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INFRASTRUCTURAL CAPITAL EXPENDITURE, TAX REVENUE AND ECONOMIC GROWTH: EVIDENCE FROM SOUTH AFRICA

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Abstract

This paper examined impacts of infrastructural capital expenditure and tax revenue on economic growth in South Africa for a period of 43 years (1980 - 2022) using Autoregressive Distributed Lag (ARDL) cointegration technique. The findings ascertained the establishment of a long-run relationship among the variables. Also, findings showed insignificant impact of capital expenditure on the economy of South Africa. In addition, tax revenue had significant impacts on economy in both short and long-run. Unidirectional causality was established between capital expenditure and economic growth of South Africa. Hence, the government should improve on her capital expenditure on infrastructure in order for the Country to achieve an appreciable level of economic growth. In the same vein, tax revenue should be judiciously utilized for the development of infrastructures to spur her economic growth.

Keywords: Capital Expenditure, Tax Revenue, Net Export, Investment, Economic Growth.

1.1 Introduction

Infrastructural development has been the major concern of every country across the World because of its significant outcome in fostering economic growth. Any nation that desires to achieve a significant economic growth and development must invest heavily on the provision and maintenance of basic infrastructural facilities. The availability of adequate infrastructures is crucial for economic growth and development of the nations which cannot be bargained with if economic progress must be made (Okolo, Edeme & Emmanuel, 2018).

According to Okoro (2013), expenditures on transportation, communiqué, sewage, water, electricity etc., incline to minimize cost of productivity, and to maximize the profitability in private enterprises, leading to better economy.

Economic growth through GDP growth rate identifies the growth attained socially and economically by different countries in the universe and by this, the GDP growth rate for South

Africa was 6.6% in 1980 which has been on increase and eventually landed on 0.57% in 2016 (World Development Indicators, 2017).

South Africa has excellent infrastructure that facilitates trade and helps significantly to its economic success. She is one of Africa's most industrialized countries, with a diverse economy and increasing affluence. South Africa is a world leader in mining, accounting for about 60% of its exports. According to statistics, the country ran out of electricity in 2007 due to inadequate maintenance, rising energy use, and a lack of fresh investment. However, Eskom was in disrepair, plunging South Africa deeper into an energy crisis, and it was clear that in order for things to return to normal, Eskom required a large cash injection to breathe fresh life into its operations (Elias, 2015).

From the economy of South African, it was revealed that her capital expenditure in the public sector increased by R9.3 billion (4.6%) from R199.8 billion in 2021 to R209.1 billion in 2022. So, extra-budgetary accounts and funds were made on national government, public corporations, provincial government and higher education institutions, leading to increases in her expenditure. Capital expenditure increased on new construction works, land and existing buildings, transport equipment and other fixed assets, while decreases were recorded on capital infrastructure on plant, machinery and equipment, leased assets and investment property, notwithstanding the expenditure contributes to her GDP growth rate (Lehohla, 2017, Statistics South Africa, 2022).

Some research questions have been generated in this study such as: what impacts can infrastructural capital expenditure and tax revenue have on economic growth? Does causality exist among infrastructural capital expenditure, tax revenue and the economy of South Africa? Hence, the objective of the study is to identify impacts of infrastructural capital expenditure and tax revenue on economic growth in South Africa. Also, the study is set to investigate into the causality of the variables interest in, using Granger causality test to determine the independent variables that influence growth.

2.0 Literature Review

2.1 Theoretical Literature

Keynesian Theory of Public Expenditure

Based on this theory of public expenditure, it was considered by Keynes that public expenditure should be an exogenous variable, imparting, motivating and creating economic growth of the nations that will efficiently and effectively manage it. It was agreed upon from the school of thought that saving will not enhance the economy like investment or spending on productive projects. Government will need to increase public expenses thereby giving a room for private investment, strengthening the economy, creating job opportunities, and all these will eventually enhance the economy. However, government spending is a tool that brings

stability in the short run but this needs to be done carefully because too much of public expenditure will lead to inflation, while in the vice versa will lead to high rate of unemployment which exists in developing countries. Keynes undertakes that when government's functionalities are increasing, it is bound that her expenses must increase on the activities especially on administration and regulation of the economy. Hence, an increase in the government consumption is possibly to lead to an increase in employment opportunities, profitability and investment through multiplier effects on aggregate demand (Keynes, 1936).

