Macroeconomic Determinants of Economic Growth in South Africa: A Cointegration Evidence

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Abstract

Purpose: The aim of this paper is to investigate the determinants of economic growth in South Africa amidst ongoing macroeconomic challenges.

Method: During the analysis of yearly time series data, stationarity was assessed using the Phillips-Perron and Augmented Dickey-Fuller tests, and the relationships between variables were explored using an Autoregressive Distributed Lag (ARDL) model, with Granger causality employed to investigate causal relationships among the variables.

Results: In the long run, financial development, capital stock, and employment are significant determinants of economic growth. In the short run, all variables examined were significant.

Originality/Relevance: The study addresses critical macroeconomic challenges in South Africa, providing insights that can inform policies aimed at stimulating economic growth through employment, investment in capital, and financial development.

Key Words: Economic growth, capital stock, financial development, employment, inflation, Autoregressive Distributed Lag (ARDL).

JEL Classification: C36; O40; O49

Déterminants macroéconomiques de la croissance économique en Afrique du Sud : une preuve de cointégration

Résumé

Objectif : Cette étude a pour objectif d'étudier les déterminants de la croissance économique en Afrique du Sud dans un contexte de défis macroéconomiques actuels.

Méthode : Lors de l'analyse des données des séries chronologiques annuelles, la stationnarité a été évaluée à l'aide des tests de Phillips-Perron et de Dickey-Fuller augmenté, et les relations entre les variables ont été explorées à l'aide d'un modèle de décalage distribué autorégressif (ARDL), avec la causalité de Granger utilisée pour étudier les relations causales entre les variables.

Résultats : À long terme, le développement financier, le stock de capital et l'emploi sont des déterminants importants de la croissance économique. À court terme, toutes les variables examinées étaient significatives.

Originalité/Pertinence : L'étude aborde les défis macroéconomiques critiques en Afrique du Sud, fournissant des informations qui peuvent éclairer les politiques visant à stimuler la croissance économique par l'emploi, l'investissement en capital et le développement financier.

Mots-clés : Croissance économique, stock de capital, développement financier, emploi, inflation, décalage distribué autorégressif (ARDL).

1. Introduction

The goal of economic policy has long been to promote economic growth. This is due to several challenges that go along with poor and slow economic growth. Substantial growth increases the overall size of the economy and strengthens fiscal conditions like aggregate demand. This is particularly true because robust growth generates jobs, leading to increased investment opportunities and improved access to capital. Growth also stimulates the formation of a strong and expanding population of entrepreneurs (Kummitha & Kummitha, 2021) and further creates virtuous circles of prosperity and possibilities.

Economic growth is defined as an increase in the production of goods and services in an economy over a time period. It is naturally measured by the rise in the real Gross Domestic Product (GDP). This growth can be measured through indicators, such as final consumption spending of households, gross value added and gross fixed capital formation (Batrancea, Balci & Akgüller, 2022). The economy's competitiveness is normally linked to economic performance as measured by the growth in the economy. Therefore, one of the key policy objectives for any country ought be to fuel economic productivity as an essential base for economic and collective development (Anon, 2022).

Since 1994, the South African economy has been at best gloomy. Before democracy, trade restrictions, financial sanctions, and political opposition to the apartheid government, all played a part in South Africa's poor growth since World War II. It was perceived that removing these restrictions would have a substantial effect on the country's fiscal and economic performance (Malebo, 2020). The dawn to democracy in 1994 led to hopes of economic improvements (Ziaja, 2020). However, according to (Tendengu, Kapingura & Tsegaye, 2022) the South African's growth rates have not been convincing.

The growth in South Africa's GDP slowed down for the four quarters in a row, putting the country into a deep recession (Stats SA, 2021). During the first two quarters of 2020, GDP dropped by nearly 16%. During April, May, and June of 2020, the economy was hit hard by several incidents, and most businesses experienced a big drop in output. Recently, the South African economy expanded by a small 0,1% in the last quarter of 2023 taking the yearly growth rate for 2023 to 0,6% after growing by 1.9% in 2022 (Stats SA, 2023). The poor economic growth brings several challenges, including high rates of unemployment, high crime rates, market failure, lack of infrastructure (Yousaf, 2020), and poverty (Fournier, 2020). Low economic growth further diminishes infrastructure development.

Several scholars have tried to probe into the determinants of economic growth. Some scholars have focused on determinants such as capital stock, employment, financial development, economic growth, and development (Manzoor et al., 2021; Ain et al., 2020; Meyer & Sanusi, 2019). Some have introduced variables like institutional quality (Joan, 2021; Nguyen, 2023) while others have tested the significance of Foreign Direct Investment (FDI), human capital, and fixed capital formation (Chibuzor & Eleh, 2023). Studies have come up with results that indicate a positive relationship between economic growth, fixed capital formation, and employment (Alshahrani & Al-Hajhoj, 2020), while other studies show a positive and significant association between exports, economic growth, and export and physical capital (Paratama, 2023; Djamal, Fariou & Brahim, 2023).

