export oriented for optimal growth of the economies.

Eclectic Paradigm Theory

John Dunning established the Eclectic Paradigm, a comprehensive paradigm that incorporates many elements influencing FDI. This theory holds that FDI happens when enterprises have a combination of ownership, location, and internalization advantages (Dunning, 1980). Ownership advantages are firm-specific assets such as technology, brand names, and management knowledge that allow a company to compete successfully in foreign markets. Location advantages refer to qualities of the host country, such as market size, resource availability, and institutional framework, that make it an appealing investment location. Internalization advantages stem from the firm's ability to internalize its operations across national borders, allowing it to better manage competition and market defects.

This theory is often used to explain the incentives for foreign direct investment and how it helps to host countries' economic growth and development. For example, research has indicated that firms with strong ownership advantages, such as technological supremacy, are more inclined to

engage in FDI to capitalize on these advantages in foreign markets (Buckley & Casson, 1997). Furthermore, a host country's location-specific advantages, such as good business environments and skilled workers, can attract large amounts of FDI (Makki & Somwaru, 2004). The internalization part of the Eclectic Paradigm emphasizes the need of enterprises controlling their operations internally to mitigate market failures and protect their exclusive assets.

Product Life Cycle Theory

Raymond Vernon established the Product Life Cycle Theory, which explains FDI in terms of the product life cycle. According to this idea, enterprises progress through many stages of product development, from innovation to maturity, and FDI happens when firms seek to exploit new markets and resources at different points of the product life cycle. In the early stages, companies innovate and manufacture in their own country. As the product evolves, corporations may seek foreign direct investment to expand into new markets and cut production costs. This hypothesis contends that FDI is motivated by the desire to maintain competitiveness as products progress through their life cycle. For example, in the early stages of product development, enterprises may concentrate on domestic markets, but as the product matures, they may want to expand into overseas markets via FDI (Rugman, 1980). The Product Life Cycle Theory offers a dynamic perspective on foreign direct investment, showing how firms' investment plans change over time in response to changes in market conditions and product life cycles.

Empirical literature

This section examines the impact of FDI on economic growth, focusing on both short- and long-term effects. It will also explore the causal relationships between economic growth, inflation, and exchange rates, showing how these factors interact with FDI. This review will lay the groundwork for understanding FDI's role in South Africa's economic performance and broader macroeconomic outcomes.

The impact of foreign direct investment on economic growth

Empirical research from various countries at different stages of development has produced mixed results regarding the impact of FDI on economic growth. A study by Sylwester (2005) using the Ordinary Least Squares (OLS) method analysed FDI, growth, and income inequality in 29 less-developed countries between 1970 and 1990. The results indicated a positive correlation between FDI and economic growth, with no significant link between FDI and changes in income inequality. These findings were supported by Sokang (2018), who used data from 2006 to 2016 and the Two-stage Least Squares Method of Simultaneous Equations, showing that FDI had a positive effect on economic growth. However, Lerato and Lorainne (2019) found a contrasting result, revealing a negative association between FDI and economic growth.

According to Makhoba and Zungu (2021), positive shock to economic growth leads to a significant increase in FDI, and in turn, GDP responds positively and significantly to a positive shock in FDI. The study suggests a dynamic relationship between FDI and economic growth in South Africa, where a positive shock to GDP, indicating increased economic activity, attracts more FDI. The study of Makhoba and Zungu (2021) also highlighted South Africa's continuous improvement in attracting FDI, leading to its competitiveness in FDI inflows. It emphasized the need for further refinement of FDI-inducing policies to stimulate economic activity, despite the country's success in attracting significant FDI over the past twenty years. However, according to Makova (2010), FDI has a non-significant negative effect on economic growth. This implies that, in the long run, FDI does not significantly contribute to economic growth.

The relationship between inward FDI and economic growth has been explored extensively, yielding diverse empirical findings. The impact of inward FDI on growth, however, is contingent upon the quality of the economic environment. Li and Liu (2005), analysing data from 84 countries spanning both developed and developing regions from 1970 to 1999, observed a statistically significant positive effect of FDI on economic growth in most developing countries.

Hansen and Rand (2004), using a sample of 31 developing countries and heterogeneous panel data estimators, identified a bi-directional causality between FDI/GDP and the level of GDP. Their findings suggest that FDI impacts GDP through knowledge transfers and the adoption of new technology, with a one percentage point increase in FDI leading to a 2.25% increase in GDP growth. Borensztein, De Gregorio, and Lee (1998), examining the effect of FDI on economic growth in 69 developing countries, found a positive correlation between growth rates and FDI. They highlighted that the contribution of FDI to economic growth is contingent on the host country's capacity to assimilate technology and noted the necessity of complementarity between human capital and FDI. Chowdhury and Mavrotas (2005) provided empirical evidence on the relationship between FDI and economic growth using single-equation and simultaneous equation estimates for 140 countries with macroeconomic variables. Their results indicated a positive and statistically significant relationship between FDI and economic growth. According to Tshepo (2014), these diverse findings underscore the complexity of the relationship between FDI and economic growth, though FDI is generally seen as a catalyst for sustainable growth through positive spillover effects such as job creation, skill and technology transfer, increased competition, and human capital enhancement in the host country.

The short and long run relationship between foreign direct investment and economic growth

To determine the direction of causality between these variables, the Granger causality test, based on error correction, was employed. The results indicated that there was cointegration between the variables when real GDP and FDI were the dependent variables. FDI, trade openness, and labour force were identified as the key factors influencing long-term economic growth in

Romania. Additionally, over time, increases in GDP, exports, imports, and the labour force stimulated FDI. Ayenew (2022) also found evidence of cointegration between economic growth and FDI. Similarly, Tshepo (2018) examined the relationship between FDI inflows and economic growth in South Africa using data from 1980 to 2014.

The study utilized a vector error correction model to estimate the long-term relationships between the variables. It revealed that economic development was positively associated with FDI and the real effective exchange rate in the long run but had a negative long-run relationship with government spending. Conversely, Falki (2009) found a negative and insignificant relationship between economic growth and FDI in Pakistan. Makova (2010) conducted a study on the impact of foreign direct investment on economic growth in Zimbabwe over the period of 1980 to 2006 using the ARDL bounds approach to cointegration, and the econometric evidence indicates that the variables included in the augmented production function are cointegrated, suggesting they are linked in the long run. This study implies that there is long run relationship between FDI and economic growth. Phyoe (2015) discovered that there is a negative relationship between FDI and economic growth at a significance level in the short run. This implies that an increase in FDI leads to a decrease in GDP in the long run.

