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REVISITING THE NEXUS BETWEEN PUBLIC EXPENDITURE AND ECONOMIC GROWTH IN SOUTH AFRICA

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Abstract

Purpose: This study evaluates the nexus between public expenditure and economic growth in South Africa. The study uses time-series data to evaluate the nexus which span through 1986-2022 which is obtained from WDI, 2022.

Method: Essentially, the study employed cointegration and VECM test. The cointegration test signifies that all the variables are cointegrated at long-run. The VECM shows a direct connection amid government expenditure and economic growth.

Result: The study found a unidirectional causal association between public investment (HE, ML, ED, and INFR) and economic development, as well as a substantial long-run relationship between the variables. Thus, the study's empirical findings indicate that public spending is a major factor in economic expansion.

Practical Implication for Economic Growth and Development: The study recommends the expansion of spending should be avoided for economic growth as it causes the economy to accumulate enormous amounts of debt. The direct influence of government expenditure on inflation makes it inappropriate to utilize it as a tool for stabilizing policy.

Keywords: ***Public expenditure, economic growth, granger causality, VECM.***

Introduction

Over the years, academics from all over the world have debated the relationship amid government expenditure and economic growth providing the subject a lot of discuss. Previous empirical work, including Buthelezi (2023), Gurdal et al. (2021), Shkodra et al. (2022), Kirikkaleli et al. (2022) and Nartea et al. (2020), have demonstrated a favorable correlation between government spending and economic growth. Several studies, including Phiri (2019), Onifade et al. (2020), and Hlongwane et al. (2021), have discovered that government spending is detrimental to economic growth. Hypothetically, Keynesians support government consumption as well affecting monetary extension. As per the old-style point of view, government consumption represses financial development. Wagner kept up with that the causal connection between government spending and financial development is the ascent in monetary movement. As per the Ricardian Identicalness model, government spending significantly affects monetary development when a forward-looking specialist is available (Ahuja et al. 2020; Badaik et al., 2022; Hlongwane et al. 2021; Mishra et al. 2021; Shkodra et al. 2022). From one viewpoint, government spending is believed to be a significant driver of monetary efficiency and, subsequently, of financial development. Public spending on wellbeing and training, for instance, is probably going to raise human resources and capacity, which will well affect the collection of actual capital in the economy and, subsequently, work on financial development. Barro et al. (1992) likewise suggests that public spending on foundation has direct effects, implying that adjustments of public spending on framework straightforwardly affect financial development. Nonetheless, in light of the obligations the public authority has taken on to pay for these consumptions, public spending has been seen as a boundary to improvement (or monetary advancement), which makes sense of the disparities in the review results.

Notably, research conducted previously on the connection between public spending and economic growth has produced conflicting and inconsistent findings, according to Ram **(**1986**)**. Certain research indicate that higher public spending promotes growth, while other studies indicate that higher public spending hinders growth, while still others state that higher public spending cannot be used to forecast economic growth. Munge (2005), for example, looked at the public portion of GDP expenditure to examine a possible correlation between public spending and economic growth in Kenya. According to the analysis, there is no correlation at all between Kenya's economic growth and the percentage of public spending. Additionally, the analysis reveals little proof that public spending influences economic growth. In recent years,

Muthui et al. (2013) investigated how economic growth was impacted by several components of state expenditure. They draw the conclusion from their research that government spending composition affects economic growth. Most empirical analyses of the relationship between public spending and long-term economic growth employ cross-sectional analysis with regression models, which is unable to capture the dynamics of the long-term relationships between economic growth and public spending. According to Shioji (2001), time series data should be used in the analysis in order to include dynamism. Maingi (2010) and Muthui et al. (2013), therefore, used time series data and analysis to investigate the impact of public spending on economic growth.

This study uses the Vector Error Corrections (VECM) model to explain the relationship between public expenditure components and economic growth in South Africa. However, the VECM model and other econometric models that assess the correlation between public expenditure and growth in the short and long term were not used in the research to analyze the relationship between public expenditure components and economic growth. The aggregate data gathered in South Africa between 1986 and 2021 is subjected to the VECM model.

Literature Review

Loizides et al. (2005) examined the connection amid public expenditure and economic development in Greece, the UK, and Ireland. They found that public investment in all three countries results in higher long- or medium-term national revenue. Mo (2007) looks into the relationship between real GDP growth and government spending. It was discovered that government expenditure has negative marginal effects on productivity and GDP growth. More precisely, a 1% increase in the GDP's share of government consumption results in a 0.216% decline in the equilibrium GDP growth rate. Gisore et al. (2014) conduct an experimental investigation of the connection between East African economic progress and government spending from 1980 to 2010. The findings showed that investments in the military and health had a positive, statistically significant effect on growth.