Although recent studies (2018–2025) have advanced the understanding of South Africa's economic growth drivers, they have generally treated variables in isolation, limiting their policy usefulness. Sanusi and Dickason-Koekemoer (2024) showed the importance of investment and private-sector employment on growth, while Ngcobo, Zhou and Pillay (2025) demonstrated how financial market capitalisation influences unemployment and growth. Broader analyses of fiscal and monetary policies, as well as reports from the SARB (2022–2024) and OECD (2022, 2025), highlighted trends in inflation, investment, and employment but lacked comprehensive causal modelling. This study fills that gap by simultaneously examining fixed capital formation, financial development, inflation, and employment as determinants of economic growth, while distinguishing between short-run and long-run effects.

Such an integrative approach not only enhances academic understanding but also equips policymakers with evidence-based insights to design balanced growth strategies that address South Africa's structural challenges of slow growth, unemployment, and inflationary pressures.

South African economic growth history

From 1994, the South African government put several structures and policies to boast economic growth in the country. However, several endogenous and exogeneous factors continued to deter growth. South Africa's economy did admirably well during the commodity boom that preceded the world-wide financial crunch of 2008. Annual growth rate reached a climax of 5.4 % in 2007 due to high commodity prices. However, these growth effects were transient. When the commodity boom ended in 2014, the economy grew at a low rate of 1.5% per year (National Treasury, 2019). The economy entered a technical recession at the start of 2018 following two consecutive quarters of negative growth (Stats SA, 2018) with a negative growth rate of 3.2 % in the first quarter of 2019 (Stats SA, 2020). The existing pattern, which extends until the COVID-19 period, indicates that the growth path has been insufficient to accommodate the population's increasing rate.

Several factors like labour market tensions, high unemployment, poorly skilled work force and a weak currency continued to slow growth. Another reason for low productivity is that job seekers do not have the right skills for the jobs that are available in the job market (ILO, 2020). Besides that, the threat of credit rating downgrades, the effects of electricity shortages, the high level of public debt, and the continued interference by politicians, all put South Africa's growth prospects at risk.

South Africa is lagging behind other emerging economies, as well as high-and middle-income countries, due to structural problems. The power supply shortages have hindered South Africa's growth for many years (Mabugu, & Inglesi-Lotz, 2022). Weak structural growth has further worsened the growth prospects undermining the progress in reducing poverty (Wahedi, Zeng. & Arbetman-Rabinowitz, 2022). It is alongside this background in South Africa that this study primarily aims at investigating the determinants of economic growth in South Africa for the period 1994 to 2021.

2. Literature Review

2.1 Theoretical literature

Keynesian growth theory: The Keynesian growth theory is the economic theory that was developed by John Maynard Keynes (1883-1946). Keynesian growth theory puts emphasis on the role of aggregate demand in fuelling economic growth, where the level of aggregate demand determines the output and employment in an economy (Palley, 2019). In periods of recession or economic downturn, Keynes' argument was that the government should step in to stimulate aggregate demand using fiscal and monetary policy measures.

Keynesian growth theory suggests that by increasing government expenditure on public infrastructure projects, the government may create jobs, boost consumer spending, and encourage investment (Fazzari, 2020). Keynesian economists also advocate for expansionary monetary policy, such as cutting interest rates in order to encourage borrowing and investment (Aksakal, 2019). Keynes argued that economies can get stuck in a state of underemployment equilibrium, where there is insufficient aggregate demand to utilize all available resources. In such conditions, government involvement is necessary to jump-start economic growth (Tien, 2021).

Keynesians recognize that inflation can be a problem for the economy. They believe that inflation can occur when aggregate demand is higher than the economy's capacity to produce goods and services (Aksakal, 2019), leading to upward pressure on prices. Keynesian policies' goal is to strike a balance

between promoting economic growth and preventing excessive inflation through fiscal and monetary policies (Hahn, 2019; Eichengreen, 2020).

Harrod-Domar Model: This model was independently invented by Roy Harrod (1939, 1948) and Eysey Domar (1946, 1947) when they both attempted to develop theories regarding the growth rate of the economy and its capital stock. They put emphasis that investment spending increases the economy's productive capacity. The theory is constructed on the capital influence as the fundamental influence of economic growth by focusing on the possibility of stable growth via the adjustment of the supply and demand for capital (Boianovsky, 2018).

The theory assumes substitution between labour and capital and a passive technical progress where technical progress is neither saving nor absorbing labour or capital (Vandenberg, 2018). Labour and capital are used in equal proportions even when neutral technological issues take place (Boianovsky, 2018). The theory highlights the needed conditions of realising and retaining a steady increase. Harrod and Domar assign an important function to capital build up in the growth process (Tarasov & Tarasova, 2019).

2.2 Empirical literature

Due to the pertinency of the studies on the economic growth determinants, there are several studies that have been done in developed nations, developing nations, and South Africa, as analyzed below.