The causal relationship between economic growth, inflation and exchange rates

According to Phyoe (2015), in the analysis of Granger-causality test between variables, there is a causal relationship between FDI and economic growth. In other words, when the economy experiences growth, FDI tends to increase as well. This indicates a positive relationship between economic growth and FDI inflows, where growth in the economy attracts more FDI. The Toda-Yamamoto causality test found that there is a one-way causal relationship between FDI and economic growth. In a similar study, Oumarou & Maiga (2019) discovered a two-way relationship between trade and economic growth, and a one-way causal link between trade and FDI, where trade influences FDI.

RESEARCH METHODOLOGY

Data

This study utilized secondary annual time series data spanning from 1994 to 2023, sourced from the World Bank. The chosen timeframe is based on data availability, ensuring a robust dataset for analysis.

Model specification

To improve the study's formulation, a simple linear regression model incorporating four variables was utilized. To enhance estimation efficiency and standardization, certain variables, including the real exchange rate and foreign direct investment inflows, were converted into their

natural logarithmic forms. The model's functional form in the current study is represented as follows:

$$GDP = f(LNFDII_1, INF_2, LNREEX_3) \quad (1)$$

$$GDP_t = \beta_0 + \beta_1 LNFDII_t + \beta_2 INF_t + \beta_3 LNREEX_t + \varepsilon_t \quad (2)$$

Where: GDP represents the natural logarithm of Gross Domestic Product (GDP) and serves as a proxy for economic growth, modelled against $LNFDII_t$ which denotes the logarithm of foreign direct investment net flows; INF_t denotes inflation (consumer prices); and $LNREEX_t$ denotes the real effective exchange rate index. β is the coefficient of the explanatory variables; L is used to standardize the variables in values; and ε_t is the error term in the study model.

Estimation Techniques

The proposed study employs the Auto Regressive Distributed Lag (ARDL) approach, as established by Pesaran and Shin (1999) and Pesaran et al. (2001). This method effectively captures cointegration among a set of variables, addressing both long-run and short-run dynamics simultaneously. The ARDL approach utilizes several techniques, including graphical analysis for visual inspection, unit root tests, lag length selection, cointegration tests, and estimates for both short- and long-run relationships. Additionally, the Granger method (Granger, 1969) is applied to determine causal relationships between the variables. The study also incorporates comprehensive diagnostic tests to ensure robustness and accuracy of the results.

Augmented Dicky- Fuller (ADF) and Phillips-Perron (PP)

Unit root testing is a crucial initial step in econometric analysis to address stationarity issues in time series data, particularly under the autoregressive model assumption. This study employed both informal and formal approaches to ensure a comprehensive analysis of the stationarity of the variables. Informal unit root testing involves visual inspections of line graphs and correlograms, providing a preliminary visual assessment of the data's stationarity. These informal tests offer an initial insight into the potential presence of unit roots in the series. Following this, the study utilized formal unit root tests, specifically the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP), to rigorously assess the stationarity of the variables. By combining both informal and formal approaches, the study ensures a thorough evaluation of the stationarity, which is essential for accurate model estimation and inference.

Autoregressive distributive lag (ARDL) Bounds test for cointegration

Cointegration is an econometric technique used to test the relationship between nonstationary time series variables. Variables are considered cointegrated when they move together in a consistent pattern (Milanzi, 2021). The study employed the ARDL Bounds procedure to test whether the concerned variables will move together in the long- run. The ARDL approach to

cointegration is particularly useful for identifying cointegrating vectors, with each variable representing a single long-run relationship equation (Ledwaba, 2022). If a cointegrating vector is identified, the ARDL model can be reparametrized into an Error Correction Model (ECM). Therefore, it is essential to explore the ARDL approach to cointegration or the bound testing procedure, as proposed by Pesaran and Shin (1995) and Pesaran et al. (1996).

Autoregressive distributed lag (ARDL)

To test for the impact of FDI on economic growth, both in the long run and short run, the ARDL approach provides realistic and efficient estimates, making it ideal for this study, following the methodologies proposed by Pesaran and Shin (1999) and Pesaran et al. (2001). This approach is suitable for analysing long-run relationships regardless of whether the underlying variables are I (0), I (1), or a combination of both. The ARDL approach was chosen due to its multiple advantages including the fact that it provides robust results when dealing with few variables, small sample size data and its ability to handle different orders of integration except for I (2) (Türsoy, 2017). Furthermore, the technique includes an Error Correction model (ECM) that shows the speed of adjustment towards equilibrium.

Granger Causality

The Granger (1988) causality test is utilized to examine the dynamic linkage between dependent and independent variables (Ncanywa & Molele, 2019). The core purpose of this test is to determine which variable initiates or causes the other and which variable is being influenced in return. Sahu, Bandopadhyay & Mondal (2014) straightforwardly point out that while causality tests are important, they do not reveal the strength of the causal relationships between variables or describe their relationship over time.

Diagnostic Testing

To ensure the model's goodness of fit, various diagnostic tests were conducted, including checks for serial correlation, heteroskedasticity, normality, and stability. Serial correlation, which occurs when error terms from different time periods are correlated, is tested using the Breusch-Godfrey test. Although it does not affect the unbiasedness and consistency of Ordinary Least Squares (OLS) estimates, it impacts their efficiency. Heteroskedasticity, where the variance of error terms varies over time, is tested using methods like the Breusch-Pagan-Godfrey, Harvey, Glejser, and ARCH tests, with adjustments made using robust standard errors if detected (Green, 2004). The normality of error terms is assessed using the Jarque-Bera test, ensuring that the distribution of errors aligns with the assumptions of the model. Finally, the stability of model parameters was evaluated using the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMsq) of recursive residuals, along with the Ramsey RESET test, to ensure both long-run and short-run stability of the model parameters (Gujarati, 2004).

EMPERICAL RESULTS

This section presents and interprets the econometric tests conducted to address the research questions, in line with the study's methodology. It includes the results from visual inspection, stationarity tests, the ARDL approach, Granger causality analysis, as well as diagnostic and stability tests. These methods were applied to empirically assess the impact of FDI on economic growth in South Africa. The findings are displayed through tables and graphs for clarity and better visualization.

Unit root test results

The empirical results are introduced by presenting the outcomes of the unit root tests, including both informal (visual inspection of time series plots) and formal tests (such as the Dickey-Fuller test) aimed at assessing whether the variables under scrutiny exhibit stationarity. The findings are displayed in Table 4.1 below.

The visual inspection test results

Visual inspection of time series data is valuable for understanding the characteristics of variables. It facilitates determining whether the variables' time series were stationary at level I (0) or became stationary after first differencing to I (1).