This analysis suggests that in order to promote economic growth, East Africa should implement a strategy of increased defense and health spending. According to Menla et al. (2014), Markov-switching dynamic regression showed that during periods of slower growth and higher growth volatility, increased government spending has a negative impact on economic growth. Chipaumire et al. (2014) examined the relationship between economics and government spending in South Africa between 1990 and 2010. It was discovered that higher government

spending led to slower economic growth. A one percent rise in government spending resulted in a 6.54% decline in GDP. The dynamic causal relationship between government spending and economic growth in South Africa was studied by Odhiambo (2015). With an annual correction rate of 89%, it was discovered through the application of the autoregressive distributed lag model (ARDL) that government spending leads to economic growth only in the short term, and that economic growth drives government spending both in the short and long terms. Kimaro et al. (2017) in the fort to examine the impact of government expenditure and efficiency on low-income Sub-Saharan African countries' economic growth between 2002 and 2015. It has been found that increased government spending promotes faster economic growth in low-income sub-Saharan African countries. Low-income Sub-Saharan African nations ought to exercise caution before using their expenditures to stimulate the economy.

Molefe et al. (2017) looked into the relationship between SA's economic growth and government spending. It was discovered that government spending hinders economic expansion. The impact of government consumption expenditure on economic growth was examined using the Eid et al. (2017) MSDR. It was discovered that whereas state 2 (the low recessionary state) decreases economic growth by 0.25%, state 1's government consumption expenditures boost economic growth by 0.04%. Masipa (2018) used the VEC model to look into the economic growth of government spending in South Africa. It was discovered that there would be a 0.2% drop in economic growth for every 1% rise in government spending.

Phiri (2019) used the logistic smooth transition regression (LSTR) model to find an inverse U-shaped relationship between military spending and economic development. These results suggest that higher government spending on the military stimulates economic growth. But eventually, government expenditure on the military results in slower economic growth. Nyasha and Odhiambo's (2019) research reveals a number of ambiguities in the relationship between government spending and economic growth. It could have favorable or unfavorable impacts; some researches have even produced contradictory or no results at all. Dinh et al. (2019) examined the connection between government spending and economic growth using the MSDR approach. The results showed that there is an 85% chance of remaining in state 2, but an 87 percent chance of remaining in state 1. State 1 saw a 0.303% increase in government spending, whereas State 2 saw a 0.18% gain in economic growth.

Ahuja et al. (2020), there is a one-way causal connection between open spending and Gross domestic product development, and financial development and public spending. Moreover, monetary development is expanded by 0.002% for each 1% ascent in government spending.

Hlongwane et al. (2021) investigated what government spending meant for South Africa's financial development. A 1% increment in government spending in the close to term will significantly help financial development by 0.15% in South Africa, as per the ARDL model. That's what nonetheless, the drawn-out result showed, ceteris paribus, a 1% increment in government spending will bring about a 0.117% decline in monetary development. Government spending fundamentally affects financial development, as per Mishra et al. (2021).

Methods

The public expenditure components which include: health, education, military and infrastructure expenditures are modeled in relation to economic growth. Data relating to these variables were obtained from World Development Indicator database (WDI, 2022). Data was collected over the period of 36 years from 1986-2022. The unit root test must be carried out in order to determine the VECM link between all of the variables. To determine whether or not the variables are stationary, unit-root tests are used. Regression analysis that produces false results is possible if the variables are non-stationary. Consequently, unit root tests are necessary to ascertain the sequence of variable integration prior to model estimation (Gujarati & Porter, 2010). This study will use the Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) tests to check for unit root. The null assumption of the existence of a unit root is tested in opposition to the alternative hypothesis that there isn't one. If, at a particular level of significance, the calculated statistic value is greater than the critical statistic value, the null assumption is rejected. The functional relationship of the model is stated below:

$$GDPPC = f(HE, ED, ML, INFR) \quad (1)$$

Where

GDPPC = Gross domestic product per capita

HE = Health expenditure

EDU = Education

ML = Military expenditure

INFR = Infrastructure

Specification of model below:

$$GDPPC = HE + EDU + ML + INFR \quad (2)$$

$$GDPPC = \beta_0 + \beta_1 HE + \beta_2 EDU + \beta_3 ML + \beta_4 INFR \quad (3)$$

$$GDPPC = \beta_0 + \beta_1 HE + \beta_2 EDU + \beta_3 ML + \beta_4 INFR + \varkappa \quad (4)$$

$$GDPPC = \beta_0 + \beta_1 HE + \beta_2 EDU + \beta_3 ML + \beta_4 INFR + \hat{e} \quad (5)$$

GDPPC is the main variable while EDU, ML and INFRA are the independent variables. Equation (5) is demonstrated to illustrate the association amid GDPPC and important variables addressed in the study. $\beta_0 - \beta_4$ are the significant symbol awaiting estimation.

