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The Impact of Public Debt Growth and Public Investment on Economic Growth in Tanzania: Time Series Analysis (1993 – 2024)

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ABSTRACT

This study aims to investigate the impact of public debt growth and public investment on economic growth in Tanzania from 1993 to 2024, using yearly data. The study employs the Vector Error Correction Model (VECM) to determine the short- and long-run dynamics among the variables. The results indicate that public debt has mixed effects on economic growth. In the short run, it has a negative effect, but in the long run, it can be positive. This means that if public debt is used wisely, especially for projects that bring future benefits, it can help the economy grow. Public investment, on the other hand, has a positive and significant effect on long-run economic growth. The study found that public investment and interest rates granger-cause economic growth, and that public debt influences public investment. These findings suggest that managing debt responsibly and making sure investments are used effectively are important for Tanzania's economy. The study suggests that the government should improve fiscal control, ensure borrowed funds are used productively, and build a better system to enable investment to work effectively.

1. Introduction

Globally, discussions over the advantages and disadvantages of public debt-financed government spending have resurfaced amid rising public debt (Gatti et al., 2021). Public debt can, on the one hand, ease short-term financial limitations, enabling governments to raise investment and consumption (Islam and Nguyen 2024). Public debt has been chiefly increasing in developed countries, particularly following the worldwide financial crisis of 2009 (Gatti et al., 2021). Investment is a key driver of economic growth, as noted by Epaphra and Massawe (2016a) in their study. Some countries, like the Asian Tigers, attract significant investment, which helps them grow their economies and develop more quickly (Epaphra and Massawe, 2016b).

Public spending on fundamental infrastructure may be a necessary prerequisite for private sector capital accumulation (Essien et al., 2021). Additionally, public spending on healthcare, education, and other public services that benefit society but lack market incentives may enhance the development of human capital and foster an environment that allows the private sector to flourish, thereby driving economic growth (Kararach *et al*., 2022). Debt accumulation has been a major approach used by many developing countries, including Tanzania, to address limited resources and boost capital formation (World Bank, 2018; Mwakalila and Muba, 2025).

Since gaining independence, Tanzania has engaged in several borrowing activities to fund social services, infrastructure, industrial ventures, and other profitable sectors such as agriculture, technology, and tourism (William, 2023; Joy and Panda, 2021; Renjith and Shanmugam, 2020). The goal of investing is to help the nation achieve its Development Vision 2050, which aims to transform Tanzania into an upper-middle-income country by strengthening fiscal sustainability, promoting innovative and diversified financing, and enhancing the enabling environment for business and investment. (URT, 2025). But the growing national debt, particularly the external debt, presents challenges to debt sustainability and long-term growth prospects (Mwakalila and Muba, 2025). Tanzania's debt stock reached previously unheard-of heights, approximately TZS 91,708.33 billion (USD 35,688.90 million), an increase of 19.09 per cent compared to TZS 77,010.45 billion recorded at the end of 2024, raising questions about whether debt-financed investments actually result in economic growth in Tanzania (Maugu, 2023).

Thus, the primary issue many nations worldwide face is public debt (Elikana, 2019). Many developing countries cover or hide their budget shortfalls by taking on debt, whether from domestic or foreign sources (William, 2023). Many countries borrow money to boost their economies through investments by both the government and the private

sector. These investments help create jobs, improve services like healthcare and education, and offer opportunities to generate income from those investments. (Were and Madete, 2022; Mwakalila and Muba, 2025). However, when the public debt becomes unstable, it causes major macroeconomic problems, including rising inflation, lower GDP growth, currency depreciation and higher borrowing costs (Abu *et al.,* 2022; Sharma *et al.,* 2023).