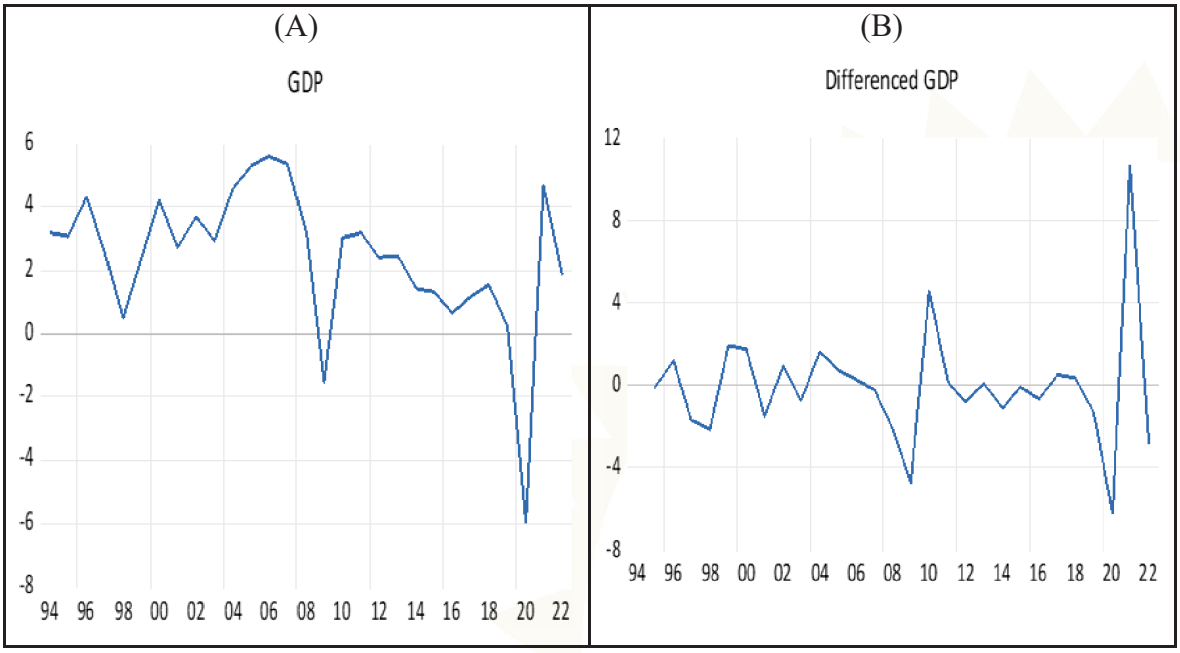


Figure 1 A and B: Gross Domestic Product

Source: Author's compilation

The initial observation from the line graph in Figure 1A indicates that the GDP time series is trending upwards away from the mean. This suggests a continual increase in GDP over time, indicating a changing mean and implying nonstationary. Conversely, in Figure 1B, which depicts the first difference of GDP, the line graph shows fluctuations around the mean.

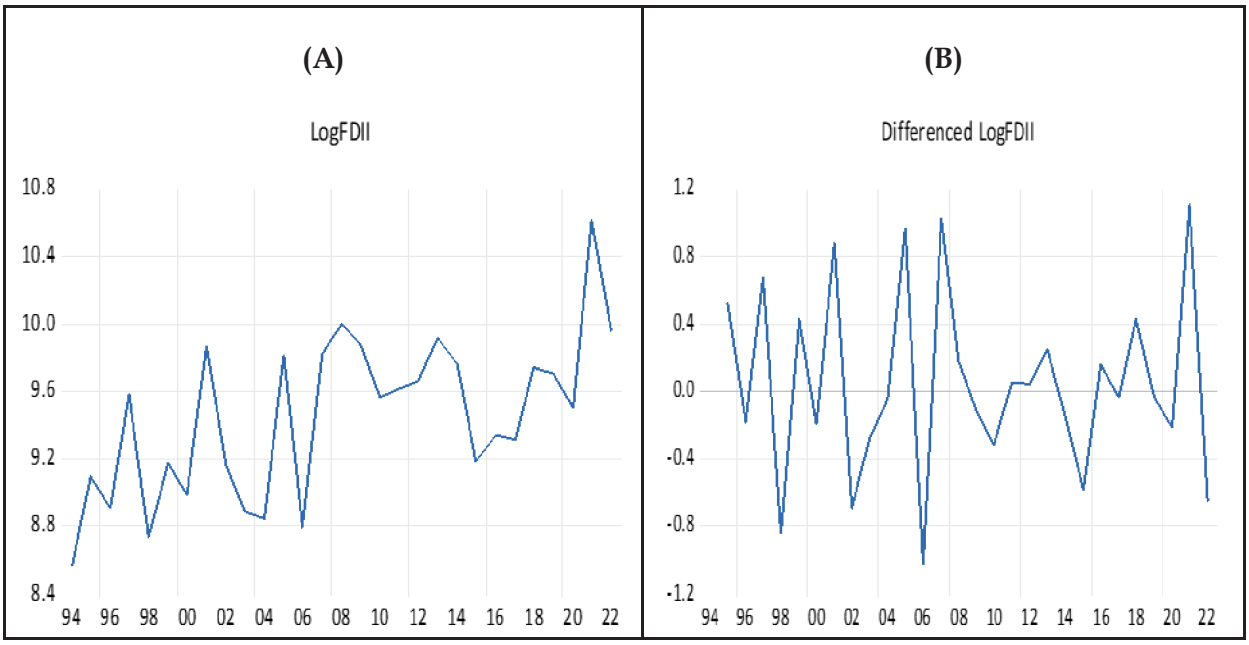


Figure 2A and 2B: Foreign direct investment inflows

Source: Author's Compilation

Figure 2 visually examines the unit root of logged foreign direct investment inflows (FDII) at both the level and first difference. Panel A indicates an upward trend in the series, while panel B shows oscillations around a mean of zero. Based on visual inspection, foreign direct investment inflows exhibit a unit root at the level, hovering around a mean of zero, and appear stationary at the first difference, fluctuating around this mean.

