Nexus between per capita income and tax revenue generation in Tanzania: An VCM analysis

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ABSTRACT

The purpose of this study was to investigate how per capita income affects tax revenue collection. Theory of tax-level determinants employed in this study. The study employed a quantitative research methodology and a panel data research design, which comprised a number of panel data procedures such as cointegration and normality testing. Tanzania was represented via secondary data from two areas, totaling 200 observations. Vector Error Correction Model (VECM) was developed to look at long-term connections between variables. The data came from credible sources Tanzania Revenue Authority (TRA), Bank of Tanzania (BOT), National Bureau of Statistics (NBS), International Monetary Funds (IMF), and Word Bank (WB). The study's findings revealed a statistically significant association between per capita income and tax revenue generation in developing countries like Tanzania. According to the research, designing and implementing a more realistic tax framework that allows for monetary ties will improve revenue collection across nations. The government must provide a more favourable environment for overseas trade so that more of them may be undertaken, hence growing GDP. Changes in tax charges must also be regulated in order to increase the TZS pricing, which may have an influence on revenue collection.

Keywords: Per Capita Income, Performance, Revenue Collection, Tax Revenue Generation, Tanzania

I. INTRODUCTION

Revenue collection is critical to long-term financial performance in both developed and developing countries (Bitababaje, 2020a). Tanzania, like other growing countries, struggles to provide communal amenities to its citizens, such as health care, education, and water (Mengistie, 2018). Tanzania, like many African governments, has sought to improve tax collecting performance by radical changes, but the results remain inefficient, and the country relies on loans and grants to cover its deficit budget (Mtasiwa, 2013). Revenue collection is crucial for promoting long-term economic growth in developing nations (Chandia et al., 2014; Thika, 2014). Individuals gain from development efforts and ongoing investment via the provision of social services. Despite this, tax collection in emerging countries has not always been as efficient as it might be, for a number of reasons (National Audit Office of Tanzania -NAOT, 2020; Ade et al., 2018). According to the World Bank's 2022 database, Tanzania had poor revenue collection between 1990 and 1996 as a result of tax reform efforts such as the establishment of the Tanzania Revenue Authority (TRA) and the denationalisation of community projects. Furthermore, between 1999 and 2010, tax receipts were insufficient due to the 2007 financial crisis, forcing the government to fail to provide people with social services. Furthermore, revenue collection grew dramatically between 2015 and 2020 as a result of TRA's increasing automation, the use of integrated systems such as Tanzania Customs Integrated System (TANCIS) and the development of Government Electronic Payment Gateway Systems (GePGs) (Ade et al., 2018). It is thought that proper population management, government spending, and per capita income can increase tax collection performance (Bitababaje, 2020; Palil, 2010; Mburugu & Gekara, 2016).

The discovery that many rising economies continue to have relatively low tax collections despite improvements in per capita income and overall economic success served as the inspiration for this study. Although economic growth is expected to broaden the tax base, structural constraints such as large informal sectors, ineffective tax administration, tax evasion, and institutional inefficiencies may limit higher incomes' ability to translate into more government revenue (Besley & Persson, 2014; Keen & Lockwood, 2010). As a result, determining the extent to which per capita income influences tax collection remains an important policy and intellectual issue.

Despite the extensive literature on tax performance, substantial research gaps remain. For starters, many empirical studies focus on aggregate GDP or economic growth rather than per capita income as a predictor of tax revenue. Second, previous findings have been inconsistent across nations and regions, indicating that the connection might be impacted by institutional and economic elements specific to each country. Third, few studies apply rigorous econometric approaches to examine the short- and long-term implications of per capita income on tax collection,

especially in emerging economies (Gupta, 2007; Tanzi & Zed, 2000). These gaps highlight the need for greater empirical research.

To address these issues, this study adopts a quantitative research approach based on secondary macroeconomic data obtained from reliable national and international sources. To analyse the influence of per capita income on tax collection, the study uses descriptive statistics and econometric techniques such as correlation analysis and regression modelling. Where available, time-series diagnostic procedures such as unit root and cointegration tests can be employed to ensure the validity and reliability of empirical data.

The results reveal that per capita income has a positive and statistically significant relationship with tax revenue, implying that rising average income levels result in higher government revenue collection. The findings show that economic expansion boosts taxable capacity and expands the fiscal space available to governments to undertake development programs. Other factors, such as tax administration efficiency and institutional quality, also have an impact on the efficacy of this link.