The Tanzanian National Five Year Development Plan (FYDP) III (2021/22 to 2025/26), which is focused on promoting industrialization and competitiveness to support human development, is moving forward even though Tanzania is making it and competitiveness to support human development, is moving forward despite Tanzania's best efforts. This plan guides the use of both local and foreign loans, mainly for energy (such as power generation), social services (such as health, education, and water supply), and major infrastructure projects (such as roads, railways, and airports) (URT, 2021). To reduce costs and lower risks, such as foreign exchange and rollover, a medium-term debt management strategy for 2023/24 to 2025/26 (the Medium-Term Debt Management Strategy 2023-2026) outlines borrowing plans that combine concessional external loans, semi-concessional financing, and domestic securities (URT, 2023). Furthermore, instead of borrowing at random, the approach aims to match funds with projects that offer important social or economic benefits, such as investments that boost productivity.

Nevertheless, the text fails to explicitly discuss the connection between public debt growth, public investment, and economic growth. Thus, the discourse on the relationship among public debt growth, public investment, and economic growth has often yielded different outcomes. Some studies have found mixed outcomes. However, other research shows a positive relationship between public debt growth and economic growth and found that an increase in public debt leads to a slowdown in economic growth in Tanzania (Elikana 2019; William 2023). Other researchers' findings from seemingly unrelated regressions show that foreign debt has significant negative effects on investment and economic growth (Abdelaziz et al., 2019; Hakimi et al., 2019; Regmi, 2023; Kasele *et al.,* 2020; Salyungu, 2019). However, Maugu (2023) found no relationship between public investment and public debt in East Africa. Both domestic and foreign direct investment contribute to economic success in Tanzania, according to Epaphra and Massawe (2016), who link investment to economic growth. According to Sánchez-Juárez and García-Almada (2016), the econometric results showed a positive association between public debt and public investment, which in turn promotes economic growth in Mexico. However, the question of how public investment and public debt growth interact to affect Tanzania's economic growth remains. Most previous studies link these two concepts (public debt and public investment) to economic growth; specifically, many focus only on external debt. Thus, this research aims to close this gap by analysing the dynamic relationship among public debt growth, public investment, and economic growth from 1993 to 2024.

2. Literature review

Solow's (1956) neoclassical Economic Growth Theory emphasizes the role of labour, capital accumulation, and technological progress in driving economic growth. Public investment plays a key role in boosting productivity by building infrastructure and developing human resources. The theory posits that countries with limited capital may be motivated to borrow and invest, especially when the returns on such investments are higher than the cost of borrowing (Islam and Nguyen 2024; Joseph and Kilindo 2024). On the other hand, the endogenous growth theory (Romer, 1986; Lucas, 1988) argues that sustained long-term growth can be achieved through knowledge, innovation, and effective government spending.

Chenery and Strout's (1966) Dual-Gap Theory states that developing economies often need to borrow from external sources due to gaps in both domestic savings and foreign exchange. However, when debt is misused, it can reduce the benefits it was intended to provide. This idea aligns with the study's focus on whether Tanzania's debt-funded projects effectively close gaps in domestic resources to drive growth (Kasele et al., 2020).

Many studies have examined the relationship between governmental investment, economic development, and public debt. However, the results can vary depending on the methods used and the sample size. Sánchez-Juárez and García-Almada (2016) studied the relationship among economic growth, public investment, and public debt in Mexico. Using data from 32 states between 1993 and 2012, they applied dynamic panel data models and the Generalised Method of Moments. Their findings showed a positive and significant relationship between public debt and public investment, both of which contribute to economic growth.

Al-Dughme (2019) investigated the impact of public debt and public investment on economic growth in Jordan. The study employed multiple linear regressions to investigate the research hypotheses. According to the study, public investment has a

positive, statistically significant impact on Jordan's economic growth, whereas public debt has a negative, statistically significant impact.

In Tanzania, Maalim (2022) looked at the impact of public investment on the economies of developing countries, using a Tanzanian case study. The study used secondary data covering 32 years (1990-2021) from the World Development Indicators published by the World Bank. The findings showed a significant positive link between Tanzania's economic growth and public investment. If public investment increases by one-unit, real GDP is expected to rise by 0.191570, assuming other factors remain constant. The Granger causality analysis indicated a unidirectional relationship between public investment and real GDP in Tanzania. However, the short-term relationship was found to be positive but not statistically significant.