(A)	(B)

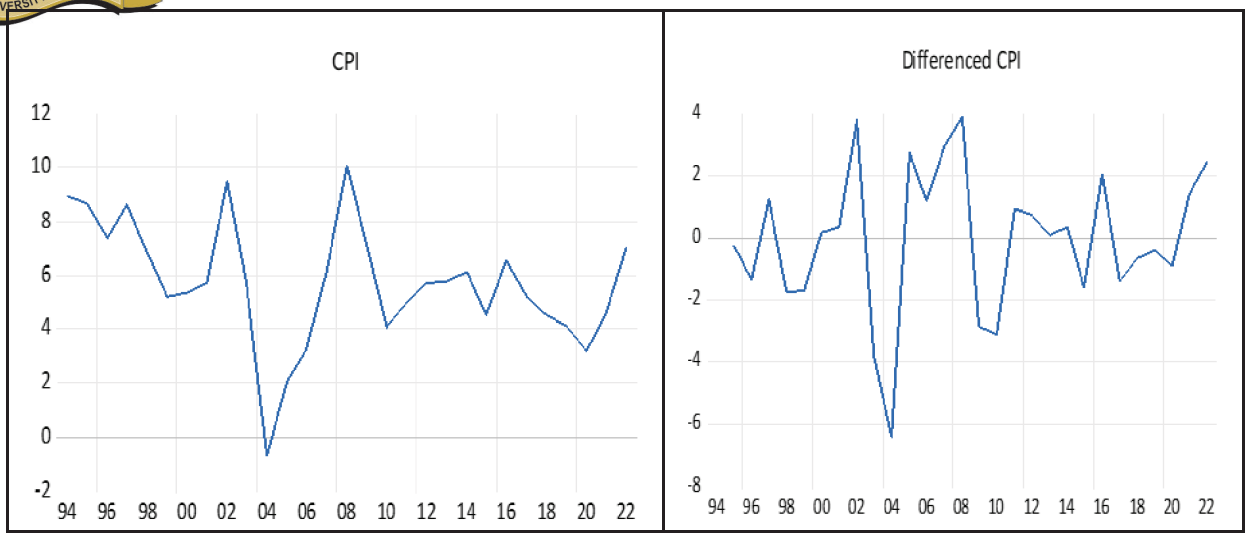


Figure 3A and 3B: Consumer price index

Source: Authors Compilation

Figure 3 presents the consumer price index (CPI) in both level and first difference. Panel A indicates that the series does not fluctuate around a mean of zero, suggesting that the CPI is not stationary at the level. In contrast, panel B shows the CPI oscillating around a mean of zero after the first difference. This indicates that CPI is integrated of the first order, meaning it becomes stationary after being differenced once.

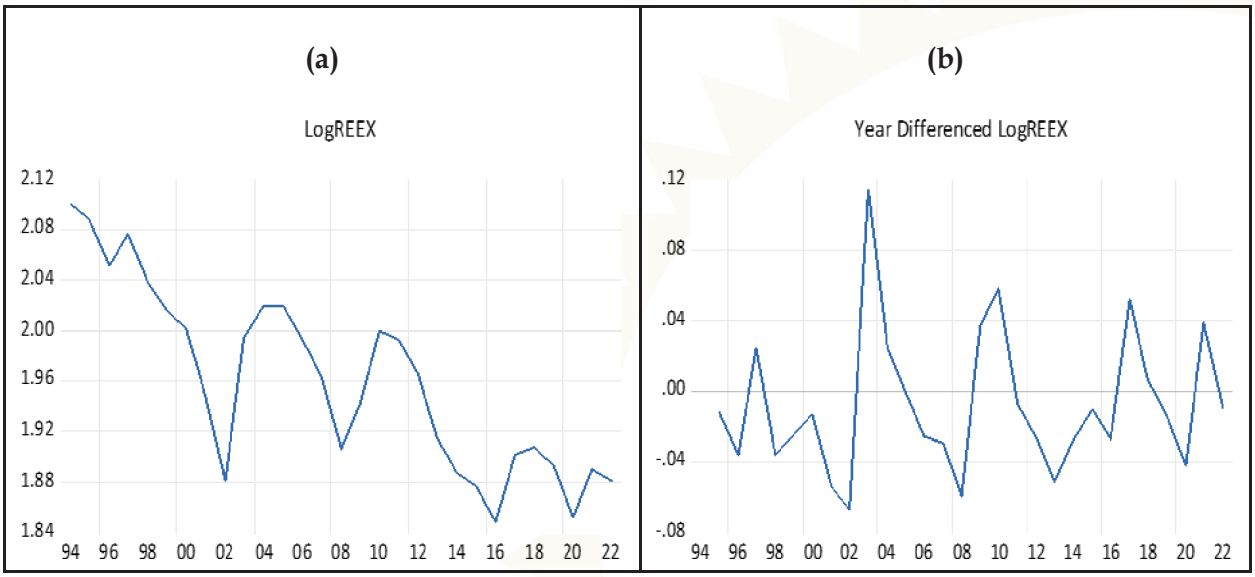


Figure 4A and 4B: Real exchange rates

Source: Author's Compilation

The downward trend observed in the line graph of Figure 4A indicates that LREEX is nonstationary at level I (0). However, in Figure 4B, the graph shows stationarity with fluctuations around the mean after LREEX has been differenced to I (1). This indicates that the variable becomes stationary as it crosses the mean value of zero.

Formal unit root test results

Unit root tests were conducted using intercept-only, trend, and intercept with trend models to assess stationarity. The outcomes of these tests are detailed in Figure1.

Table 1: Augmented Dickey Fuller and Philips-Perron Test Results

Variables	Model	Augmented Dickey-Fuller (ADF)	Phillips-Perron (PP)	Order of Integration	Conclusion
GDP	Intercept	-4.1054***	-4.1075***	I (0)	Stationary
	Trend & Intercept	-4.7477***	-4.7474***	I (0)	
	None	-2.5684***	-2.3802***	I (0)	
INFDII	Intercept	-4.0848***	-4.0488	I (0)	Non-stationary
	Trend & Intercept	-5.5935***	-5.5885***	I (0)	
	None	0.7925	1.5681	I (0)	
ΔINFDII	Intercept	-9.4821	-9.8612	I (1)	Stationary
	Trend & Intercept	-9.5446	-10.00479	I (1)	
	None	-9.4596	-9.7654	I (1)	
	Intercept	-4.1189	-3.2152	I (0)	Non-stationary

CPI	Trend & Intercept	-4.1590	-2.8504	I (0)	
	None	-1.0401	-1.0820	I (0)	
ΔCPI	Intercept	-5.4791***	-5.7415***	I (1)	Stationary
	Trend & Intercept	-5.4964***	-6.0310***	I (1)	
	None	-5.5400***	-5.8974***	I (1)	
LNREEX	Intercept	-1.9820	-1.8384	I (0)	Non-stationary
	Trend & Intercept	-3.8190	-2.8395	I (0)	
	None	-1.0935	-3.1275	I (0)	
ΔLNFEEX	Intercept	-4.3733***	-5.7915***	I (1)	Stationary
	Trend & Intercept	-4.4304***	-5.8528***	I (1)	
	None	-4.8295***	-4.9242***	I (1)	

Source: Author's compilation

Notes: Asterisk *, **, *** denote significance at the 1%, 5% and 10% respectively. L indicates the logged variables. indicates 1st difference.

