

Article

Nexus between foreign assistance and economic growth in Tanzania

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CITATION

Chindengwike JD. Nexus between foreign assistance and economic growth in Tanzania. *Sustainable Economies*. 2024; 2(3): 163. <https://doi.org/10.62617/se.v2i3.163>

ARTICLE INFO

Received: 27 May 2024
Accepted: 4 July 2024
Available online: 19 July 2024

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Abstract: The ability of a country to grow economically sustainably depends on its ability to borrow since borrowing is an essential component of resource creation and the foundation of resource generation strategy, particularly in emerging nations. Evaluating the relationship between Tanzania's economic progress on foreign aid, it was the main goal of the study. Secondary data and a quantitative time series data regression research methodology were used in the study. The fiscal years 1970–2020 were covered by the 51 data observations. The findings indicated that while there is a statistically significant positive relationship between foreign aid and economic growth.

Keywords: foreign assistance; foreign direct investment; trade openness; economic growth; Tanzania

1. Introduction

Borrowing is essential to a country's ability to achieve sustainable economic growth since it is one of the key elements influencing resource generation and the foundation for directing resource generation, especially in developing nations [1]. Since economic growth is the primary objective of the majority of developing nations, funds are raised from various sources, including the national debt, and allocated to workable projects to accelerate development [2,3]. Every country has benefited from the global wealth boom by increasing reserves and fostering economic growth [3]. found that these are unique countries with high loan servicing levels that contribute to low levels of domestic savings and investment and growing fiscal deficits. This finding is supported by the data.

The African Development Bank provides advice on how nations should use the available cash to strengthen their economies. The African Development Bank observed in its 2018 report that public borrowing and national debt are widespread global practices, particularly for emerging countries. The nation's debt has historically come from the inability to pay for actual development initiatives, such as those pertaining to infrastructure, water, energy, education, and so forth. But according to an assessment conducted later by the Africa Development Bank, the country's debt has significantly increased [3]. Further evidence supporting this assertion came from Azam and Feng [3], who noted that during the past 50 years, economic development in less developed countries has occurred at a glacial pace in every sector.

To pay for their budget deficits, many developing countries rely on loans, whether from domestic or international sources. Despite the government's best efforts to ensure that the financial system makes money by ensuring that it is regularly exploited, manufacturing speculation resulted in the construction of transportation infrastructure, hydroelectric plants, responsible public services, and management of

all unethical activities. Still, it appears that the state's responsibilities are expanding every year [4]. The study attempted to solve Tanzania's most significant issue by examining the relationship between economic conditions and public loans. However, Tanzania's GDP remains unstable, and the government of the nation continues to borrow money from foreign organizations and nations.

A consensus regarding the relationship between national debt and economic growth cannot be reached due to limited evidence from previous studies. While this has historically been the case in academic journals and scientific publications, new research indicates that the emphasis on economic expansion and budget deficits may be progressively contributing to a large level of debt. The general consensus that late payments are advantageous to the lending industry motivates this kind of research. Further research is necessary to fully comprehend the impact of growing debt on the economy because countries such as Tanzania keep borrowing money even after gaining independence. The foundation for future research on possible connections between foreign aid and economic development will be laid by this study. This organization is required to carry out any upcoming initiatives.

This research aimed to examine whether economic growth, that is GDP can be explained foreign assistance, foreign direct investment and trade openness.

2. Literature reviews

The dual-gap idea was initially presented by Chenery and Strout in 1966 [4]. contend that saving should come before investing. According to this idea, there aren't enough domestic savings to cover the costs of the investments needed for economic growth. Foreign investment capital is required to close the gap [4]. The main query is whether and to what degree foreign public debt and other external funding sources contribute to the economic development of developing countries. Since the components of spending and revenue are equal, dual-gap analysis is predicated on the identities of national income accounting, as demonstrated below:

$$Y_i = C + I + S \quad (1)$$

whereby Y_i and Y_o represent income and output respectively, C represent Consumption, E represent export, I represent imports and S the savings, INV is the investments.

$$Y_o = C + E + INV \quad (2)$$

As income = output from Equations (1) and (2) it implies that

$$INV - S = I - E \quad (3)$$

In theory for uniqueness Equation (3) to grasp truth it needs that

$$INV = S + I - E \quad (4)$$

There is an export-of-origin exchange gap when imports exceed required exports; on the other hand, there is a saving-investment gap when domestic saving falls short of anticipated economic growth [4].