Maganya (2024) empirically investigated the impact of public debt on economic growth in Tanzania over the period 1990 to 2023. A Vector Error Correction Model (VECM) and Johansen co-integration analysis were employed. The empirical findings show that economic growth (real GDP) and external debt, as well as economic growth (real GDP) and external debt service payments have a negative and significant long-term association. This suggests that external debt and its servicing hinder long-term economic growth.

Maugu (2023) analyzed how public debt affects investment and interest rates in part of the East African Community. Using panel data from 1980 to 2020 and the Autoregressive Distributed Lag (ARDL) method, the study found no clear link between public debt and public investment in the East African region. However, there was a positive effect in Rwanda and a negative effect in Kenya and Burundi. This suggests that borrowed funds were not always used for public investment. Additionally, the findings indicated that short-term private investment was not affected by public debt. However, over time, public debt negatively affected private investment across all five East African countries.

3. Materials and Methods

3.1. Data sources

The data utilised in this study span 1993-2024. The data is obtained from three main sources: the World Development Indicator (WDI), the Tanzania Investment Centre, and the Bank of Tanzania. The WDI provides the dependent variable (economic growth) as a GDP growth rate, while the Tanzania Investment Centre and the Bank of Tanzania provide public debt, public investment, and interest.

3.2. Data analysis

To achieve the study's main goal, a time-series analysis was conducted to examine how rising public debt and public investment affected economic growth in Tanzania over a 31-year period from 1993 to 2024. The main purpose is to explore how economic growth rate, public investment, and public debt are connected in a cause-and-effect way. To examine this, the study used the Wald-Granger causality test. It also applied the Johansen cointegration test to examine the long-run equilibrium relationship between these variables. To meet the requirements for stationarity and cointegration, the study used a VECM-to-ECM approach to analyse both the short- and long-term effects of public debt and public investment on economic growth.

3.3. Variable Measurement and Model Estimation

3.3.1. Variable Measurement

The major macroeconomic variables, each measured yearly from 1993 to 2024, were the subject of this study. Government borrowing relative to the size of the economy is measured by public debt, calculated as a percentage of GDP. Public investment is expressed as a proportion of GDP growth rate. The annual GDP growth rate is one measure of economic growth that shows how the economy is expanding overall. The interest rate is determined using the typical annual loan rate, which reflects the price of borrowing in the economy.

Table 10: Variables description and Measurements of the study

Variable Name	Type	Measurement
Economic growth	Dependent Variable	GDP growth rate (%)
Public debt	Independent variable	% of GDP
Public investment	Independent variable	% of GDP
Interest Rate	Control Variable	Annual lending rate (%)

3.3.2. Model Estimation

This study's main goal is to investigate how public investment and debt increase affect Tanzania's economic expansion. Consequently, the Vector Error Correction Model (VECM) was used in this investigation. The functional form of the model is as follows:

$$\Delta GDP_t = \beta_0 + \beta_1\Delta GDPt_{-1} + \beta_2\Delta PI_{t-j} + \beta_3\Delta PD_{t-i} + \beta_4\Delta IR_{t-i} + eEC_{t-1} + \mu_t \quad (i)$$

$\Delta PI_t = \beta_0 + \beta_1 \Delta PI_{t-1} + \beta_2 \Delta PD_{t-i} + \beta_3 \Delta IR_{t-I} + \beta_1 \Delta GDP_t + eEC_{t-1} + \mu_t$……..…..….(ii)

$\Delta PD_t = \beta_0 + \beta_1 \Delta PDt_{-1} + \beta_2 \Delta PI_{t-j} + \beta_3 \Delta GDP_{t-i} + \beta_4 \Delta IR_{t-i} + eEC_{t-1} + \mu_t$……...……. (iii)

$\Delta IR_t = \beta_0 + \beta_1 \Delta IRt_{-1} + \beta_2 \Delta PI_{t-j} + \beta_3 \Delta GDP_{t-i} + \beta_4 \Delta PD_{t-i} + eEC_{t-1} + \mu_t$……..…….……..(iv)

Where: GDP_t - Economic growth rate; PI_t-Public investment; PD_t-Public debt; IR_t-interest rate; EC_t-Erro correction term; μ_t -Error term; $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$-Adjustment Coefficient estimation; and t- time series over period.