Table 1 presents the results of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. The ADF test was chosen for its robustness with larger sample sizes, while the PP test served to corroborate the findings from the ADF test. These tests were conducted at significant levels of 1%, 5%, and 10%, using models with intercept, trend, and intercept with trend specifications, both at the level and after first differencing. According to the results, Gross Domestic Product (GDP) was found to be stationary at the level, indicating integration of order I (0). In contrast, Foreign Direct Investment inflows (LNFDII), Consumer Price Index (CPI) and

Real Effective Exchange Rates showed non-stationarity at order I (0), but became stationary after first differencing, indicating integration of order I (1).

ARDL Bounds test results

The ARDL cointegration technique is advantageous when analyzing variables that are integrated at different orders I (0), I (1), or a mix of both. This aspect has been detailed in the unit root results presented in figure 1. In ARDL, the long-run relationship between variables is identified using the F-statistic, where significance is determined if the F-statistic exceeds both the lower and upper critical value bounds. A summary of these results is provided in figure 2 below:

Table 2: ARDL Bounds test results

Model:		F-statistics= 7.92369***	
Critical value bounds		No. of independent variables: K=3	
Significance	Lower bounds I (0)	Upper bounds I (1)	Results
10%	2.37	3.2	Cointegration
5%	2.79	3.67	Cointegration
2.5%	3.15	4.08	Cointegration
1%	3.65	4.66	Cointegration

Source: Author's compilation

Notes: ***indicates significance at the 10% level

Table 2 shows that the calculated F-statistic exceeds both the lower and upper critical values across all levels of significance. This indicates a robust long-run relationship among the variables. According to the standard practice, for a valid long-run relationship, the F-statistic must surpass all levels of significance thresholds. Subsequently, the study proceeded to estimate the coefficients for both the long-run and short-run effects of the variables in the model. Detailed results can be found in table 3 and table 4 below:

ARDL short-run and long-run coefficient

In this part of the ARDL modelling, the researcher computes the long-term and short-term coefficients of the model outlined in Table 3 (results for long-term coefficients) and Table 4.4 (results for short-term coefficients).

Table 3: Long-run coefficient results

Variables	Coefficient	Std. Error	t-statistic	Prob.
LFDI	0.05031	-1.1248	0.04473	0.9648
CPI	-0.7470	0.3798	-1.9667	0.0658
LREEX	26.05952	8.3469	3.1220	0.0062
C	-45.1005	22.5371	-2.001165	0.0616

Source: Author's compilation

Notes: Asterisk *, **, * indicate statistical significance at the 1%, 5% and 10% level**

Table 3 outlines the estimated long-run coefficients following confirmation of a stable long-run relationship among the variables. The Consumer Price Index (CPI) displays a coefficient of -0.7470, indicating that a 1% increase in inflation is associated with a 0.747% decrease in economic growth. This negative relationship is statistically significant at the 10% level and is consistent with the Mundell-Tobin effect, which argues that lower inflation enhances investment by raising real returns, thereby promoting growth. In the South African context, this result underscores how persistent inflation may discourage private sector investment and undermine long-term economic expansion.

Although the coefficient for foreign direct investment inflows (FDII) is positive at 0.0503, it is statistically insignificant. Nevertheless, the direction of the relationship supports the FDI-led growth hypothesis, which posits that FDI enhances economic performance through capital accumulation, job creation, and technological spillovers. While the current data do not establish a strong long-term impact, the potential of FDI to stimulate growth remains particularly relevant for a developing economy like South Africa. This highlights the importance of creating an enabling environment to attract meaningful investment inflows that can boost productivity and innovation.

The real effective exchange rate (LREEX) presents a notably high and statistically significant coefficient of 26.06. This implies that a 1% appreciation in the exchange rate corresponds with a 26.06% increase in economic growth. Such a substantial effect suggests that exchange rate

movements play a critical role in shaping economic activity, particularly through their influence on import prices, investor confidence, and trade competitiveness. These findings are consistent with previous evidence from Ali, Liu, and Su (2018), who observed a similarly strong link between exchange rate appreciation and growth in emerging markets. However, the magnitude of the coefficient calls for careful interpretation, as it may reflect structural economic sensitivities or model limitations that exaggerate this impact. While FDI has the potential to drive development, its effectiveness is closely linked to macroeconomic stability, especially inflation control and exchange rate management. These insights are essential for policymakers aiming to design strategies that harness investment and monetary tools for sustainable growth.

Table 4: Short-run coefficients results

Variable	Coefficient	P-value
D(CPI)	0.373397	0.0695
D(REEX)	37.57778	0.0014
CointEq(-1)*	-0.973227	0.0000

Notes: Asterisks *, **, * indicate statistical significance at the 1%, 5% and 10% level**

Source: Author's compilation

Table 4 presents the short-run dynamic relationships among the variables based on the estimated error correction model. The coefficient for the first-differenced Consumer Price Index (D(CPI)) is 0.3734 with a p-value of 0.0695, indicating a positive but weakly significant relationship with economic growth at the 10% level. This suggests that in the short run, a 1% increase in economic growth is associated with a 0.37% increase in CPI. Although the coefficient appears relatively moderate, the lack of strong statistical significance implies that inflation does not exert a reliable short-term impact on growth dynamics in the South African context. However, the positive sign may reflect the inflationary pressures that often accompany rising aggregate demand during economic expansions (Barro, 1996).

In contrast, the short-run coefficient for the real effective exchange rate (D(REEX)) is notably high at 37.58 and is statistically significant at the 1% level. This result indicates that a 1% increase in economic growth is associated with a 37.58% appreciation in the real effective exchange rate. Such a substantial elasticity raises concerns about the sensitivity of the exchange rate to changes in economic activity. A possible explanation could be the high degree of trade openness and capital flow responsiveness in South Africa, where even modest shifts in output can lead to large exchange rate adjustments (Ali, Liu & Su, 2018). However, the magnitude of this coefficient may also point to underlying volatility or structural asymmetries in the short-run transmission mechanism, warranting cautious interpretation and further robustness checks.

The error correction term (ECT) is statistically significant at the 1% level with a coefficient of -0.9732. This reflects a rapid speed of adjustment, meaning that approximately 97.32% of the disequilibrium from the previous period is corrected within one time period. Such a high adjustment speed suggests that the model strongly reverts to its long-run equilibrium path following short-term shocks. This supports the stability and reliability of the model and confirms the presence of a long-term relationship among the variables (Banerjee, Dolado, Galbraith & Hendry, 1993).