The study of economic growth determinants has attracted extensive research across developed, developing, and South African contexts. Paratama (2023) investigated the influence of Foreign Direct Investment (FDI), government debt, foreign exchange reserves, and exports on economic growth within the G20 from 2012 to 2021 using the Pooled Mean Group/Autoregressive Distributed Lag (ARDL) model. The results indicated that, in the short run, FDI and government debt had a positive but insignificant effect on economic growth, while exports showed a positive and significant impact. While this study was broad, cutting across several countries, it did not concentrate on country-specific dynamics, particularly in South Africa, which may have distinct economic structures and challenges.

Nguyen (2023) examined the impact of macroeconomic factors on economic growth in low- and middle-income countries using non-parametric approaches, including Moment Quantile Regression (MMQR) and Quantile Regression (QR). The findings revealed that institutional quality, FDI, and human capital were more significant in countries with lower growth rates, while trade openness had a strong negative effect on economic growth in these nations. The study achieved its focus based on its tested variables, which were different from the ones tested in this paper.

Chibuzor and Eleh (2023) employed Ordinary Least Squares (OLS) to analyze the relationship between GDP growth, total domestic savings, gross fixed capital formation, and FDI in Nigeria from 1981 to 2022. Their findings indicated that gross fixed capital formation and FDI were insignificant for Nigeria's GDP, while total national savings significantly influenced GDP. This study focused on certain macroeconomic variables and cannot be generalized to South Africa, limiting the applicability of its findings to South Africa.

Joao (2021) explored the determinants of economic growth in sub-Saharan Africa from 1990 to 2021 using a multi-linear regression model. Variables included regional factors, gross fixed capital formation, institutional quality, education, labor force, Gini index, FDI, and population growth rate. Education, institutional quality, and the Gini coefficient were found to significantly promote growth. A broad regional analysis was provided by this study, but it did not delve into South Africa's specific economic dynamics.

Djamal, Fariou, and Brahim (2023) studied the effect of human capital on GDP per capita in South Africa from 2000 to 2021 using the ARDL model. Results showed a long-run equilibrium association between GDP, labor force, human capital, and physical capital, with human capital positively affecting GDP in the short term but negatively in the long term. The study made a good contribution to the context; however it did not explore the reasons behind the adverse long-term effect, which could include factors such as education quality, brain drain, or skills-labor market mismatches.

Hlapi, Stiglingh-Van Wyk, and David (2023) used ARDL to explore the factors influencing South African economic growth from 1990 to 2021. Findings revealed that labor, technological progress, capital formation, and power supply significantly influenced growth, with technological progress and labor positively correlated in the long run, while human capital and electricity supply were negatively associated.

The reviewed empirical literature reveals several recurring gaps: many studies focus on broad regional or country groups rather than South Africa specifically, limiting the understanding of country-specific economic dynamics (Paratama, 2023; Nguyen, 2023; Joao, 2021). Several studies employ a specific set of variables, overlooking critical determinants such as financial development, employment, and sector-specific factors (Chibuzor & Eleh, 2023; Djamal, Fariou & Brahim, 2023). Additionally, results on key variables like FDI and human capital are inconsistent across studies, highlighting the need for context-specific analysis. Some studies also fail to capture both short- and long-term dynamics or to investigate underlying mechanisms behind unexpected relationships, such as the adverse long-term effect of human capital in South Africa (Hlapi, Stiglingh-Van Wyk & David, 2023).

In summary, this study seeks to address these gaps by examining multiple determinants of economic growth in South Africa, incorporating both short- and long-term dynamics, and exploring the mechanisms behind observed relationships to provide more targeted and effective policy recommendations.

3. **Methodology**

3.1 Data and Sources

A quantitative research approach was utilised to gather and analyse statistical data. This current study obtained all the annual data from the International Monetary Fund (IMF) and the South African Reserve Bank (SARB) for the period 1994 to 2021. This study period was chosen due to the availability of data; a time series studied provided enough observations with sufficient degrees of freedom, ensuring stability in the model.

3.2 Model Specification

The present study specifies an empirical model inspired by Gebru (2015), who examined the determinants of economic growth in Ethiopia. Drawing from this approach but focusing on the objectives of the current research, the baseline model is formulated as follows:

$$Y_t = \beta_0 + \beta_1 CS_t + \beta_2 EMP_t + \beta_3 FD_t + \beta_4 INF_t + \beta_5 D_t + \mu_t \quad \text{...................} \quad (1)$$

Where: Y_t = Gross Domestic Product (real values)
- CS_t = Capital stock (measured as fixed capital formation)
- EMP_t = Employment
- FD_t = Financial development (measured by access to credit)
- INF_t = Inflation(measured as CPI)

- D_t = Dummy variable capturing the COVID-19 period
- μ_t = Error term
- $\beta_1 \ldots \beta_5$ = Coefficients of explanatory variables

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Equation (2) is a multiple linear regression representation of the long-run relationship. Since the data are time series in nature and variables may be integrated of different orders, the study applies the Autoregressive Distributed Lag (ARDL) framework, which is suitable when regressors are a mixture of I(0) and I(1) but not I(2). The ARDL model also allows the estimation of both short-run dynamics and long-run equilibrium relationships through an error correction mechanism.