Result and Discussion

The unit root test must be carried out in order to determine the VECM link between the variables. To determine whether or not the variables are stationary, unit-root tests are used. Regression analysis that produces false results is possible if the variables are non-stationary. Consequently, unit root tests are necessary to ascertain the sequence of variable integration prior to model estimation (Gujarati & Porter, 2010). Essentially, the unit test result is displayed below in Table 1.

Table 1: Unit Root Test

		ADF Null (H_0): Non-stationary				PP Null (H_0): Non-stationary			
		DF_α				ERS_α			
	$z_{.t}$	$\tau_{.\mu}$	1%	5%	Prob.	τ_τ	1%	5%	Prob.
Intercept without Time Trend	***GDPPC***	2.01	1.72	-1.49	0.00	0.86	1.48	3.52	0.00
	HE	8.5	2.61	2.86	0.00	0.01	2.73	2.82	0.62
	ED	2.61	2.53	2.64	0.00	3.71	3.61	2.87	0.00
	ML	1.03	3.73	2.75	0.51	0.83	3.63	2.95	0.80
	INFR	4.15	3.63	2.94	0.00	4.27	3.63	2.95	0.00
	Δ***CGDP***	4.36	2.54	2.75	0.00	4.20	3.63	2.95	0.00
	Δ***HE***	7.57	3.27	2.98	0.00	5.51	2.63	2.59	0.00
	Δ***ED***	6.53	3.64	2.95	0.00	7.58	3.63	2.95	0.00
	Δ***ML***	5.91	3.64	2.95	0.00	2.56	3.36	2.95	0.07
	Δ***INFR***	1.64	3.24	3.45	0.26	5.53	3.35	2.95	0.00
Intercept with Time Trend	***GDPPC***	5.09	5.24	3.45	0.01	3.09	3.42	3.45	0.00
	HE	11.3	6.51	3.59	0.00	2.28	3.42	3.54	0.73
	ED	2.26	3.42	3.45	0.04	2.72	3.42	3.54	0.00
	ML	1.34	4.24	3.54	0.85	1.25	4.24	3.54	0.88
	INFR	2.08	2.24	4.54	0.00	1.20	1.24	2.54	0.01
	Δ***GDPPC***	3.14	3.82	2.33	0.00	9.26	6.52	3.54	0.00
	Δ***HE***	3.46	3.73	2.50	0.00	5.12	3.52	3.54	0.00
	Δ***ED***	5.67	4.62	2.53	0.00	11.14	3.52	3.54	0.00

	ΔML	2.11	2.21	3.55	0.00	1.28	3.54	3.54	0.03
	$\Delta INFR$	8.68	4.16	3.55	0.00	5.91	3.25	3.54	0.00

Source: Authors Compilation, 2024

Table 2: Lags Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
1	-1284.029	NA	1.92e+27	77.00169	78.12401	77.38443
2	-1256.335	39.09740*	1.77e+27*	76.84322*	79.08786*	77.60871*

Source: Authors Compilation, 2024

The anticipated statistical parameters for the ADF and P-P tests are listed in Table 1. The outcome is that the model's independent and dependent variables are integrated as I(1) and I(0). The lag selection is based on the AIC criterion at lag 2.

Cointegration Test

The results of the Trace and Eigenvalue cointegration tests in Tables 3 and 4 indicate that the variables employed in the study are cointegrated, permitting the employment of further techniques

Table 3: Test of Unrestricted Cointegration (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.731487	133.5930	96.13621	0.0000
At most 1 *	0.700608	90.20276	72.24278	0.0001
At most 2 *	0.513099	50.40465	54.63713	0.0076
At most 3 *	0.403808	26.65472	36.62302	0.0399
At most 4	0.252130	9.587360	12.51798	0.1471

Source: Authors Compilation, 2024

Due to these variables' non-stationarity, disequilibrium does arise among them during the brief study time. On the other hand, if the link between the variables grows more stable over time, this disequilibrium might eventually disappear. Keeping the previously mentioned points in

mind, this study looks at the long-term equilibrium between domestic savings and other relevant variables. In the Johansen Cointegration Test, there are at least four cointegration vectors between these variables, as shown in Tables 3 and 4 above. This suggests that the variables employed to describe household savings and economic growth demonstrate long-term equilibrium.