Overall, the short-run results indicate that while inflation exerts a limited influence on economic growth in the short term, exchange rate movements respond sharply to changes in output. The significant and large REEX coefficient may reflect the structure of South Africa's external sector, but its scale calls for additional scrutiny. Nonetheless, the significant ECT confirms that the model effectively captures the dynamic interactions and corrects deviations toward equilibrium efficiently.

Granger Causality test results

The Engle-Granger causality test was used to examine the causal relationships among the variables in the study. Below are the summarized results:

Table 5: Granger Causality test

Null Hypothesis:	Obs	F-Statistic	Prob.
LOGFDII does not Granger Cause GDP	27	2.25568	0.1285
GDP does not Granger Cause LOGFDII		0.40139	0.6742
CPI does not Granger Cause GDP	27	1.73980	0.1989
GDP does not Granger Cause CPI		0.50499	0.6103
LOGREEX does not Granger Cause GDP	27	1.60920	0.2227
GDP does not Granger Cause LOGREEX		0.29819	0.7451
CPI does not Granger Cause LOGFDII	27	2.02091	0.1564
LOGFDII does not Granger Cause CPI		0.85052	0.4408
LOGREEX does not Granger Cause LOGFDII	27	0.49825	0.6143
LOGFDII does not Granger Cause LOGREEX		1.73730	0.1959

LOGREEX does not Granger Cause CPI	27	3.38124	0.0524
CPI does not Granger Cause LOGREEX		2.56844	0.0994

Source: Author's compilation

The Granger causality analysis reveals no significant causal relationships between GDP and the other variables, foreign direct investment inflows (FDI), consumer price index (CPI), and real effective exchange rate (REEX), suggesting that, in the short term, GDP does not predict changes in these factors, nor do these factors drive GDP movements. However, a significant bidirectional causality between CPI and REEX was found at the 5% and 10% significance levels, indicating a mutual influence between inflation and exchange rate dynamics. This suggests that fluctuations in the exchange rate can influence inflation levels, while inflationary changes also impact the exchange rate. Such findings are consistent with the broader economic theory, where exchange rate depreciation can increase import prices, leading to inflation, while inflation expectations can drive exchange rate volatility. A similar relationship was identified by Zhanje and Nyamwena (2017), who highlighted the interaction between inflation and exchange rates in emerging economies. This highlights the need for coordinated policy measures to ensure both monetary and external sector stability in South Africa.

Diagnostic test results

The diagnostic tests assess the reliability and efficiency of the model. The summary of these test results is presented in figure 6 below:

Table 6: Diagnostic test results

Diagnostic Analysis	Tests	P-Value	Conclusion
Serial correlation	Breusch-Godfrey	0.5405	No serial correlation
Heteroskedasticity test	Breusch-Pagan Godfrey	0.5405	No heteroskedasticity
Heteroskedasticity test	Arch LM	0.7918	No heteroskedasticity
Heteroskedasticity test	Harvey	0.7551	No heteroskedasticity
Normality test	Jarque-Bera	0.9254	Residuals are normally distributed

Source: Author's compilation

Normality tests are employed to assess whether the residuals in the estimated model adhere to a normal distribution with a consistent mean and variance over time (Ouma & Muriu 2014). According to Brooks (2008), for residual distributions to be considered normal, the probability of the Jarque-Bera test must be insignificant. In this analysis, the null hypothesis was tested, and the results indicated that the residuals were normally distributed, as shown in Table 6. The computed p-value of 0.9254 confirms that the probability is insignificant.

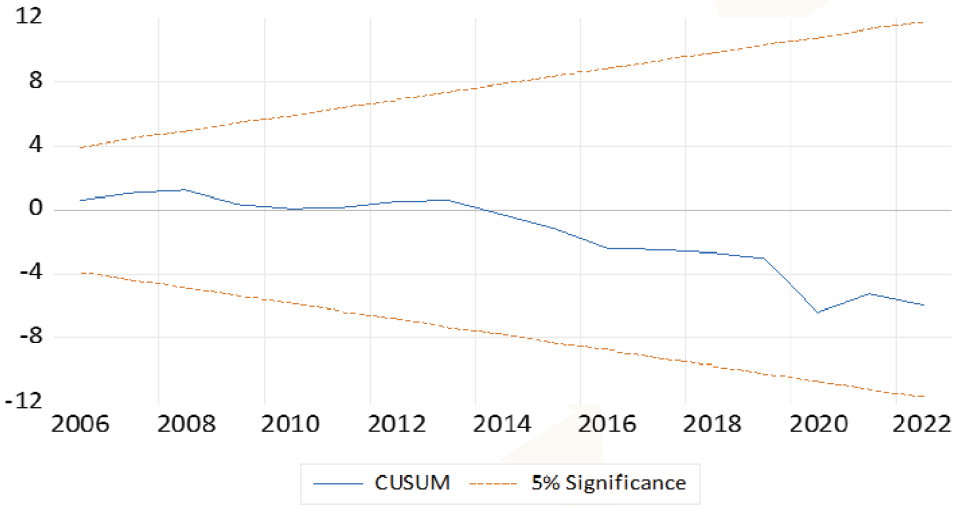
The Breusch-Godfrey Lagrange Multiplier Test (LM) was employed to test the null hypothesis that there is no serial correlation in the model. The results indicated that the null hypothesis cannot be rejected, as the computed p-value of 0.5405 is greater than all level of significance. This suggests that the model is free from serial correlation (Zhanje and Nyamwena, 2017).

The Breusch-Pagan-Godfrey test, ARCH test, and Harvey test were conducted to assess the presence of heteroscedasticity in the model. The results indicated that the probability values were 0.8375, 0.7918, and 0.7551, respectively, which are all greater than the 10% level of significance (Gujrati & Porter, 2009). These findings suggest that the model is statistically insignificant, and thus, the null hypothesis is not rejected, indicating no heteroscedasticity in the model.