The general ARDL ($p, q_1, q_2, q_3, q_4, q_5$) representation of equation (1) is expressed as:

$$Y_t = \alpha_0 + \Sigma(\phi_i Y_{t-i}) + \Sigma(\delta_{1j} CS_{t-j}) + \Sigma(\delta_{2j} EMP_{t-j}) + \Sigma(\delta_{3j} FD_{t-j}) + \Sigma(\delta_{4j} INF_{t-j}) + \Sigma(\delta_{5j} D_{t-j}) + \varepsilon_t \quad \ldots\ldots\ldots\ldots (2)$$

Where $p, q_1, q_2, q_3, q_4, q_5$ represent optimal lag lengths selected using information criteria, and ε_t is the stochastic disturbance term.

The ARDL specification enables the estimation of both short-run and long-run relationships. If a cointegrating relationship is found among the variables, the model can be reparametrized into an Error Correction Model (ECM) to capture the speed of adjustment back to long-run equilibrium after short-run shocks.

3.3 Estimation Techniques

This study used the Philips Peron (PP) test together with the Augmented Dickey-Fuller (ADF) test to check for data stationarity. An ARDL model was used to estimate both the short and the long run relationship of the variables. It was chosen due to its suitability, whether some variables are stationary at levels and other variables are stationary after first differencing (Nkoro & Uko, 2016). The model permits for the estimation of the short and long run cointegration among variables, thereby offering a robust framework to analyse their associations (Pesaran, Shin & Smith, 2001). The ARDL approach is suitable for small sample sizes, as it can still yield reliable and meaningful results.

A causality test within the series was done using the Granger procedure. This study investigated the Granger causality between economic growth and its determinants. Diagnostic tests were done to check the reliability of the ARDL model. The tests used were normality, serial correlation, heteroscedasticity, and parameter instability.

4. Results

5.1 Descriptive Statistics:

Table 1 below presents the results of descriptive statistics, which are numerical measures utilised to elucidate the fundamental characteristics of the dataset under investigation. These statistics offer concise summaries that shed light on key features of the dataset.

Table 1: Descriptive statistics results

	Y	FD	CS	EMP	INF	DUMMY
Mean	2.74	-0.12	4.26	1.40	5.77	0.04
Median	2.82	-0.05	3.67	1.51	5.65	0.00
Maximum	5.60	3.80	13.76	6.53	11.02	1.00
Minimum	-1.54	-2.98	-7.51	-3.05	1.39	0.00
Std. Dev.	1.76	1.14	6.14	2.65	2.08	0.11
Skewness	-0.31	0.86	-0.16	0.15	0.43	4.80
Kurtosis	2.74	7.81	2.14	2.51	3.31	24.04
Jarque-Bera	0.51	28.29	0.91	0.36	0.95	579.41
Probability	0.79	0.00	0.63	0.84	0.62	0.00
Sum	71.29	-3.11	110.79	36.43	155.78	1.00
Sum Sq. Dev.	77.21	32.41	940.98	175.80	112.38	0.96
Observations	27	27	27	27	27	27

Source: Research results from EViews 10

Table 1 presents the descriptive statistics of the variables used in the study. Real Gross Domestic Product growth is measured in annual percentage growth rates Financial development (FD) is expressed as the ratio of private sector credit to GDP (%), while capital stock (CS) is measured as the gross capital formation to GDP ratio (%). Employment is represented by the employment-to-population ratio (%), and inflation (INF) is measured by the annual percentage change in the consumer price index (CPI). The dummy variable (DUMMY) takes the value of 1 for the COVID-19 period (2020–2021) and 0 otherwise.

On average, GDP growth was 2.74% over the study period, with a minimum of −1.54% and a maximum of 5.60%, indicating periods of both contraction and expansion. Financial development (FD) averaged −0.12%, reflecting relatively shallow financial depth in some years, with values ranging from −2.98% to 3.80%. Capital stock (CS) recorded an average of 4.26% of GDP, with wide fluctuations (−7.51% minimum to 13.76% maximum), suggesting volatility in investment activities. Employment averaged 1.40% with moderate variability, while inflation (INF) averaged 5.77%, peaking at 11.02% and falling to as low as 1.39%. The dummy variable (DUMMY) has a mean of 0.04, reflecting that only a small proportion of the sample period corresponds to the COVID-19 shock.

The Jarque-Bera statistics indicate that most variables, except financial development and the dummy, are approximately normally distributed, as their probabilities exceed 0.05.

5.2 Correlation

The data was further analysed to understand the relationship among each of the determinants of economic growth using the correlation matrix. The relationship between the variables did not exhibit any traces of a solid relationship among the independent variables with the corelation matrix ranging from 0.2 to 0.7.

Table1bis: correlation

	GPD	CS	FD	EMP	INF	DUMMY
GDP	1	0.8	0.7	0.7	0.1	-0.7
CS	0.8	1	0.6	0.7	0.3	-0.6
DF	0.7	0.6	1	0.6	0.2	-0.7
EMP	0.7	0.7	0.6	1	0.2	-0.6
INF	0.0	0.3	0.2	0.5	1	-0.1
DUMMY	-0.7	-0.6	-0.7	-0.6	-0.1	1

Source: Results obtained from EViews 10

The results show moderate to strong positive correlations among GDP, capital stock (CS), financial development (FD), and employment (EMP), with coefficients ranging from 0.6 to 0.8. Inflation (INF) exhibits very weak correlations with GDP and other variables, while the COVID-19 dummy variable (DUMMY) is negatively correlated with GDP, CS, FD, and EMP.