Unlike prior studies (Barro & Furman, 2018; Hanson, 2021), which have mostly concentrated on aggregate economic growth, this one highlights individual income levels as a critical element in tax capacity. The findings can assist policymakers establish strategies for increasing domestic revenue mobilisation through inclusive economic development, tax system modernisation, and improved fiscal governance.

An investigation of the factors determining revenue collection success through the lens of an authorised budget yields varied results. Manyanga (2020) and Onduso (2013) found no association between per capita income and revenue collection performance, but rather a mismatch between per capita income and actual tax collections caused by poor forecasting. Furthermore, the study findings will be useful to researchers since they will encourage future research into the scope of the tax system and tax regulators; academics who wish to begin new research on taxes will also find the works from this study intriguing. The study sheds light on the factors that influence tax revenue collection and creates an environment that promotes tax compliance in Tanzania. In Tanzania, income collection remains a significant difficulty, preventing the government from paying community services such as education and health. According to the TRA Survey in 2022, Tanzania's primary revenue collection difficulties include poor tax administration, tax arrears, and excessive tax rates. Exploring these three variables in Tanzania indicates that between 1995 and 2020, revenue collection performance fell from 0.9% to 0.3%, indicating a knowledge gap in recognising these two trends. Against this backdrop of theoretical and empirical evidence, the study attempts to identify the drivers impacting revenue collection success utilising secondary data rather than primary data, as in earlier studies.

The next section covers the relevant theoretical and empirical literature. This is followed by the research approach, which includes data sources and analytical methods. The empirical findings are presented and discussed in the next part, and policy recommendations, conclusions, and future study are provided in the last section.

1.1 Research Hypothesis

H_0: There is no relationship between per capita income and tax revenue generation
H_1: There is a relationship between per capita income and tax revenue generation

II. LITERATURE REVIEW

2.1 Theoretical Review

This study connected by theory of tax level determinants

2.2.1 Theory of tax level determinants

The theory of tax level determinants was developed by Lotz and Morss (1970). The theory explains tax revenue as a share of Gross Domestic Product (GDP), commonly referred to as the tax ratio (Orlova et al., 2019). It argues that the primary factors influencing tax revenue performance in developing economies are trade openness, measured through imports and exports, and per capita income, which reflects the level of economic development. According to Ramgulam et al. (2012), more overseas trade results in higher tax revenue. Elmirzaev (2016) observed that the growth in trade activity was due to the government's administrative necessity to encourage business transparency and commercialisation.

The theory also contends that governments may improve their tax collecting capability by fostering economic growth and investing in public infrastructure and social services such as education, transportation systems, communication networks, water supply, and human capital development. Scholars such as Bird et al. (2008), Chelliah et al. (1971), Gupta (2007), and Masiye (2019) have widely used the theory of tax level determinants to taxation research. The argument emphasises how governments in both rich and emerging economies rely on tax revenues to fund critical industries such as agriculture, industry, and services. As a result, knowing the drivers of tax income across different industries is critical, as some sectors contribute much more than others. Furthermore, Elmirzaev (2016) and Orlova et al. (2019) expanded the theory by include sectoral composition as a new driver of tax income. Despite its applicability,

the hypothesis has been criticised by various experts. For example, Bird (2008) advocated against using cross-sectional and panel data to analyse tax revenue performance, claiming that findings from one nation cannot be easily generalised to other countries. Furthermore, critics argue that the theory fails to adequately explain how governments in underdeveloped countries may efficiently enhance tax collecting systems. Chindengwike (2020) also noted that several of the theory's assumptions are less appropriate in developing nations. Nonetheless, the theory is still relevant since it emphasises economic growth, trade openness, imports, exports, and industry development as key drivers of tax revenue mobilisation.

Furthermore, the theory argues that tax bases are more important in determining tax income in developing nations than public expenditure demands, whereas in rich economies, tax collection is primarily driven by government spending requirements. Several empirical studies have looked at the link between structural characteristics including trade openness, per capita income, and commercialisation and tax revenue performance.

2.2 Empirical Review

Jabari (2020) found that per capita income increases tax revenue collection in the long term, but has no meaningful influence in the short run. Similarly, Nguyen et al. (2014) observed that increases in per capita income tend to boost tax revenue, as many governments rely substantially on income taxes. Empirical studies from OECD nations also show that economic growth and growing income levels increase tax collections by expanding the formal sector of the economy (Castro et al., 2014; Amin et al., 2014; Langford et al., 2015; Terefe et al., 2018).