Table 4: Test of Unrestricted Cointegration (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.731487	43.39025	46.22311	0.0121
At most 1 *	0.700608	39.79810	44.33410	0.0047
At most 2	0.513099	23.74993	36.41590	0.0917
At most 3	0.403808	17.06736	26.53572	0.1053
At most 4	0.252130	9.587360	26.32978	0.1471

Source: Authors Compilation, 2024

Vector Error Correction Model (VECM)

Table 5 below displays the VECM estimates of South Africa (SA) public expenditure and economic growth. Like the other variables, the coefficients for the health expenditure (HE) and education (ED) also follow the aprori expectation. This demonstrates how well the model and the empirical study fit one another. When taking into consideration the variables with significant coefficients, the military expenditure and infrastructure have a notable and positive impact on SA economic growth. Essentially, the speed of adjustment is established at 56% and significant with probability of 0.02.

Table 5: Vector Error Correction Model (VECM)

Cointegrating Eq:	CointEq1
GDPPC(-1)	1.000000
HE(-1)	26664.70
	(15596.4)
	[1.70967]

ED(-1)	-867.5416
	(811.189)
	[-1.06947]
ML(-1)	-3.39E-06
	(7.4E-07)
	[-4.59362]
INFR(-1)	-106.0039
	(519.781)
	[-0.20394]
C	-64488.87

Error Correction:	D(GDPPC)	D(HE)	D(ED)	D(ML)	D(INFR)
CointEq1	0.560550	4.05E-06	-0.000136	21431.70	-0.000171
	(0.02634)	(1.8E-05)	(3.7E-05)	(19084.0)	(8.5E-05)
	[2.12787]	[0.22041]	[-3.66647]	[1.12302]	[-2.01952]
D(GDPPC(-1))	0.178386	7.66E-05	0.001813	498145.9	0.000549
	(0.32227)	(0.00022)	(0.00045)	(233466.)	(0.00104)
	[0.55352]	[0.34040]	[3.99028]	[2.13369]	[0.52882]
D(GDPPC(-2))	0.219019	-0.000157	0.000224	361372.9	0.000848
	(0.34979)	(0.00024)	(0.00049)	(253399.)	(0.00113)
	[0.62615]	[0.64359]	[0.45396]	[1.42610]	[0.75298]
D(HE(-1))	1150.259	0.238654	17.98077	5.05E+08	4.269075
	(687.194)	(0.47974)	(0.96889)	(5.0E+08)	(2.21263)
	[-1.67385]	[-0.49747]	[18.5581]	[-1.01430]	[1.92941]
D(HE(-2))	690.4834	0.450103	9.043416	3.55E+08	6.669708
	(1618.71)	(1.13004)	(2.28226)	(1.2E+09)	(5.21193)
	[0.42656]	[0.39831]	[3.96249]	[0.30280]	[1.27970]
D(ED(-1))	28.53897	0.023719	-0.491372	17239896	0.382760
	(0.00451)	(0.07228)	(0.14598)	(7.5E+07)	(0.33337)
	[0.27564]	[0.32815]	[3.36604]	[0.22985]	[1.14815]

D(ED(-2))	8.612845	2.31E-05	0.160904	21473204	0.135957
	(0.00376)	(0.01586)	(0.03204)	(1.6E+07)	(0.07316)
	[0.37906]	[0.00145]	[5.02261]	[1.30454]	[1.85836]
D(ML(-1))	2.569107	1.507293	5.00E-10	0.377079	5.07E-10
	(0.04632)	(2.5E-10)	(5.0E-10)	(0.25494)	(1.1E-09)
	[0.78817]	[0.06089]	[1.00778]	[1.47907]	[0.44787]
D(ML(-2))	7.91E-08	2.88E-10	2.99E-10	0.103317	1.96E-09
	(3.3E-07)	(2.3E-10)	(4.6E-10)	(0.23779)	(1.1E-09)
	[0.24094]	[1.25601]	[0.64505]	[0.43449]	[1.85760]
D(INFR(-1))	43.31792	0.029770	0.045253	16316920	0.079353
	(0.01725)	(0.04545)	(0.09180)	(4.7E+07)	(0.20964)
	[0.66530]	[0.65494]	[0.49295]	[0.34593]	[0.37852]
D(INFR(-2))	85.53925	0.012994	0.336040	14902856	0.091097
	(65.5594)	(0.04577)	(0.09243)	(4.7E+07)	(0.21109)
	[1.30476]	[0.28391]	[3.63547]	[0.31379]	[0.43156]
C	1722.751	0.741592	-4.236610	9.45E+08	-2.497436
	(958.048)	(0.66882)	(1.35077)	(6.9E+08)	(3.08473)
	[1.79819]	[1.10880]	[-3.13643]	[1.36108]	[-0.80961]

Source: Authors Compilation, 2024

There is a long-term correlation indicated by the significant negative coefficient of the error correction term. It is anticipated that the error correction term would have a negative statistical significance, suggesting that any short-term shock will eventually change. CGDPP's adjustment coefficient is fairly quick, completing the equation's convergence to equilibrium at a pace of 56%. Anytime the model deviates from equilibrium, changes to the variables HE, ED, ML and INFR will exert a significant force to bring it back to balance.