Although some correlations are moderately high (e.g., GDP-CS = 0.8), they are still below the common threshold of 0.9 used to indicate serious multicollinearity. Therefore, the variables can be included in the regression analysis without posing severe multicollinearity concerns.

5.3 Unit root tests

The results of the formal unit root tests by making use of ADF and PP tests are presented below.

Table 2: Augmented Dickey – Fuller test (ADF)

Variables	Model Specification	t-statics	P-value	Order of differencing
GDP	Trend and intercept	-4.559231***	0.0064	I (0)
FD	Trend and intercept	-5.190533***	0.0015	I (0)
CS	Trend and intercept	-3.652251**	0.0446	I (0)
INF	Trend and intercept	-1.138199	0.1167	I (0)

	Trend and intercept	-5.341225***	0.0015	I (1)
EMP	Trend and intercept	-3.776987**	0.0346	I (0)
Dummy	**Trend and intercept**	-5.562030	0.0006	I (0)

Source: Research results from EViews 10

Note: *, **, *** represents significance at 10%, 5% and 1 %

Table 2 shows that at the levels, financial development was stationary at 1% and capital stock at 5% level of the significance. Inflation was not stationary at levels, but was stationary after first difference at 1% significance level. Employment was stationary at levels with the p-value 0.0346. These results were confirmed by those from the PP test displayed in the table below:

Table 3: Phillip Peron

Variables	Model Specification	t-statics	P-value	Order-of differencing
GDP	Trend and intercept	-4.559231***	0.0064	I (0)
FD	Trend and intercept	-5.191178***	0.0015	I (0)
CS	Trend and intercept	-3.643606**	0.0454	I (0)
INFL	Trend and intercept	-2.962611	0.1609	I (0)
	Trend and intercept	-7.045011***	0.0000	I (1)
EMP	Trend and intercept	-3.776987**	0.0346	I (0)
Dummy	Trend and intercept	-5.562030**	0.0006	I (0)

Source: Research results from EViews 10

Note: *, **, *** represents significance at 10%, 5% and 1 %

Table 3 shows the results for the PP test. FD was stationary at levels of 1%, capital stock at 5%, and inflation results were not stationary at levels, but it was stationary at first difference at 1% significance level, while employment was stationary at the level since the p-value is 0.0346.

In a nutshell, all variables were stationary at levels and first differencing. These results warrant the use of the ARDL model.

Choosing the right leg length is important in time series analysis. Lag order selection was used to select a model by examining several information criteria and selecting one that minimizes these indicators. In cases of small sample sizes, Akaike information criterion (AIC) is the most suitable criterion and was used. Using the ARDL model, 20 models were generated, and the best one was selected based on the minimum number of optimal lags.

5.4 Cointegration test results

Below are the results of a bound test to assess if the long-run correlation exists amongst the variables:

Table 4: ARDL bounds test for cointegration results

T statistic	Values	K
F statistic	13.00330	5
Critical Value bounds test		
Significance	I (0) Bound	I (1) Bound
10%	2.2	3.09
5%	2.56	3.49
2,5%	2.88	3.87
1%	3.29	4.37

Source: Research results from EViews 10

The results displayed in Table 4 indicate the F statistic value of 13.00330 which exceeds the critical value of 3.49 at the 5% significance level. These results prove the existence of a long-run link among the variables considered in the study. The estimation of both long-run and short-run cointegration was then performed.

Long run elasticities

Table 5: ARDL long run cointegration results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FD	1.72	0.72	2.39	0.03**
CS	0.15	0.08	2.00	0.07*
EMP	0.34	0.18	1.84	0.09*
INF	-0.02	0.07	-0.28	0.78
DUMMY	16.81	7.27	2.31	0.04
C	8.19	4.41	1.86	0.08

Source: Research results from EViews 10

Note: *, **, *** represents significance at 10%, 5% and 1 %

Financial development, as measured by access to credit, showed a positive relationship with economic growth and was significant at 5% level of significance. Thus, an increase of one percent on financial development has an increase of 1.72661 percent in economic growth when all other variables are held constant. The positive and significant impact of financial development on economic growth suggests that improved access to credit in South Africa facilitates investment, capital accumulation, and entrepreneurship. This enables firms to expand and innovate, supporting overall economic growth, particularly in sectors previously constrained by limited financing. These results are directly in line with the results found by Pham and Nguyen (2020) and Olowofeso, Adeleke and Udoji (2015) which showed a positive relationship between financial development and economic growth.

An increase of one percent in capital stocks increases economic growth by at least 0.154191 percent. The results are the same as the results found by Meyer and Sanusi (2019. Investment in infrastructure is assumed to play a critical role in growth; furthermore, growth is presumed to play a significant role in employment creation.