Keynes believed that government plays a role in aggregating the expenditure in an economy where Consumption is (C), Aggregate expenditures on investment is (I), government (G) and net exports is (NX). Thus, AE=C + I + G + NX.

2.2 Empirical Studies

Odo, Igberi, and Udude (2016) used Cointegration and Vector Error Correction Mechanism to examine the long-term relationship between public expenditure and economic development of South Africa from 1980-2022. The findings revealed a steady long-term relationship between the dependent and independent variables. It also found a negative insignificant relationship between total government spending and economic growth, as well as a positive significant association between economic growth and total revenue. The Pairwise Granger causality revealed unidirectional causality, moving from national income (RGDP) to total government expenditure, confirming Wagner's theory of the economy.

Nicholas (2015) used ARDL bounds to investigate the dynamic causality between government expenditure and economic growth in South Africa. The study revealed that government expenditure had a causal effect on the economic growth in the short run. However, it was shown that the economic growth granger caused government expenditure but government expenditure did not granger cause economic growth.

Meyer, Manete and Muzindutsi (2017) studied how government spending and investments in different sectors affected the economy in South Africa. They used a Vector Autoregressive model to analyze the impact of government spending and sector investments on the economy. By employing Vector Error Correction Model, they discerned that only investment in the financial sector exhibited a positive significant influence on the economy. Furthermore, their insightful long-run analysis disclosed that only investment in manufacturing sector exerted a positive effect on economic growth, while the impact of government spending on the economy was negligible.

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3.0 Methodology

3.1 Model Specification

The study adopted Keynesian (1936) model of public expenditure coupled with the model inOdo et al., (2016) as thus;

$GDPGR_t = f(CAPEX_t, INVT_t, NEXP_t, TAX_t)$……..……... (1)

Where;

GDPGR = Gross Domestic Product.
CAPEX = Capital expenditure.
INVT = Foreign direct investment.
NEXP = Net exports.
TAX = Tax revenue.

The model to be estimated in econometric analysis can be written as;

$GDPGR_t = \alpha_0 + \alpha_1 CAPEX_t + \alpha_2 INVT_t + \alpha_3 NEXP_t + \alpha_4 TAX_t + u_t$ **…… (2)**

Where;α_0 = constant interceptα_1 to α_4 = regression coefficients and parameters to be estimated.
U_t = residual or error term

4.0 Results

Table 1: Descriptive statistics

	CAPEX	FDI	GDPGR	NEXP	TAX
Mean	19.59413	2.322805	2.105857	3.520071	23.77835
Median	19.05302	0.710486	2.394784	2.179420	24.13044
Std. Dev.	3.824961	6.384373	2.564967	5.942098	2.288616
Skewness	1.088328	5.493874	-0.816332	2.611443	-0.351042
Kurtosis	3.430110	33.90324	4.115783	11.54719	2.486731
Jarque-Bera	8.820056	1927.370	7.006426	179.7634	1.355160
Probability	0.012155	0.000000	0.030101	0.000000	0.507844
Observations	43	43	43	43	43

Source: Authors' Computation (2024)

Table 4.1 recorded the highest mean value of 23.77835 for TAX, while GDPGR has the least value of 2.105857. The standard deviation of variables showed that all the variables have low variability of variables in South Africa.

Based on the Skewness of all variables, CAPEX, FDI, NEXP have positive skewed values, but GDPGR and TAX have negative skewed values. In the case of Kurtosis, it is shown that only TAX is having a value less than 3, while all the remaining variables have values greater than or equal to 3, showing that more variables are leptokurtic. P-value of Jarque-Beraindicated that only TAX is normally distributed, having p-value greater 5% significance level.

Table 2: Lag Selection

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Lag	LogL	LR	FPE	AIC	SC	HQ
0	-502.8487	NA	73357.55	25.39243	25.60354	25.46876
1	-382.3103	204.9152	624.8653	20.61552	21.88218*	21.07350*
2	-354.9567	39.66276*	590.5767*	20.49784*	22.82005	21.33747
3	-330.2347	29.66637	705.4535	20.51174	23.88950	21.73303

Source: Authors' Computation (2024)

Table 2 showed the lag selection criteria for which the model is based upon. Lag 2 is the appropriate lag which is the most suitable lag for the study.