Stability tests results

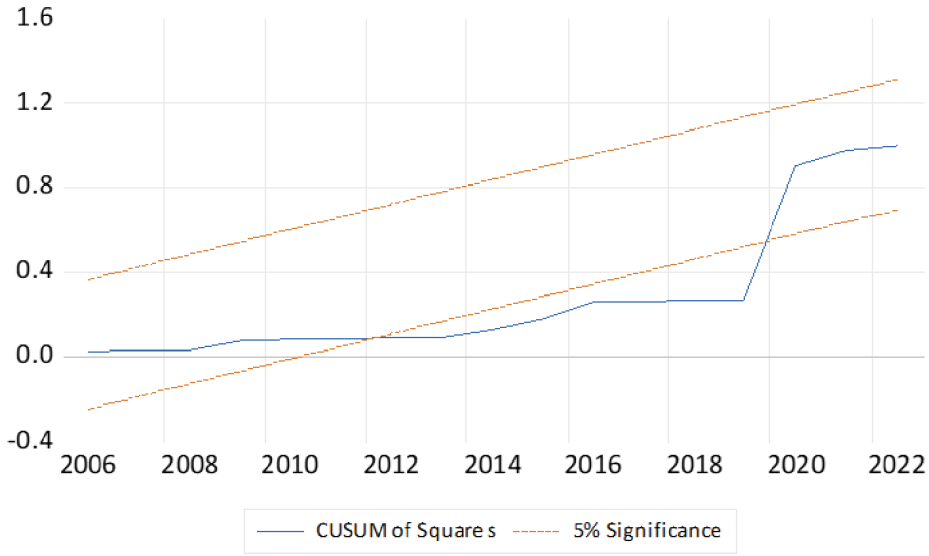
To reinforce the ARDL results, the model underwent stability testing, which included the CUSUM and the CUSUMSQ tests. The results of the CUSUM and CUSUMSQ tests are illustrated in Figures 5 and 6, respectively.

Figure 5: CUSUM test results



Source: Author's compilation

Figure 6: CUSUMSQ test results



Source: Author's compilation

In the estimation shown in Figure 5, the blue line represents the Cumulative Sum (CUSUM) control chart, while the dotted red lines indicate the model's 5% significance level. The fact that the cumulative plots remain within these red lines suggests that the model is stable, as it falls within the acceptable 5% significance threshold.

The test depicted in Figure 6 assesses whether the coefficients of the regression model experience sudden shifts. In this case, the CUSUM of squares line moves outside the critical boundaries, indicating potential instability. According to the CUSUM test, any movement beyond the two critical lines reflects variance instability in the model. Therefore, based on these findings, Figure 6 reveals that the model is subject to instability. A similar observation was made in the study by Acaravci and Ozturk (2012), where they examined the impact of FDI on economic growth in Turkey. In their analysis, the CUSUMSQ line exceeded the significance boundaries at certain points, indicating potential instability in the FDI-growth relationship, which they attributed to external economic shocks and fluctuations in global market conditions.

CONCLUSION AND RECOMENDATIONS

The major goal of this research was to investigate the relationship between foreign direct investment (FDI) and economic growth in South Africa. The findings confirm FDI's critical role in promoting economic development by encouraging knowledge transfer, job creation, and increased productivity. The study's results are consistent with the Eclectic Paradigm Theory, which posits that FDI occurs when firms possess a combination of ownership, location, and

internalization advantages (Dunning, 1980). Additionally, the findings support the Internalization Theory, which emphasizes the role of market imperfections and the need for firms to internalize their operations to mitigate these imperfections (Buckley & Casson, 1997). However, unexpected findings, such as the negative impact of foreign divestment on economic growth, could be attributed to the loss of critical skills and technology when foreign firms withdraw from the host country (Hymer, 1976).

The results from the study's econometric analysis highlight several key findings. Unit root tests confirmed that some variables, such as GDP and FDI inflows, were stationary at level I (0), while CPI and Real Effective Exchange Rates were found to be non-stationary but became stationary after first differencing, indicating I (1) integration. The ARDL bounds test confirmed a long-run cointegration relationship between GDP, FDI inflows, CPI, and REEX, as the F-statistic exceeded the critical bounds at all significance levels. Long-run results demonstrated that CPI had a negative and significant effect on GDP, while FDI inflows and REEX exhibited positive relationships. In the short run, REEX had a positive and significant effect on GDP, but CPI did not. The model's error correction term suggested rapid adjustment toward long-run equilibrium. Diagnostic tests revealed no serial correlation or heteroscedasticity, though the residuals were not normally distributed. Stability tests, including CUSUM and CUSUMSQ, confirmed the model's robustness.

List of References

Acaravci, A., & Ozturk, I. (2012). Foreign direct investment, export, and economic growth: Empirical evidence from new EU countries. *Journal of Economic and Social Research, 12*(1):5-20.

Ali, H., Liu, Y. & Su, C.W., (2018). The relationship between exchange rate and economic growth in emerging Asian economies. *Economic Research-Ekonomska Istraživanja*, 31(1):1–17.

Antwi, S., Mills, E.F.E.A., Mills, G.A. and Zhao, X., (2013). Impact of foreign direct investment on economic growth: Empirical evidence from Ghana. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, *3*(1): 18-25.

Asiedu, E., (2005). Foreign direct investment in Africa. *WIDER Research Paper*, *24*(1): 1-15.

Awokuse, T. O., (2003) Is the export-led growth hypothesis valid for Canada? *Canadian Journal of Economics/Revue canadienne d'économique,* 36(1): 126-136.

Ayenew, B. B. (2022). The effect of foreign direct investment on the economic growth of Sub-Saharan African countries: An empirical approach. *Cogent Economics & Finance, 10*(1): 2038862.

Banerjee, A., Dolado, J.J., Galbraith, J.W. & Hendry, D.F., (1993) *Co-integration, Error Correction, and the Econometric Analysis of Non-Stationary Data*. Oxford: Oxford University Press.

Barro, R.J., (1996) Inflation and growth. *Federal Reserve Bank of St. Louis Review*, 78(3): 153–169.

Borensztein, E., De Gregorio, J. and Lee, J.W., (1998) How does foreign direct investment affect economic growth. *Journal of international Economics*, *45*(1): 115-135.

Brooks, C., (2008) *Introductory econometrics for finance* 2nd edition. Cambridge: Cambridge University Press, ISBN-13 978-0-521-87306-2.

Buckley, P. J., & Carter, M. J. (1997) The economics of business process design in multinational firms. In M. Ricketts & R. Mudambi (Eds.), *The organisation of the firm: International business perspectives*. London: Routledge.

Chibalamula, H., Evans, Y., Kachelo, M. & Bamwesigye, D., (2023) The Effect of Foreign Direct Investment and Trade Openness on Economic Growth: Evidence from Five African Countries. *AGRIS on-line Papers in Economics and Informatics,* 15(1): 35-46.

Chowdhury, A. & Mavrotas, G., 2005. FDI and Growth: A Causal Relationship. *UNU-WIDER Research Paper* No. 2005/25, UNU-WIDER, 1(1).