When it comes to international help, objectives, resource types and sources, and recipient performance expectations differ [5]. The four types of subsidies that are offered are capital project loans, general assistance loans, grants, and surplus agricultural commodities against loans repayable in local currency [5]. From an economic standpoint, encouraging economic growth is the main goal of public capital

inflows as, among other things, foreign aid generates export revenues, which spare developing nations from having to bridge the funding gap on their own.

Foreign aid can impact a recipient's GDP at macro- and micro-level, according to Kirikkaleli et al. [6], albeit other external factors need to be taken into account when estimating economic growth.

The text does not, however, make clear how public debt impacts economic advancement. The argument on the relationship between the national debt and economic progress has endured despite contradictory results. Previous research has shown that in order to fully comprehend the several factors influencing economic growth, a thorough analysis of the conditions in each nation is required. Numerous writers focused on developed economies, analyzing debt from both domestic and international sources while leaving out the impact of public debt on economic expansion [7]. Others have conducted research on Tanzania's external loans and their servicing, as well as the importance of foreign direct investment and external debts to the nation's economic growth. The majority of them have underestimated Tanzania's economic development due to the country's total external and domestic debt.

Similar research was done on 85 developing nations in Latin America, Africa, Asia, and the Caribbean by Kyara et al. [8]. who found that different foreign aid programs had different effects on economic growth [8,9].

Research hypothesis

H0: There is no relationship between foreign assistance and economic growth in Tanzania?

H0: There is no relationship between Trade openness influence economic growth in Tanzania?

3. Research methodology

Secondary data was used as source of the data and a time series used as research design because the study intends to test causal relationship between variables. Quantitative method used as research approach. The financial data from 1970–2020 were included to this study whereby 51 observations were used. Diagnostic tests of econometric methods were used for both descriptive and inferential data analysis was used, the Autoregressive Distributed Lag Model (ARDL) was employed.

Model specification

Using the Autoregressive Distributed Lag Model (ARDL), Tanzania's economic progress, trade openness, foreign aid, and foreign direct investment were assessed. It is important to keep in mind that the dependent variable being examined is "continuous data in nature" or GDP fluctuations expressed as percentages. The ARDL are therefore pertinent to our research. Using the model, the researcher investigated the long-term relationship between the variables.

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \epsilon \quad (5)$$

whereby, Y = Economic Growth; X_1 = Foreign Assistance, X_2 = FDI and X_3 = Trade openness; whereby β_0 = Co-efficient of the model; β_1 – β_5 = Coefficients; ϵ = Stochastic Error Term.

4. Results and discussion

4.1. Basic descriptive statistics

In the study, descriptive statistics are employed to emphasize the salient features of the data. Big data sets can also be presented in a comprehensible way with descriptive statistics. Since a descriptive statistic distills a large amount of data into a concise description of the sample, it is the initial stage in any quantitative data study. Descriptive or summary statistics, which use skewness and kurtosis to infer features of the data distribution, play a major role in determining whether or not the data may be processed using natural logarithms. The annual time series data used in this study comprised 51 observations from 1970 to 2020. The two primary components of the study are the GDP and foreign aid. **Table 1** displays the findings of the created, assembled, and presented descriptive statistics.

Table 1. Descriptive statistics.

Variables	Observation	Mean	Std. Dev.	Min	Max	Skew.	Kurt.
GDP	51	3,652,526	5,923,000	9173	1.4908e	1.718	4.731
DD	51	743.1181	768.9742	6.9	2294.1461	0.712	2.246
ED	51	5,440,000	8,760,000	2219.6	29,900,000	1.582	4.123
ln (GDP)	51	14.3750	3.2501	9.124	18.8155	-0.223	1.585
TO	51	15.6010	11.0551	2.4	36.1001	0.504	1.693
FA	51	16.5540	7.5792	7.5	35.9499	0.874	3.15

Source: Research findings, 2024.

The results of the logarithmically converted data for the level and mean, standard deviation, maximum, minimum, and skewness are shown in **Table 1**. The data in the accompanying table shows that the mean values of all the variables that were analyzed were positive. Furthermore, in the event of exceptional trade openness and foreign help, a negative skewness is observed for the natural logarithms of GDP and foreign aid. The kurtosis values of all the variables are quite close to normalcy and fall below the 3-point threshold for a normal distribution. The GDP and foreign aid show the biggest disparities.