Employment showed a positive relationship towards economic growth at a statistical significance level of 10% in the log-run. These results show that a unit increase in employment increases economic growth by 0.336615. These results tally with the results of Makaringe and Khobai (2018) carried out in South Africa.

The dummy variable is positive and significant at the 5 percent level, capturing the effects of major structural breaks on economic growth. In South Africa, this likely reflects the impact of events such as the 2009 global financial crisis, the COVID-19 pandemic, and other key policy or economic shocks during the study period. Its significance indicates that these events had a substantial effect on GDP, influencing the dynamics alongside financial development, capital stock, and employment.

Short-Run Elasticities
Table 6 below exhibits the estimations of short-run elasticities together with the error correction model (ECM).

Table 6: Short-run elasticities and ECM

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (GDP (-1))	1.19	0.11	10.40***	0.00
D (CS)	0.14	0.02	7.23***	0.01
D (FD)	3.41	0.14	24.91***	0.00
D (EMP)	1.10	0.05	20.38***	0.00
D (INF)	-0.02	0.07	-7.28***	0.00
CointEq (-1)	-0.47	0.06	-8.16***	0.00

Source: Research results from EViews 10

Note: *, **, *** represents significance at 10%, 5% and 1 %

Table 6 shows the results for short-run elasticities, all variables, and the ECM were significant at 1%. A unit increase in capital stock increases GDP by 0.137928. This result is consistent with Kaitila (2016) who carried a similar study in Russia:

A percentage increase in financial development increases GDP by 3.4126 in the short run, and it showed a significant positive relationship. The results are similar to the findings of Jedidia, Boujelbene, and Helali's (2014) study in Tunisia from 1973 to 2008. In the short run, a one-unit increase in employment impacts GDP by 1.1014, which suggests a significantly positive short-run relationship among the variables. These results concur with the results of Manzoor *et al*. (2019). A unit rise in inflation drops GDP by -0.019448 in the short run (Iqbal, Nadim & Akbar, 2022).

The ECM coefficient of –0.4688 (1% significant) indicates that about 47 percent of short-term deviations from equilibrium are corrected within a year, consistent with the long-run ARDL results, where variables like financial development gradually impact economic growth in South Africa.

5.5 Results of Granger Causality Test

Having confirmed a long-run equilibrium cointegration, the Granger causality test results are presented below:

Table 7: Granger causality test results

Null Hypothesis:	Obs	F-Statistic	Prob.
FD does not Granger Cause GDP	27	2.71*	0.09
GDP does not Granger Cause FD		0.72	0.50
CS does not Granger Cause GDP	27	0.97	0.40
GDP does not Granger Cause CS		3.09*	0.07
EMP does not Granger Cause GDP	27	1.19	0.33
GDP does not Granger Cause EMP		3.33*	0.06
INF_ Does not Granger Cause GDP	27	8.47***	0.00
GDP does not Granger Cause INF_		1.65	0.22

Source: Research results from EViews 10

Note: *, **, *** represents significance at 10%, 5% and 1 %

The hypothesis which states that financial development does not granger-cause economic growth can be rejected at 10% significance level since p-value is 0.0906. However, the hypothesis which states that economic growth does not granger-cause financial development cannot be rejected. Access to credit can enable firms and individuals to invest in research and development, education, and training, fostering innovation and productivity gains (Comin & Mulani, 2006). These studies confirm that indeed financial development can be used to forecast economic growth.

The hypothesis that capital stock does not granger-cause economic growth is rejected, with a p-value of 0.3978. The hypothesis that states that GDP does not granger-cause capital stock cannot be rejected since p-value is 0.0677 and is significant at 10% level, showing weak evidence to suggest that GDP may have some influence on capital stock, but it is not statistically significant at a 5% significance level but at 10%.

The hypothesis that states that employment does not granger-cause economic growth cannot be rejected since p-value is 0.3258. On the contrary, the null hypothesis of no granger causality from GDP to employment was rejected, at 10% level of significance. The results agree with the Keynesian theory of full employment, where the increase in the real GDP is predicted to lead to a rise in employment levels. In line with this theory, and the study results showed that the theory can be applied in the case of South Africa.

The hypothesis that states that inflation does not granger-cause economic growth is rejected at 1% level of significance. The hypothesis that states that economic growth does not granger-cause inflation cannot be rejected since p-value is 0.2192 and is above 1%. The findings suggest that changes in inflation can be considered as a predictor or cause of changes in economic growth.

5.6 Diagnostic Test

Diagnostic tests should be performed to check the strength of the model.

Results of Serial Correlation: The Breusch-Godfrey (1978) serial correlation LM test was applied to test serial correlation and results are shown below:

Table 8: Serial correlation results

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.01	Prob. F (2,12)	0.91
Obs*R-squared	0.38	Prob. Chi-Square (2)	0.83

Source: Research results from EViews 10

Note: *, **, *** represents significance at 10%, 5% and 1 %

The decision rule determines whether to reject the null hypothesis on the grounds of the results of the test statistic and the significance level. The results in table 8 show that, the decision rule states that if the computed chi-squared value is greater than the critical value corresponding to the 5% significance level, the null hypothesis cannot be rejected, indicating that there is no correlation in the residuals.