4. Results

Tests for descriptive statistics, normality, serial autocorrelation, multicollinearity, and stationarity are performed on the data before further analysis to ensure the results are reliable. The findings would be inaccurate and consequently unreliable if these assumptions were violated (Gujarat, 2003; Wooldridge, 2006). All preliminary tests' outcomes indicated that the data were reliable enough for further analysis.

4.1. Descriptive Statistics

Tanzania's economy grew at an average rate of 5.22% during the research period, indicating modest yet steady growth. The standard deviation of 1.83 indicates little variation in the growth rate over time, suggesting the country's GDP increased consistently. This suggests that Tanzania's economy is stable and not easily affected by small economic ups and downs. Public investment varied somewhat, with an average of 4.33% and a standard deviation of 1.77. This means that overall, public spending remained relatively steady, though there were a few years when investment was much higher or lower than usual.

Public debt shows significant variation over the course of the study, with a mean of 2.04% and a standard deviation of 1.67%. This indicates a generally sustainable debt profile, notwithstanding occasional rises in borrowing. Due to tight monetary conditions, the average interest rate is relatively high at 19.44%. The standard deviation of 6.21 indicates significant variability, indicating changes in economic policy stance and financial market movements. This implies that Tanzania's interest rate system has seen periods of extreme tightness, which could impact the cost of borrowing and investing. The findings are summarized in Table 1.

Table 1: Descriptive Data Analysis

Stats	GDP (%)	Public investment (%)	Public debt (%)	Interest (%)
Mean	5.217	4.333	2.036	19.437
SD	1.834	1.767	1.671	6.210
Variance	3.364	3.124	2.792	38.563
Min	1.024	1.442	0.300	14.140
Max	7.672	6.995	6.000	35.810
Skewness	-0.836	-0.153	0.895	1.3800
Kurtosis	2.901	1.613	2.608	3.5510

4.2. Stationarity Tests

Table 2 shows that the Augmented Dickey-Fuller (ADF) unit root test indicates that the variable is stationary at the first difference (I (1)), as the t-statistics for each variable exceed the 5% critical value. However, all variables were non-stationary at level I (0). So, the null hypothesis of a unit root is rejected because the p-value of the t-statistic is significant, and the absolute value of the ADF test statistic for the first difference exceeds the 5 per cent significance level.

Table 2: Unit root test

Variables at levels				
	GDP	Public investment	Public debt	Interest rate
Test statistic	-2.386	-2.562	-1.861	-1.694
Critical value at 5%	-3.576	-3.576	-3.580	-3.580
p- value	0.387	0.298	0.675	0.754
Order of integration	I (0)	I (0)	I (0)	I (0)
Remark	Non-stationary	Non-stationary	Non-stationary	Non-stationary
Variables at first differences				
	D_GDP	Public investment	D_Public debt	D_Interest rate
Test statistic	-5.307	-6.672	-6.177	-5.138
Critical value at 5%	-3.580	-3.576	-3.580	-3.584
P – value	0.0001	0.0000	0.0000	0.0001
Order of integration	I (1)	I (1)	I (1)	I (1)
Remark	Stationary	Stationary	Stationary	Stationary

4.3. Cointegration Test

Table 3 shows the results of the Johansen test for co-integration. By considering the Trace and Eigenvalue statistics rather than the 5 per cent critical value, the table reveals that the study's variables (GDP, public investment, and public debt) are co-integrated at rank zero. This suggests that the variables in the model have a single co-integrated equation (one co-integrating equation). The result indicates that the variables converge in a long-term balance. Given this result, the Vector Error Correction Model has been employed rather than Vector Auto Regression