Table 3: Unit Root Test

Variable	Augmented Dickey-Fuller			Philip-Peron		
	Stat	5% C.V	Order of Integration	Stat	5% C.V	Order of Integration
GDPGR	-5.236712	-3.520787	I(0)	-5.236712	-3.520787	I(0)
CAPEX	-4.483670	-3.526609	I(1)	-4.427153	-3.523623	I(1)
FDI	-12.74225	-3.523623	I(1)	-5.853818	-3.520787	I(0)
NEXP	-6.912964	-3.526609	I(1)	-5.348911	-3.523623	I(1)
TAX	-6.918730	-3.523623	I(1)	-6.933430	-3.523623	I(1)

Source: Authors' Computation (2024)

Table 3 disclosed the results of Augmented Dickey-Fuller and Phillip-Peron test for the study. From the results, only GDPGR was stationary at level, i.e. I(0) under Augmented Dickey-Fuller unit root test and others were stationary at 1st difference, while only GDPGR and FDI attained their stationarities at level, i.e. I(0) under Philip-Perron unit root test while others were stationary at 1st difference. Based on the information here, the study therefore proceeds to use ARDL Bound Test to investigate the long-run relationship.

Table 4: ARDL Bound Cointegration Results.

H_0: There is no long-run relationship among the variables.

H_1: There is long-run relationship among the variables.

T-statistics	Value	K
F-statistics	7.836193	4
	Critical Value Bounds	
Level of significance	I(0) Bound	I(1) Bound
10%	1.90	3.01
5%	2.26	3.48
2.5%	2.62	3.90
1%	3.07	4.44

Source: Authors' Computation (2024)

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Table 4 exhibited the Bound Cointegration Test for South Africa. The Cointegration test equally showed that the computed f-statistics of 7.836193exceeds upper bound values at all levels of significance (10%, 5%, 2.5% & 1%). Hence, the null hypothesis (H_0) is rejected while the alternative hypothesis (H_1) is accepted, indicating the presence of a long-run relationship among all the variables. This is an indication that all the variables of interest in this study co-move on the long-run in South Africa.

Table 5: ARDL Cointegration Results

Variables	**Short-Run Model**			
GDPGR	Coefficient	Std. Error	t-statistics	Probability
D(CAPEX)	-0.130106	0.066359	-1.960644	0.0587
D(FDI)	0.112963	0.051204	2.206129	0.0347
D(NEXP)	-0.382055	0.073376	-5.206779	0.0000
D(TAX)	0.888214	0.223093	3.981362	0.0004
CointEq(-1)	-0.737516	0.111086	-6.639170	0.0000
	Long-run Model			
CAPEX	-0.176411	0.094939	-1.858162	0.0724
FDI	-9.178727	0.146866	-1.216933	0.2325
NEXP	-0.096653	0.108833	-0.888091	0.3811
TAX 0.239592	0.078018	3.070962		0.0043
R-squared = 0.696905, Durbin-Watson Stat = 2.12927				

Source: Authors' Computation (2024)

Note: P-value is significant at 5% level of significance.

Table 5 showed the results in the short-run and long-run ARDL Cointegration. From the short-run segment, all the variables except CAPEX have significant impacts on economic growth. In the case of long-run model, only TAX is significant, showing that it is the only variable which impacts economic growth of the country.

The coefficient of ECM is negative (-0.737516) with significant p-value 0.0000 between the independent variables and the dependent variable, thereby indicating that the level of adjustment to correct any deviation in the long-run is 73.8%.