Results of Heteroscedasticity: The ARCH test of Engle (1982) was applied to determine heteroscedasticity shown below:

Table 9: Breusch-Pagan-Godfrey Test for Heteroscedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	3.81	Prob. F (9,14)	0.01
Obs*R-squared	17.16	Prob. Chi-Square (9)	0.05

| Scaled explained SS | 6.57 | Prob. Chi-Square (9) | 0.68 |

Source: Research results from EViews 10

Table 9 reveals the results that the probability of chi-squared 0.6821 is greater than the 5% significance level. Following the decision rule stated, the null hypothesis cannot be rejected at this level confirming no heteroscedasticity in the residuals.

*Results of Normality:* A normality test was conducted to check the residuals' normality using Jarque-Bera, as illustrated below:

Figure 1: Normality test
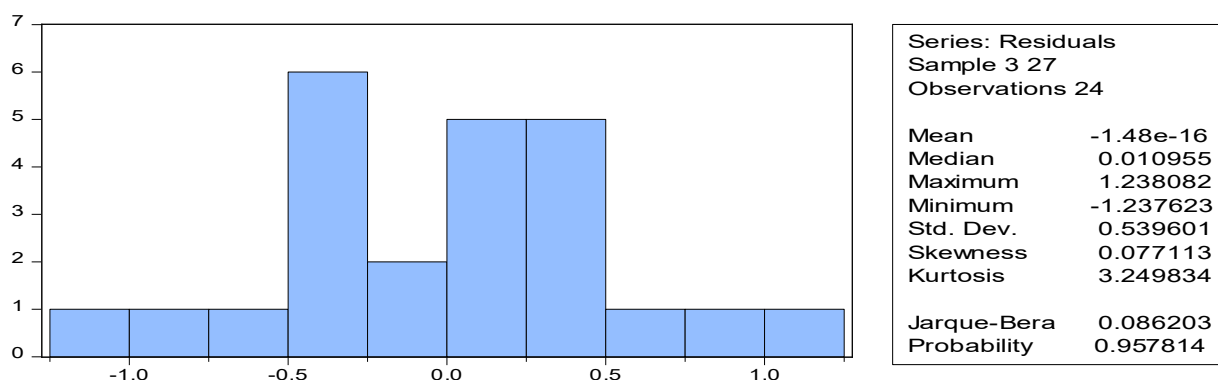
Source: Research results from EViews 10

The Jarque-Bera statistic yields a p-value of 0.96, indicating that the data does not significantly depart from a normal distribution, thus failing to reject the null hypothesis of normality.

5.7 Results of Parameter Stability

Parameter stability refers to the constancy or consistency of the estimated parameters in a statistical model or system over time or across different samples. Figure 5.2 below illustrates the parameter test.

Figure 2: CUSUM Test
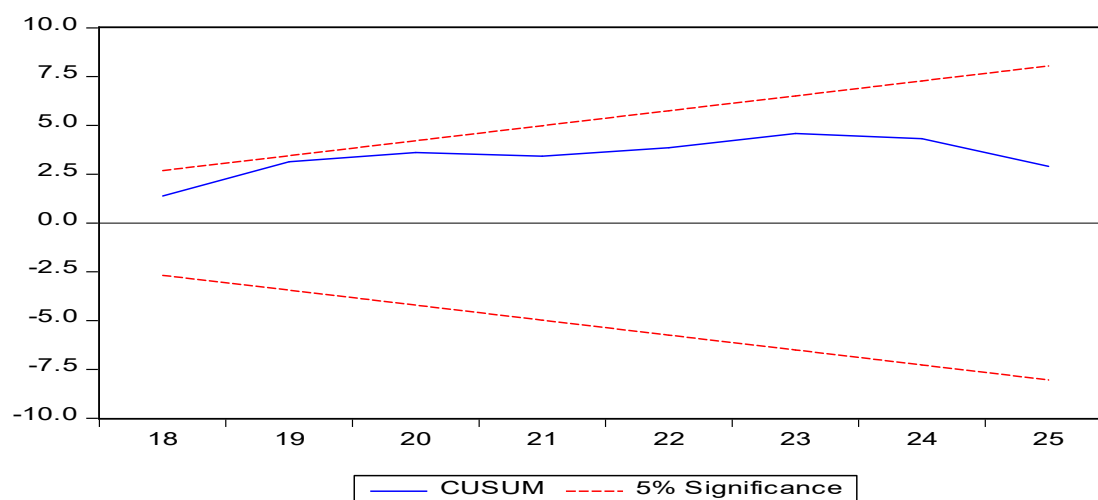
Source: Research results from EViews 10

The results indicate that the equation or model under examination displays stability over time or across various conditions, as evidenced by the behaviour of the Cumulative Sum of Recursive Residuals (CUSUM). Figure 2 illustrates the path of the CUSUM statistic, with the blue line remaining within the expected range denoting stability in the equation.