Donghui, Z., Yasin, G., Zaman, S. and Imran, M., (2018) Trade openness and FDI inflows: A comparative study of Asian countries. *European Online Journal of Natural and Social Sciences*, *7*(2): 386.

Dunning, J.H., (1980) Toward an eclectic theory of international production: Some empirical tests. In *The Eclectic Paradigm: A Framework for Synthesizing and Comparing Theories of International Business from Different Disciplines or Perspectives* (pp. 23-49). London: Palgrave Macmillan UK.

Falki, N. (2009). Impact of foreign direct investment on economic growth in Pakistan. *International Review of Business Research Papers, 5*(5): 110-120.

Fedderke, J. & Romm, A., (2006). Growth impact and determinants of foreign direct investment into South Africa, 1956–2003. *Economic Modelling,* 23(5): 738-760.

Granger, C. & Newbold, P., (1969). Spurious Regressions in Econometrics. *Journal of Econometrics,* 2(2): 111-120.

Granger, C.W., (1988). Causality, cointegration, and control. *Journal of Economic Dynamics and Control*, *12*(2-3): 551-559.

Green, K.C., (2004). Department of Econometrics and Business Statistics.

Gujarati, D. & Porter, D., (2009). *Basic Econometrics.* s.l.: McGraw-Hill.

Gujarati, D., (2004) *Basic Econometrics* (4th edition). New York: McGraw-Hill Companies.

Hansen, H., Rand, J. and Tarp, F., (2004). *SME growth and survival in Vietnam: Did direct government support matter?* (pp. 04-13). Institute of Economics, University of Copenhagen.

Kumo, W.L., (2012). Infrastructure investment and economic growth in South Africa: A granger causality analysis. *African development bank group working paper series*, *160*.

Ledwaba, N.A., (2022). Growth through innovation and productivity: The case of South Africa.

Lerato Mothibi & Lorainne Ferreira (2019). "An Empirical Analysis of Foreign Direct Investment and Domestic Investment as Drivers of Economic Growth in South Africa," Proceedings of International Academic Conferences 9912016, International Institute of Social and Economic Sciences.

Li, X. and Liu, X., (2005). Foreign direct investment and economic growth: an increasingly endogenous relationship. *World development*, *33*(3), pp.393-407.

Makhoba, B. & Zungu, L., (2021). Foreign Direct Investment and Economic Growth in South Africa: Is there a Mutually Beneficial Relationship? *African Journal of Business and Economic Research,* 16(4): 101-115.

Makki, S.S. and Somwaru, A., (2004). Impact of foreign direct investment and trade on economic growth: Evidence from developing countries. *American journal of agricultural economics*, *86*(3): 795-801.

Makova, T., (2010). Foreign direct investment and economic growth in Zimbabwe: An ARDL bounds test approach. *Journal of Strategic Studies: A Journal of the Southern Bureau of Strategic Studies Trust,* 1(1): 37-56.

Marandu, S. H., (2018) The Impact of FDI on Economic Growth in Southern African Countries. *University of Cape Town,* 1(1): 1-42.

Milanzi, S. A., (2021) Inclusive growth, innovation, and economic development in South Africa: An empirical analysis.

Ncanywa, T. & Molele, S. B., (2019) Effects of oil prices and exchange rates movements on JSE stock return volatility. *Journal of Reviews on Global Economics,* 8: 305-314.

Ouma, W.N. and Muriu, P., (2014) The impact of macroeconomic variables on stock market returns in Kenya. *International journal of business and commerce,* 3(11): 1-31.

Oumarou, I., & Maiga, O. A. (2019). A causal relationship between trade, foreign direct investment, and economic growth in Niger. *Journal of Social and Economic Statistics, 8*(2), 24-38.

Pesaran, H. M., Shin, Y. & Smith, R. J., (2001) Bounds testing approach to the analysis of level relationships. *Journal of Applied Econometrics,* 16(1): 289-326.

Pesaran, M.H. and Shin, Y., (1995) *An autoregressive distributed lag modelling approach to cointegration analysis* (Vol. 9514, pp. 371-413). Cambridge, UK: Department of Applied Economics, University of Cambridge.

Pesaran, M.H. and Shin, Y., 1996. Cointegration and speed of convergence to equilibrium. *Journal of econometrics*, *71*(1-2): 117-143.

Pesaran, M.H., Shin. Y., (1999) An autoregressive distributed lag modeling approach to cointegration analysis. Chapter 11 in Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium, Strom S.

Phyoe, E.E., (2015) The relationship between foreign direct investment and economic growth of selected ASEAN countries. *International Journal of Business and Administrative Studies*, *1*(4): 132.

Ratombo, N. & Mongale, I., (2019) The effect of domestic credit and debt on economic growth of South Africa. p. 865.

Ratombo, N.E., (2019) The effects of international trade on economic growth in South Africa (2000Q1 to 2017Q2): An econometric view. *Doctoral dissertation.*

Rugman, A.M., (1980) Internalization as a general theory of foreign direct investment: A re-appraisal of the literature. *Weltwirtschaftliches Archiv*, (H. 2): 365-379.

Sahu, T. N., Bandopadhyay, K. & Mondal, D., 2014. Crude oil price, exchange rate and emerging stock market: Evidence from India. *Jurnal Pengurusan,* 42: 75-87.

Shirazi, N.S. and Manap, T.A.A., 2005. Export-led growth hypothesis: Further econometric evidence from South Asia. *The Developing Economies*, *43*(4): 472-488.

Sokang, K. (2018). The impact of foreign direct investment on economic growth in Cambodia: Empirical evidence. *International Journal of Innovation and Economic Development, 4*(5), 31-38.

Strauss, L., (2015) FDI inflows and economic growth in South Africa from 1994 to 2013.

Sylwester, K. (2005). Foreign direct investment, growth, and income inequality in less developed countries. *International Review of Applied Economics, 19*(3): 289-300.

Tshepo, M. S. (2018). The relationship between foreign direct investment and economic growth in South Africa: Vector error correction analysis. *Acta Commercii, 18*(1): 1-8.

Tshepo, M., (2014) The impact of foreign direct investment on economic growth and employment in South Africa: A time series analysis. *Mediterranean Journal of Social Sciences*, *5*(25): 18.

Türsoy, T., (2017) Causality between stock prices and exchange rates in Turkey: Empirical evidence from the ARDL bounds test and a combined cointegration approach. *International Journal of financial studies*, *5*(1): 8.

Zhanje, S. and Nyamwena, J.K.T., (2017) Autoregressive distributed lag analysis of international trade and economic growth: empirical evidence from Kenya. International Conference on Public Administration and Development Alternatives (IPADA).