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Stability Test

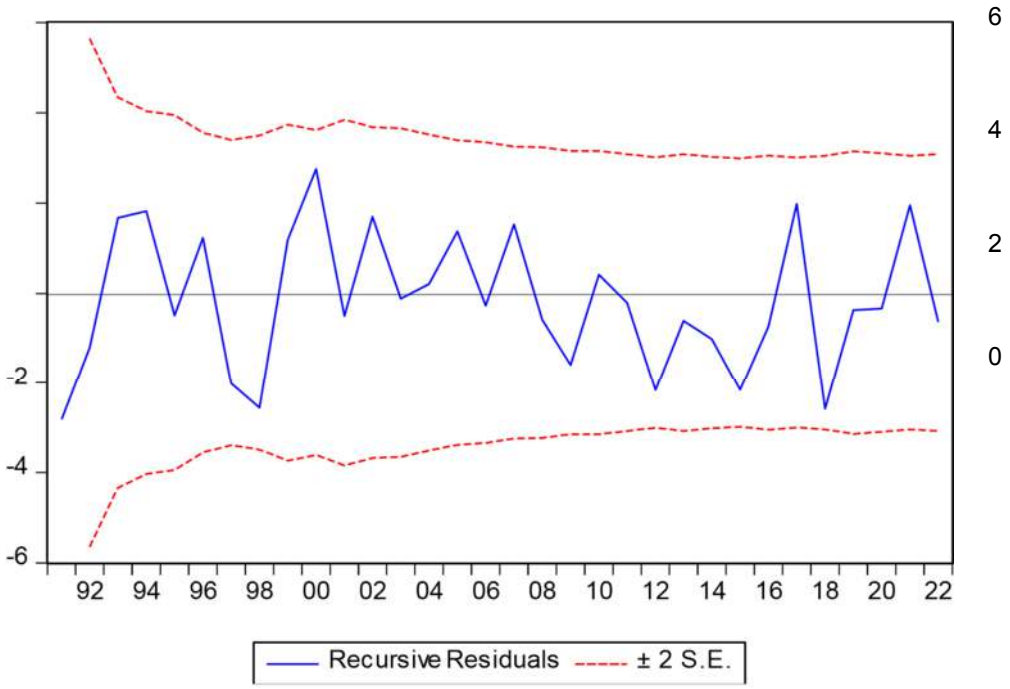

Figure 1 – Recursive Residuals

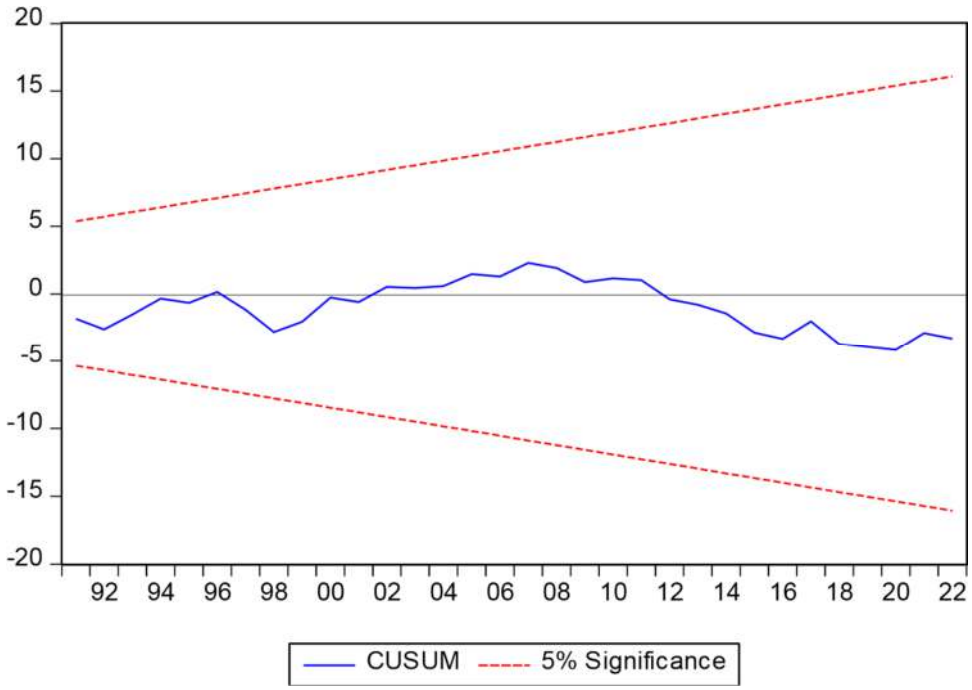

Figure 2 - CUSUM

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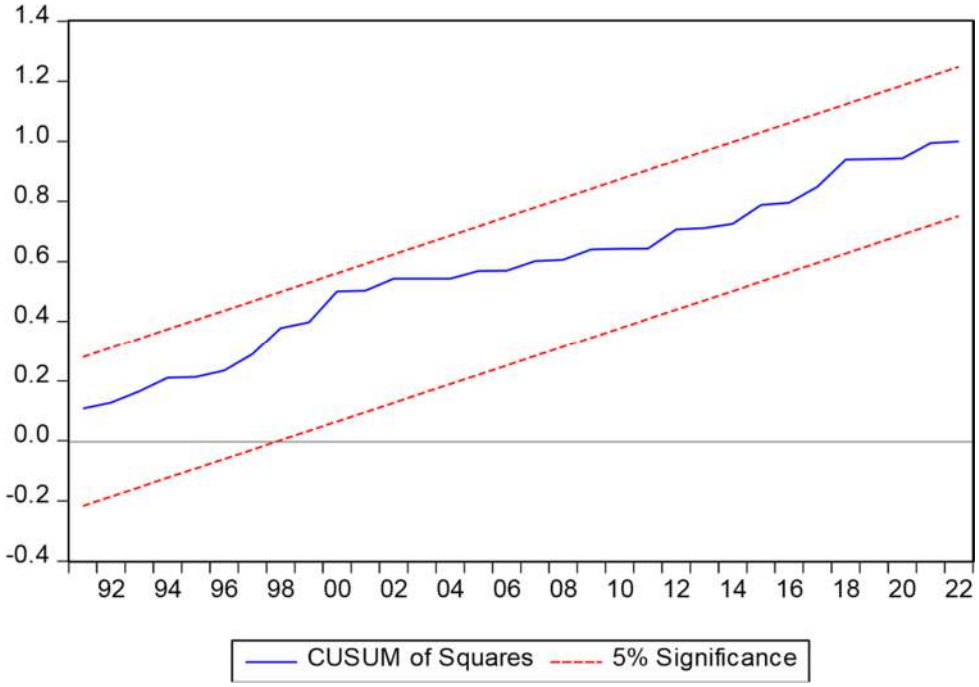

Figure 3 – CUSUM of Sqaures

From figure 1, 2 and 3, it was clearly indicated that recursive residual, CUSUM and CUSUM of Square are all showing the stability of the model

Table 6: Granger Causality

Null Hypothesis:	Obs.	F-Stat	P(value)	Decision
FDI does not Granger Cause CAPEX CAPEX does not Granger Cause FDI	41	1.25113 0.25261	0.2983 0.7781	No causality
GDPGR does not Granger Cause CAPEX CAPEX does not Granger Cause GDPGR	41	12.9839 2.48445	6.E-05 0.0976	Unidirectional causality
NEXP does not Granger Cause CAPEX CAPEX does not Granger Cause NEXP	41	1.25778 0.69145	0.2828 0.5074	No causality
TAX does not Granger Cause CAPEX CAPEX does not Granger Cause TAX	41	1.30835 1.28957	0.2828 0.2828	No causality
GDPGR does not Granger Cause FDI FDI does not Granger Cause GDPGR	41	4.38863 0.27081	0.0197 0.7643	Unidirectional causality
NEXP does not Granger Cause FDI FDI does not Granger Cause NEXP	41	13.2363 9.89920	5.E-05 0.0004	Bidirectional causality
TAX does not Granger Cause FDI FDI does not Granger Cause TAX	41	1.04551 0.15779	0.3619 0.8546	No causality
NEXP does not Granger Cause GDPGR GDPGR does not Granger Cause NEXP	41	1.75932 4.77678	0.1866 0.0145	Unidirectional causality

TAX does not Granger Cause GDPGR GDPGR does not Granger Cause TAX	41	0.03767 1.04522	0.9631 0.3620	No causality
TAX does not Granger Cause NEXP NEXP does not Granger Cause TAX	41	1.73984 0.08229	0.1900 0.9212	No causality

Source: Authors' Computation (2024)

Table 6 displayed the Pairwise granger causality results in South Africa. The results from the table showed the establishment of unidirectional causality between capital expenditure and economic growth, while there was bidirectional causality between net export (NEXP) and foreign direct investment (FDI). GDPGR granger caused capital expenditure on infrastructure, foreign direct investment and net export.

5.0 Conclusion

South Africa's economic prospects remain bleak, despite the fact that it has a highly diverse economy and is regarded as one of Africa's greatest. As a result, the government of this country has continued to spend beyond its means, failing to address the country's infrastructure deficits. The ARDL cointegration and long-run regression revealed that capital expenditure had no substantial short- or long-term impact on South African economic development. Taxation has a substantial impact on economic growth in both the short and long term. Pairwise Granger causality demonstrated a one-way relationship between capital investment on infrastructure and economic growth in South Africa. It is therefore recommended that government should channel her tax revenue into the provision of infrastructural facilities in order to encourage more foreign direct investment in South Africa and that a more conducive macroeconomic environment should be made available for more foreign direct investment as this gesture will go a long way toward enhancing economic growth of South Africa.

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