4.2. Diagnostics test

Before making any conclusions from the estimation data, a number of diagnostic tests were run to make sure the models were statistically sound and appropriate for forecasting [9]. The following diagnostic tests were performed to make sure the empirical models were statistically sound and that the fundamental presumptions of the classical linear regression model (CLRM) were maintained: To ascertain whether the residuals were regularly distributed, a number of tests were conducted. These included tests for heteroscedasticity, Jarque-Berra (J-B) tests, Breusch-Godfrey LM tests to find the Lagrange multiplier (LM) to assess for serial autocorrelation, and CUSUM and CUSUM of squares tests to confirm model stability. It is crucial to remember that estimating statistical models under circumstances when the traditional linear regression model's assumptions are broken may result in skewed and

inconsistent parameter estimates.

4.2.1. Breusch-Godfrey LM test for autocorrelation

The Breusch-Godfrey Serial Correlation Test was used to determine whether the investigation's mistake phrases were serially connected. The alternative hypothesis to the null hypothesis that there is no serial correlation in the serial correlation test is that the error terms are auto-correlated. At a 5% significance level, the Breusch-Godfrey (B-G) critical value (CV) is normally 3.84. The estimated Breusch-Godfrey F -statistic (B-G statistic 3.84), at the 5% significant level, should typically be less than the critical value of 3.84 in order to avoid rejecting the null hypothesis that there is no serial link. Additionally, at the 5% significant level, the matching p -value that was produced ought to have been greater than 0.05. **Table 2** shows the findings of the Breusch-Godfrey Serial Correlation tests, which were prepared, summarized, and presented as shown below.

Table 2. Breusch-Godfrey LM test for autocorrelation.

lags(p)	chi2	df	Prob > chi2
1	20.369	1	0.630

Source: Research findings, 2024.

The p -value exceeds the test's necessary significance level of 5%, as **Table 2** demonstrates. Therefore, we are unable to reject the null hypothesis at the 5% significance level. Consequently, it was demonstrated that serial autocorrelation is absent from the regression residuals. The data series does not violate the autocorrelation assumption, as shown by the Breusch-Godfrey Serial Autocorrelation results.

4.2.2. Test of the normality assumption

As seen in **Table 3**, the computed Jarque-Berra p -value was 0.3443, which is greater than 0.05 at the 5% significant level. Because of this, if the computed p -value is higher than the 5% level of significance, the null hypothesis can usually not be rejected. Consequently, the normal distribution of the regression residuals was ascertained. The data series does not defy the presumption of a normal distribution, according to the findings of the Jarque-Berra normality test. According to Mushi [10], if the residuals show a pattern of normal distribution, then the estimates' coefficients also do.

Table 3. Jarque-Berra statistic.

Model	Chi2	Prob > Chi2	Model
Residuals	3.222	0.4322	Residuals

Source: Research findings, 2024.

4.2.3. Test of heteroscedasticity assumption

Table 4 displays the computed p -value of 0.1129 for the Breusch Pagan test of heteroscedasticity. This finding is significant above 0.05 at the 5% level. Therefore, in general, at the 5% level of significance, the null hypothesis could not be rejected. This suggests that there is continuous variance as the residual show homoscedasticity.

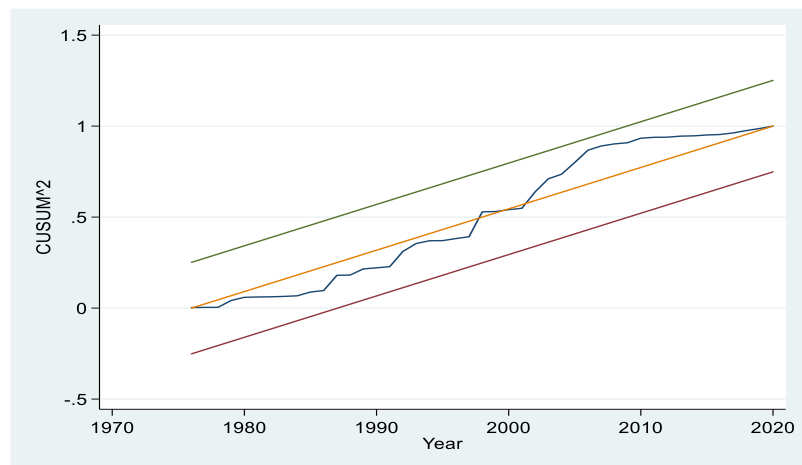
Table 4. Test for heteroscedasticity.