Table 3: Trace Statistics and Max-Eigen Statistics

Maximum				**Trace**	**Critical value**
Rank	**Params**	**LL**	**Eigenvalue**	**Statistic**	**5%**
0	36	-153.437	-	61.225	47.21
1	43	-134.116	0.724	22.583*	29.68
2	48	-126.871	0.383	8.092	15.41
3	51	-123.146	0.220	0.642	3.76
4	52	-122.825	0.021		

Maximum					**Critical value**
			----------Eigenvalue----------		
Rank	**Params**	**LL**		**Maximum**	**5%**
0	36	-153.437	-	38.642	27.07
1	43	-134.116	0.724	14.491	20.97
2	48	-126.871	0.383	7.449	14.07
3	51	-123.146	0.219	0.642	3.76
4	52	-122.825	0.021		

4.1.3. Serial correlation

The serial correlation test was performed using Breusch-Godfrey (BG). The results of the serial correlation tests obtained were Prob. Chi-Square (2) 0.77337, which is greater than the critical (5%). It can be concluded that there is no serial correlation. As a result, the alternative hypothesis was rejected and the null hypothesis was accepted.

H_0: Serial correlation at lag order not exists.

H_1: Serial correlation at lag order exists.

Table 4: Lagrange multiplier test

lag	**chi²**	**df**	**Prob > chi²**
1	13.680	16	0.623
2	11.565	16	0.774

4.1.4. Normality test

The results of the skewness and kurtosis tests (Jarque-Bera statistics) used to determine whether the data were normally distributed are shown in

Table 5. If the p-value is higher than 5%, the test concludes that the data are not normally distributed. This means the null hypothesis, which assumes the data follow a normal distribution, is not supported. The alternative hypothesis suggests the data do not have a regular distribution. The findings in Table 5 show that the alternative hypothesis was accepted and the null hypothesis was not rejected. This finding suggests that the model's error term has characteristics of a typical distribution.

Table 5: Skewness and kurtosis test for normality

Equation	chi^2	df	Prob > chi^2
D_GDP	0.575	2	0.750
D_public_investment	1.455	2	0.483
D_public_debt	57.892	2	0.475
D_interest	1.178	2	0.555
ALL	61.101	8	0.517

4.3. Vector Error Correction Model (VECM) Result

The independent variables of the Vector Error Correction Model (VECM), public investment, public debt, and interest rate, account for approximately 56.1% of the fluctuations in GDP growth, according to the model's R-squared score of 0.561.

4.3.1. Effect of public debt growth on economic growth in Tanzania

The study showed that public debt had a negative effect on Tanzania's economic growth in the short term, specifically at a one lag (Table 5). This means that Tanzania's high level of debt is hindering short-term economic growth by diverting funds from productive projects to debt service. Assuming all other factors remain the same, an average increase in public debt has caused the short-term GDP growth rate to drop by 0.342%. These findings match those of Mussa and Abdulhamid's (2022) research on Nigeria, which also found that both foreign and domestic debt have a negative short-term impact on the Nigerian economy.

Table 5: VECM Result Short Run Effect

Coefficient	Coefficient	Std. err.	z	p>z	[95% conf.	interval]
D_GDP						
R-squared	0.561					
_ce1						
L1.	-0.921	0.282	-3.270	0.001	-1.474	-0.369
GDP						
LD.	-0.004	0.215	-0.020	0.986	0.425	-0.418
L2D.	0.142	0.195	0.730	0.465	-0.239	0.524
Public investment						
LD.	0.312	0.430	0.730	0.468	-0.531	1.156
L2D.	0.628	0.332	1.890	0.058	-.0224	1.278
Public debt						
LD.	-0.342	0.172	-1.990	0.047	-0.678	-0.005
L2D.	-0.254	0.170	-1.500	0.135	-0.588	0.079
Interest						
LD.	0.161	0.128	1.250	0.211	-0.091	0.412
L2D.	0.237	0.184	1.280	0.199	-0.125	0.598
_cons	0.109	0.238	0.460	0.647	-0.358	0.576