Granger Causality Test

The Granger causality test is used to ascertain whether one variable is useful in anticipating another (Granger, 1969). Table 6 below shows the pairwise Granger causality results, which

show that GDPPC Granger causes ML and HE Granger causes GDPPC. This leads to the rejection of the null hypothesis, which states that there is no causal relationship between the variables. Additionally, there is a unidirectional link between HE and GDPPC, meaning that ML is caused by GDPPC Granger rather than HE. Furthermore, HE and ML have an autonomous relationship. Thus, ML does not produce HE, according to this. Additionally, there is a separate link between GDPPC and ED. This indicates that GDPPC in South Africa is caused by ED.

Table 6: Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
HE → GDPPC	34	4.86840	0.0150
GDPPC ≠ HE		0.22337	0.8012
ED → GDPPC	34	4.62749	0.0180
GDPPC ≠ ED		0.90727	0.4148
ML ≠ GDPPC	34	1.31333	0.2844
GDPPC → ML		11.1379	0.0003
INFR ≠ GDPPC	34	2.02307	0.1505
GDPPC ≠ INFR		0.60058	0.5552
ED ≠ HE	34	0.25635	0.7756
HE ≠ ED		234.756	1.E-18
ML ≠ HE	34	0.09445	0.9102
HE → ML		3.33482	0.0497
INFR ≠ HE	34	1.46665	0.2473
HE ≠ INFR		0.57081	0.5713
ML ≠ ED	34	1.88497	0.1700
ED ≠ ML		2.25506	0.1229
INFR ≠ ED	34	1.26492	0.2974
ED ≠ INFR		0.49485	0.6147
INFR ≠ ML	35	0.77626	0.4691
ML ≠ INFR		1.00665	0.3775

≠ means does not granger cause; → means granger cause

Source: Authors Compilation, 2024

Conclusion and Recommendation

The goal of the study was to examine how public spending affects South Africa's economic expansion. The present study aimed to shed light on the impact of public spending on the nation's economic growth by utilizing annual time series data and analytic approaches such as unit root tests, co-integration, and the VECM.

GDPPC, HE, ML, INFR, and ED were the study's variables of interest. The variables' long-term relationship was established by the Johansen Cointegration test. The VECM study found a substantial long-run link between the GDPPC and other employed variables. The economy may achieve full equilibrium, restating the strong long-run relationship, according to the error correction period. Furthermore, a positive short-term connection between the variables GDPPC, HE, ML, ED, and INFR was shown by the short-term VECM analysis. Results showed that spending on health care has a short-term favorable impact on economic growth. Given that GDPPC is caused by ED, the Granger causality test showed a unidirectional link between HE and GDPPC. There is a causal relationship between the variables, as demonstrated by the dependent relationship that was shown between GDPPC and ML. HE and ML show that the variables have an independent relationship with one another.

The study found a unidirectional causal association between public investment (HE, ML, ED, and INFR) and economic development, as well as a substantial long-run relationship between the variables. Thus, the study's empirical findings indicate that public spending is a major factor in economic expansion.

The study recommends the expansion of spending should be avoided for economic growth as it causes the economy to accumulate enormous amounts of debt. The direct influence of government expenditure on inflation makes it inappropriate to utilize it as a tool for stabilizing policy. Policies that promote and sustain long-term economic growth without endangering the consumption of the next generation should be put into place in South Africa. Consequently, the long-term benefits are tenacious and precisely what South Africa needs. Technology is clearly taking over as the globe transitions to a more service-oriented industrial model. It is imperative that South Africa increases its technological investment.

Productivity will rise as a result, spurring economic growth and employment creation. The main worry for South Africa is that it is falling behind, thus it is constantly trying to catch up

with innovations in the global market. Growth is slowed down as a result of decreasing productivity. This research suggests that the key components for forecasting and understanding economic growth are capital, technology, and skills. The market economy is fiercely competitive and constantly changing in response to the introduction of new technologies. If South Africa makes investments in the use of cutting-edge technology, it will reap the benefits of higher growth rates and decreased unemployment rates.

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