Source	chi2	df	P
Heteroscedasticity	30.00	3	0.001
Skewness	8.22	3	0.003
Kurtosis	2.33	3	0.03
Total	2.88	9	0.04

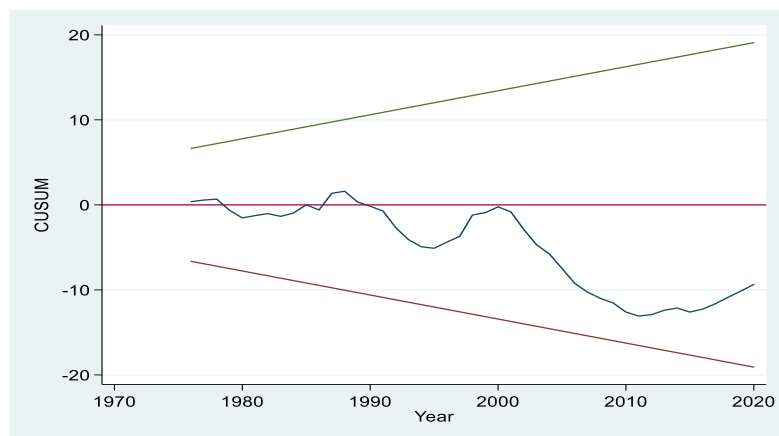
Source: Research findings, 2024.

4.2.4. Model stability tests

Ultimately, a stability test of the recursive estimations in the model was performed on the resulting equations. Consequently, in order to ascertain whether the regression model is stable, the CUSUM chart tests were employed in this investigation. In contrast to the alternative hypothesis, which contends that the model is not stable, the null hypothesis for the CUSUM chart tests suggests that the model is stable. If the cumulative sum (CUSUM) of the residual curves is beyond the dual standard of errors range, the null hypothesis that the model is stable at the 5% significance level is typically not able to be rejected. **Figures 1** and **2** show the output results from the CUSUM tests that are performed in this regard.

**Figure 1.** CUSUM square chart.

Source: Research findings, 2024.

**Figure 2.** CUSUM chart.

Source: Research findings, 2024.

The results displayed in **Figure 1** demonstrate that the residual curves fall inside or between the upper and lower bounds of the dual standard of errors range at a five percent significant level. These results provided significant evidence for the null hypothesis, which holds that the model is stable, at the five percent significance level. The findings suggest that the regression model hypothesis is robust because the residuals curve falls within the dual standard error range.

The CUSUM chart, which is used to track residual and assess model stability, is shown in **Figure 2**. The results, which are shown in **Figure 2**, show that residual curves exist over the dual standard of error range at the 5% significant level. These results provide sufficient evidence in favor of the null hypothesis. Because the residuals curve and the CUSUM square chart are both within the dual standard error range, the results support the assertion that the regression model is stable.

4.3. Correlation matrix

The correlation matrix shows the initial pattern of the relationship between the dependent and explanatory variables. This matrix shows the orientations of the two random variables. The multicollinearity of the explanatory components may also be shown by the correlation matrix if the correlation coefficient is 0.9 or above. If the correlation coefficient is one, then there is a complete linear relationship between the variables. There is always a range of values for the correlation coefficient, ranging from negative to positive. These two additional important correlational characteristics. Moreover, multicollinearity is evident at all correlation locations, which span from 0.9 to 1 or from -0.9 to negative 1. **Table 5** displays the outcomes of the matrix test.

Table 5. Show the correlation matrix table for foreign assistance, FDI and Trade Openness.

	TO	FA	FDI
TO	1		
FA	-0.4303 (0.0016)	1	
FDI	0.4127 (0.0026)	0.2573 (0.0683)	1

Source: Research findings, 2024.

Due to the fact that the absolute coefficient of correlation, $r = 0.7697$, is found to be greater than 0.5 and the p -value in the brackets was 0.000, which is below the 0.05 level of significance, **Table 5** only shows a strong positive linear link between trade openness, foreign aid, and FDI. This suggests that there is no connection between aid, foreign direct investment, and trade openness. Furthermore, a less-than-0.5 correlation of 0.4127 was found between trade openness, FDI, and aid. Furthermore, the p -value was found to be less than 0.05, indicating that aid, FDI, and trade openness were only marginally positively correlated.

However, the results show a strong positive linear correlation between foreign aid, FDI, and trade openness rate, with the p -value in the brackets being less than the 0.05 level of significance and the absolute coefficient of correlation ($r = 0.5653$) being

less than 0.5. Finally, **Table 5**'s results demonstrated that there was no correlation between the independent variables examined in this study, with each pair's coefficient being less than 0.9. This suggests that the multicollinearity of the model was not problematic.