Additionally, the result in Table 5 shows that public debt has a positive effect on Tanzania's long-term economic growth. Table 6 shows the coefficients of the normalised equation (VECM), which are interpreted as inverse signs. This result suggests that public debt and GDP have a positive long-term effect, with a 1% increase in public debt leading to a 0.39% increase in GDP. In contrast, interest rates have a negative relationship with GDP, with a 1% increase in interest rates leading to a 1.04% decrease in GDP, ceteris paribus.

Table 6: Johansen normalisation restriction imposed for the long-run

beta	Coefficient	Std. err.	z	p>z	[95% conf.	interval]
_ce1						
GDP	1	.	.	.	.	.
Public investment	-1.043	0.158	6.61	0.001	-0.733	-1.352
Public debt	-0.396	0.158	-2.50	0.012	-0.707	-0.086
interest	0.479	0.048	9.89	0.000	0.384	0.574
_cons	-18.444	.	.	.	.	.

4.3.2. Effect of public investment on economic growth in Tanzania

The results in Table 6 demonstrated a strong and substantial long-term association between public investment and GDP, with an average increase in public investment leading to a 1.043 increase in the GDP growth rate when all other components were held constant at 5% (p=0.001). The outcome suggests that public investment in various productive sectors, such as social services, has a significant effect on boosting Tanzania's economic growth.

4.3.3. Granger causality between public investment, public debt and economic growth

The effectiveness of a single series in predicting another time series was assessed using the Granger causality test (Chindengwike, 2023). The study evaluated its capacity to forecast future values of other variables. It is thought that there may be Granger causality in at least one direction; even though the dependent variables exhibit cointegration, this does not indicate the direction of the variables' causal relationship (Were and Madete, 2022). Granger's (1969) causation method states that an independent variable (X) causes a dependent variable (Y) if historical values of Y and X can predict Y more accurately than values of Y alone. The Granger causality test findings for each variable are shown in Table 7

Table 7: Granger causality Wald test

Null hypothesis	chi^2	Df	Prob > chi^2	Decision
GDP is not Granger-caused by public investment.	21.053	3	0.000	Accept
GDP is not Granger-caused by public debt.	0.190	3	0.979	Reject
GDP is not Granger-caused by interest.	19.877	3	0.000	Accept
Public investment is not Granger-caused by GDP.	3.466	3	0.325	Reject
Public investment not Granger-caused by public debt	14.318	3	0.003	Accept
Public investment not Granger-caused by interest	6.947	3	0.074	Reject
Public debt not Granger-caused by GDP	18.470	3	0.000	Accept
Public debt not anger-caused by public investment	1.756	3	0.625	Reject
Public debt not Granger-caused by interest rate	1.197	3	0.754	Reject
Interest rate not Granger-caused by GDP	3.376	3	0.337	Reject
Interest rate not Granger-caused by public investment	3.298	3	0.348	Reject
Interest rate not Granger-caused by public debt	6.241	3	0.100	Reject

The findings in Table 7 display that public funding Granger-induced GDP (P = 0.000), suggesting that historical public investment enhances the forecast of GDP growth. Likewise, interest rates Granger-cause GDP (P=0.000), suggesting that shifts in interest rates have a major impact on economic expansion. However, public debt does not Granger-cause GDP (P = 0.979), indicating that historical debt accumulation levels do not significantly predict economic growth. Nonetheless, GDP Granger-causes public debt (P=0.000), suggesting that economic development affects borrowing choices.

The government is more inclined to finance debt when the economy grows.

The findings also revealed that public debt Granger-causes public investment (P = 0.003), indicating that debt accumulation choices have a major impact on the amount of public investment. Similarly, public investment is weakly Granger-caused by interest rates (P=0.074). These results are in line with other studies by Joseph and Kilindo (2024), Maalim (2022), and Were and Madete (2022), which demonstrate that increasing public investment is positively correlated with rising public debt.