Figure 3 shows the results for the CUSUM of Squares analysis, demonstrating equation stability and significance at a 5% level, indicating that the regression model accurately captures the relationships between economic growth and its determinants over time. Visually, the blue line falling within the bounds set by the red dots confirms the stability of the equation. Rejecting the null hypothesis of unstable parameters based on CUSUMSQ analysis implies that the coefficients in the model remain consistent, suggesting that the correlations between economic growth and its determinants persist both in the short run and the long run.

Figure 3: CUSUM of Squares
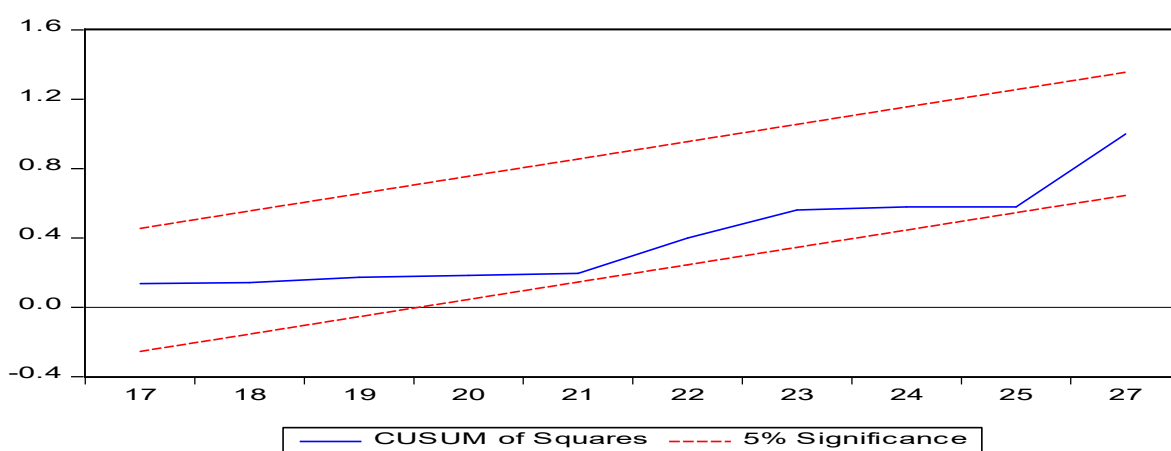
Source: Research results from EViews 10

5. Conclusion

In the South African context, economic growth faced stagnation due to spillover effects from global events the pandemic. The study unveils both the short and long run relationship among the variables.

In the long run, financial development exhibited significance at a 5% level, while capital stock, employment, and inflation demonstrated significance at a 10% level. In the short run, all variables proved significant at a 1% level. The study concludes in support of the null hypothesis positing that capital stock, financial development, employment, and inflation collectively act as determinants of economic growth in South Africa. However, it is noteworthy that the study reveals an inverse relationship between economic growth and inflation. This study contributes valuable insights into the determinants of economic growth in the South African context over the analyzed time frame.

6. Recommendations

Economic growth is the crucial government macro-economic objective. There are several policy tools that the South African government can use to promote economic growth, such as investment in infrastructure, such as roads, investment in education and skills development to improve the productivity of the employees and improve employment in the economy. The section below will suggest some recommendations based on the variables studied.

Capital Stock: The results show that both in the long-run and short-run, capital stock creates economic growth in South Africa. Thus, from the results, there is need to increase spending in infrastructure to

promote Gross Fixed Capital Formation (GFCF) by investing in infrastructure such as roads, ports, and telecommunications networks, the government can create an environment that is conducive to business investment.

Financial Development: There are several policies that South Africa can implement to promote financial development, such as the government focusing on promoting financial inclusion by increasing access to financial services for underserved communities. This can be done by promoting microfinance institutions, expanding the reach of mobile banking services, and developing new financial products that cater to the needs of low-income households. These loans can help individuals start small businesses or meet immediate financial needs, without requiring collateral or a high credit score.

Employment: Findings suggest that in South Africa, policymakers should, overall, focus on investing in education and skills development, support for SMEs, investment in infrastructure, encouraging foreign investment, and addressing inequality, all of which can help promote employment in South Africa.

Inflation: The SARB can manipulate the monetary policy to decrease inflation. Inflation movement should be strictly monitored and any deviations from the target band should be quickly dealt with. The SARB can increase interest rates, which would reduce spending and investment, leading to a decrease in inflation. The South African government can use fiscal policy by increasing taxes or reducing government spending, which would reduce the amount of money in circulation and decrease inflation.

7. Delimitations and Areas of further studies

The current research is limited to data from 1994-2021. Future research could benefit from extending the time horizon or considering additional periods to capture more trends and dynamics. The study also exclusively focuses on a set of predetermined variables, including GDP, financial development, capital stock, employment, and inflation. To enhance the comprehensiveness of the analysis, future studies may explore the impact of a broader range of factors on economic growth in South Africa.

Furthermore, the study solely concentrates on South Africa, offering a singular perspective. To enrich the comparative understanding, future research could explore cross-country analyses by benchmarking South Africa's economic performance against that of other emerging economies. This comparative approach would provide valuable insights into South Africa's relative standing and potential areas for improvement.

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