The findings presented here corroborate those of Mushi [10], who discovered evidence of a significant positive and negative relationship between GDP and foreign assistance.

4.4. Results for unit root test

The unit root or stationarity test was applied to the time series data. This test aims to identify the order in which the variables are integrated as well as if the time series consists of stationary or non-stationary data. A time series is considered stationary when its mean and variance do not change during the course of the series. On the other hand, time series data are regarded as non-stationary if the variance and/or the mean vary over time. The trend in the data series makes non-stationary variables liable to yield weak or misleading results, which is why the unit root test is required.

Mushi [10], states that the first stage in creating a time series model is to test the unit root. One popular technique for figuring out if a series has a root unit is the Augmented Dickey-Fuller (ADF) test. But as Mushi [10] points out, the ADF criteria is notorious for having a low test power. The ADF test has been criticized on occasion for having insufficient power, hence the unit root test was broadened to incorporate Phillips' Peron (PP) test techniques. PP is a better criterion since it can differentiate between series that seem to have unit roots, series that are stationary, and series for which tests are unable to identify whether the series is stationary or integrated. The results were created, summarized, and submitted in **Table 6** for the Augmented Dickey-Fuller (ADF) tests and Phillips's Peron (PP) test.

Table 6. Show test for stationarity in both the Augmented Dickey fuller test and Phillips's Peron.

ADF Test					
Variable	Level		First difference		order of integration
	Test statistics	Critical value	Test statistics	Critical value	
GDP	-3.255	-2.588	-3.551 **	-5.555	I (1)
TO	-3.222	-1.258	-4.555 **	-3.555	I (1)
FA	-2.058	-3.580	-9.007 **	-3.587	I (1)
FDI	-1.428	-3.580	-5.263 **	-3.587	I (1)
The PP Test					
Variable	Level		First difference		order of integration
	Test statistics	Critical value	Test statistics	Critical value	
GDP	2.50	-2.3633	-4.187 **	-3.587	I (1)
TO	-3.252	-7.333	-4.336 **	-3.587	I (1)
FA	-1.931	-3.580	-9.167 **	-3.587	I (1)
FDI	-1.606	-3.580	-5.233 **	-3.587	I (1)

Note: That the star (**) therefore accounts for the *P* values that are less than a 5% level of significance. Source: Research findings, 2024.

The alternative hypothesis, which contends that the series lacks a root unit, and the null hypothesis, which contends that the series does have a root unit, serve as the foundation for the Dickey-Fuller (ADF) test. It is assumed that the series has no unit root if the ADF statistics exceed the absolute asymptotic critical values. It is necessary to show the stability of the null hypothesis, which states that the unit root of the series is rejected [11]. To further evaluate the provided data, the superior Phillips's Peron (PP) criteria were applied because some of the variables had root unit ADF data. According to Mwananziche [11], when tests fail to identify whether a series is integrated or stationary, Phillips's Peron (PP), which makes the distinction between stationary series, unit root series, and non-unit root series, is a more appropriate criterion. The results that were gathered, combined, and presented are shown in **Table 6**.

4.5. Johansen co-integration test

The task of figuring out whether there is a long-term link between the variables is made easier by Johansen co-integration. The Johansen co-integration test is applied once the variables' ideal lag time has been determined and a stationary check has been completed. When variables show a long-term link or association, the Vector Error Correction Model (VECM), also known as the VEC model, is appropriate. When there are both non-stationary I (1) and Stationary I (0) variables present, Mwananziche et al. [11] advise using the ARDL.

Among the many advantages of the ARDL model is its ability to avoid the pre-test difficulty that the typical co-integration technique provides, which requires a comparable integration [12]. It also applies to small samples. This study employed the homogeneous integration order-based Johansen co-integration test to determine whether or not the time series data are co-integrated. Other co-integration tests, such as the Gregory-Hansen test and co-integration border tests, have historically been employed in addition to the Johansen co-integration test when the order integration is not uniform to all variables.

Table 7. Johansen co-integration test.

Null Hypotheses	Trace Statistics	Critical Value	Max-Eigen Statistics	Critical Value
$r = 0$	77.5522**	87.88	66.888	88.663
$r \leq 1$	57.1572**	63.55	36.666	63.88
$r \leq 2$	63.555**	33.88	99.888	87.22
$r \leq 3$	33.333**	18.88	33.885	19.88
$r \leq 4$	3.8522**	6.33	3.999**	88.99

Note: r : represents co-integrating vectors or relationships; when λ_{trace} and λ_{max} tests are in conflict decision is made based on λ_{trace} statistics; ** indicates rejection of the null hypotheses at 5% levels of significance.