5. Discussions of the results

5.1. Effect of public debt on economic growth in Tanzania

The results indicate that public debt affects Tanzania's economic growth in both the short and long run. In the short run, public debt has a negative effect, slowing economic growth by increasing interest rates and depreciating the domestic currency, thereby increasing public debt payments and reducing investment. This result was consistent with a Nigerian study by Mussa and Abdulhamid (2022), which found short-term detrimental effects of economic growth. In a similar vein, Masoga (2017) examined how public debt affected South Africa's economic growth between 1995 and 2016 and found that it had a negative impact. The study also found that public debt affected South Africa's economic growth over time. Public debt has a long-term beneficial impact on economic growth. This implies that, if properly managed, public debt can stimulate economic growth as long as it is allocated to profitable ventures that yield long-term profits.

The findings align with those of Sánchez-Juárez and García-Almada (2016) in Mexico regarding the influence of public debt and public investment on economic expansion, who found that public debt affects economic growth by stimulating investment. Similarly, in Tanzania, Maganya's (2024) study found that its findings were in line with the debt overhang and Keynesian theories, which primarily explain how public debt initially boosts economic development but ultimately has a favourable effect on investment and economic growth. Furthermore, the Joseph and Kilindo (2024) study, which found that public debt had a detrimental impact on the economic development of sub-Saharan African countries, including Tanzania, is at odds with these results.

5.2. Effect of public investment on economic growth in Tanzania

Empirical evidence suggests that public investment in Tanzania influences long-run economic growth. This indicates that the increase in government spending is a true reflection of Tanzania's economic expansion. According to Epaphra and Massawe (2016b), the accelerator and the neoclassical theory of investment, first proposed by Clark (1917) and later adapted to a business cycle by Samuelson (1939), describe an effect that is completely opposed to the multiplier effect. According to the idea, investment will rise by multiple amounts as income rises. Nonetheless, the study is in line with earlier research, such as the empirical evidence from a Tanzanian study on the effects of public and private investments on the economic growth of developing nations referenced by Maalim (2022), which found that Tanzania's economy grows faster when public investment rises. As a result, the researcher concluded that Tanzania's GDP growth rate and public investment are long-term linked.

5.3. Granger causality between public investment, public debt and economic growth

Granger causality in Table 8: The dynamic relationships of Tanzania between GDP, public debt, public investment, and interest rates are made clear by the Wald test results. The results show that GDP is Granger-caused by public investment (p = 0.000), suggesting that historical public investment values greatly enhance the forecast of GDP growth. This highlights the significance of government spending on productive industries, indicating that increases in public investment encourage economic growth rates in Tanzania. Furthermore, interest rates Granger-cause GDP (p = 0.000), suggesting that shifts in interest rates significantly impact economic expansion. The direction implies that changes in interest rates, whether they are tightening or loosening, may be a predictor of GDP performance. However, public debt does not Granger-cause GDP (p = 0.979), indicating that past levels of public debt don't reliably predict future economic growth. However, in contrast, GDP does Granger-cause public debt (p = 0.000), showing that a strong economy can influence how much the government borrows. Furthermore, public debt Granger-causes public investment (p = 0.003), suggesting that decisions to borrow affect the amount the government invests. Interest rates have a weak Granger-cause effect on public investment (p = 0.074), indicating that monetary conditions can influence government spending. But economic growth rate does not Granger-cause public investment (p = 0.325), implying that economic growth alone isn't a strong indicator of how much the government spends on public projects.

These results are in line with recent studies by Joseph and Kilindo (2024), Maalim (2022), and Were and Madete (2022) that indicate the advantageous relationship between increased public investment and rising foreign debt. This could be explained by the growing volume of public

investment, which can alter economic growth. Nonetheless, the majority of variables exhibit unidirectional causality; these results suggest specific predictive linkages among the model's variables, emphasising the significance of interest rate changes and public investment in predicting Tanzania's economic growth.