Source: Research findings, 2024.

Because the trace statistics were greater than the absolute asymptotic critical values, the tests in **Table 7** reject the null hypothesis of co-integration ($r = 0$) against the alternative, indicating a long-term relationship between GDP, foreign aid, FDI, and trade openness. In contrast to Max-Eigen statistics, which fell below the absolute

asymptotic critical values, this showed that trade openness, GDP, FDI, and foreign assistance did not have a long-term relationship. When two statistics produce inconsistent results, the most reasonable course of action is to use trace statistics [12]. Because of this, there is a need to find trace statistics, which ultimately results in the realization that trade openness, FDI, GDP, and foreign assistance all have a consistent relationship.

4.6. Autoregressive distributed lag model for determining the nexus between foreign assistance, foreign direct investment, trade openness and economic growth in Tanzania

In this section, the result of regression analysis is presented then after that the diagnostic test is followed for the sake of testing the validity of the findings.

4.7. Determination of the relationship between foreign assistance, FDI and trade openness and economic growth in Tanzania

The ARDL statistics used to ascertain the correlation between foreign aid and Tanzania's economic development are presented in **Table 8**. Given that the p -value above the significance level of 0.05, it seems likely that there was no long-term effect on economic growth and foreign aid. However, the p -value is below the 5% significance level, indicating that there isn't a direct association between foreign aid and economic growth. The regression coefficient of -0.00410 indicates that the initial difference in foreign aid had a substantial negative impact on GDP (economic growth) in the short run; the p -value was also found to be below the 5% level of significance. This means that economic growth fell on average by 0.00410 percent for every percentage increase in the first difference in foreign aid. These results are not supported by the findings of Rojík et al. [13]. Studies have demonstrated a strong positive correlation between foreign aid and economic expansion. In this particular study, however, foreign aid had a negative short-term impact on growth. The fact that our study focused on middle-income nations, although the developed countries in these two studies had diverse economies, may help to explain this discrepancy [14].

According to the study's findings on foreign aid, more funding might promote economic growth by providing social amenities like power, water, and medical facilities in addition to education.

Table 8. Show the effects of public debt on economic growth in Tanzania.

	(1)	(2)	(3)
VARIABLES	ADJ	LR	SR
			(0.0019)
D. Foreign assistance			0.0005
			(0.0043)
LD. Trade openness			-0.0182^{***}
			(0.0043)
ln (Trade openness)		0.560 ^{***}	
		(0.171)	

Table 8. (Continued).

	(1)	(2)	(3)
VARIABLES	ADJ	LR	SR
Ln Foreign assistance		0.645*** (0.1072)	
FDI		0.0075 (0.0107)	
GDP		-0.0150 (0.0149)	
L. ln GDP	-0.240*** (0.0818)		
Constant			0.891*** (0.277)
Observations	51	51	51
R-squared	0.78	0.66	0.77

Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$
Source: Research findings, 2024.

4.8. Research hypothesis

H0: There is no relationship between foreign assistance and economic growth in Tanzania?

Findings indicated that there is relationship between foreign assistance and economic growth. These results are not supported by the findings of Younsi et al. [15]. Studies have demonstrated a strong positive correlation between foreign aid and economic expansion. In this particular study, however, foreign aid had a negative short-term impact on growth. The fact that our study focused on middle-income nations, although the developed countries in these two studies had diverse economies, may help to explain this discrepancy [15].

H0: There is no relationship between Trade openness influence economic growth in Tanzania?

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5. Conclusion and recommendation

There's a risk that receiving aid from abroad may prevent rapid economic expansion. Therefore, in order to decrease the detrimental consequences that these factors impose, the Bank of Tanzania should regulate the variables that affect debt. According to the study, larger loan amounts can promote economic expansion by making it possible to meet necessities like power, water, and medical care.

The analysis's findings show that there isn't a clear relationship between Tanzania's GDP and foreign aid. The analysis came to the conclusion that the

Tanzanian government shouldn't pursue any additional short- or long-term changes to contract terms and conditions in order to achieve economic development and sustainability. The study's findings should increase our understanding of the relationship between Tanzania's national debt and economic growth.

Conflict of interest: The author declares no conflict of interest.

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