5.4. Model Stability Tests

The generated equations were put to the test by testing the stability of the model's recursive estimations. The CUSUM chart tests were employed in this study's analysis to verify the regression model's stability. We will use the CUSUM chart to assess the model's stability; the null hypothesis states that the model is stable, while the alternative hypothesis asserts that it is unstable. To avoid rejecting the null hypothesis that the model is stable, you should typically maintain the CUSUM of residual curves at the 5% significance level within the dual standard of error range. The output was subjected to CUSUM testing, and the results are shown in Figure 1.

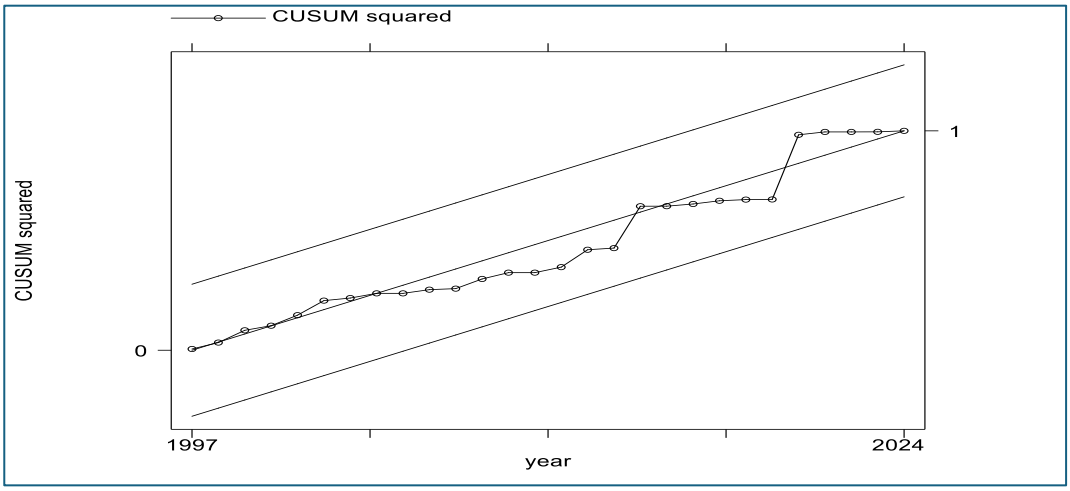

Figure 1: CUSUM Chart test of model stability

The cumulative sum of residuals remained within the 5% confidence boundaries, indicating parameter stability over time (Figure 1). As a result, the model is dependable and structurally stable for forecasting and inference. Because all points in Figure 1 lie within the upper and lower boundary limits, none are out of control, indicating that the model is stable.

6. Conclusion and Recommendations

6.1. Conclusion

The study examines how public investment and public debt growth affect Tanzania's economy and concludes that both have short- and long-run effects on economic growth in Tanzania. While public debt did not exhibit a direct causal relationship to economic growth, the Granger causality analysis showed that the economic growth rate in Tanzania Granger-caused by public investment and interest rates. This investigation demonstrates the importance of monetary and investment conditions in determining economic growth.

Additionally, the results demonstrate a reciprocal causal relationship between public debt and GDP. suggesting that while GDP growth affects borrowing capacity, debt sustainability is just as important for sustaining steady growth. Public investment in Tanzania directly affects the GDP growth rate, and public debt begins to directly affect public investment.

6.2. Recommendations

The government should guarantee the effective use of public funds and enhance grants to profitable industries. The growth benefits of public investment will be maximised by improving project management, reducing corruption, and focusing on high-return industries such as transportation, energy, and ICT. Long-term growth might also benefit from partnerships with the business sector to mobilise additional resources.

Increasing public investment and making sure interest rate policies support growth should be the main priorities of policymakers. At the same time, by tying borrowing to projects that generate income, debt management measures should align with GDP growth goals. To maintain steady growth and prevent debt distress, coordinated monetary and fiscal policies are crucial.

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