On the contrary, Alabede (2018) discovered a negative association between per capita income and tax revenue collection in Sub-Saharan African nations, owing mostly to the presence of informal economic activity that are difficult to tax. Similarly, research conducted by Alabede (2018). Addison and Jorgen (2012), and Ayenew (2016) discovered that per capita income had a negative impact on tax revenue collection in the near run since the advantages of economic expansion take time to transfer into greater revenue. Furthermore, trade openness, typically defined as the ratio of imports and exports to GDP, has been identified as a critical factor of tax revenue mobilisation. According to Gupta (2007), the link between trade openness and domestic tax income is ambiguous since trade liberalisation can either raise or decrease tax collection. Keen and Simone (2004), on the other hand, contended that better customs administration and openness can boost tax revenue performance. Other researchers, including Minh Le, Moren-Dodson, and Bayraktar (2012), investigated the contribution of agricultural value addition to GDP in explaining tax revenue mobilisation and discovered that the agricultural sector generally contributes less tax revenue than other sectors of the economy.

H_O: There is no relationship between per capita income and tax revenue generation

On the contrary, Ramgulam et al. (2012), Bătrâncea et al. (2013), and Ganecho (2018) revealed a positive association between these characteristics. The research findings will help the government develop and implement financial and economic measures to enhance tax collecting situations. Furthermore, the study findings will be valuable to researchers since they will inspire further research in the breadth of the tax system and tax regulators; academics who want to start fresh research on taxes will also find the works from this study interesting. The study provides insight into the elements that impact tax revenue collection and fosters an environment that supports tax compliance in Tanzania. The research findings will help the government create and implement financial and economic measures to increase tax collection.

H_1: There is a relationship between per capita income and tax revenue generation

III. METHODOLOGY

The study used a quantitative research technique and a panel data research design, which included several panel data procedures such as the cointegration test and normalcy test. Secondary data from two regions was utilised to represent Tanzania, totalling 200 observations. The Vector Correlation Model (VCM) was used to investigate long-term relationships between variables. The data was gathered from respectable sources (TRA, BOT, NBS, IMF, and WB).

The inclusion and exclusion criteria were designed to guarantee that the dataset was accurate, comprehensive, consistent, and relevant to the study's aims. Restricting the analysis to data from reputable agencies such as the Bank of Tanzania, the National Bureau of Statistics, the Ministry of Finance, and the Tanzania Revenue Authority reduced measurement errors and increased the trustworthiness of the findings. Including just full time-series observations decreased the possibility of estimate bias and increased the efficiency of statistical analyses including unit root tests, cointegration tests, and regression models.

Furthermore, removing incomplete and inconsistent data improved the study's internal validity by ensuring that the predicted association between per capita income and tax revenue generation was based on true economic trends rather than data anomalies. The use of standardised terminology and a continuous study duration increased the

comparability of observations throughout time, boosting the research's reliability and replicability. Overall, these criteria helped to produce strong, valid, and reliable empirical conclusions about the impact of per capita income on tax revenue collection.

3.1 Model Specification

This study employed the Vector Error Correction Model (VECM) to examine the long-rung connection between variables. This study used the VECM since the dependent variable is "continuous" and the sample size is sufficient to apply the VEC model. The computation of the model is as follows:

$$Y_t = f(PI_1 + TO_2 + IR + EDO + IQ + e_t) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots . (1)$$

Where:

$PI_1 =$ Per Capita Income; $\mathrm{IR} =$ Investiont ratio; $\mathrm{EDO} =$ Educational outcomes; $\mathrm{IQ} =$ Institutional Quality; TO_2 =Trade Openness; $Yt = Tax$ Revenue Generation; $e_t =$ Error Term

IV. FINDINGS & DISCUSSION

4.1 Findings

4.1.1 Lag Order Selection Criteria

Table 1 demonstrates the ideal lag duration for the four variables: revenue collection performance, per capita income, and AIC/SIC. The practical criteria are to focus on the lowest AIC and SIC; this provides the ideal lag to utilise. According to Kripfganz et al. (2016), the benchmark for lag order selection criterion should be based on values from Schwartz Information criterion, Akaike Information Criteria (AIC), and Hannan-Quinn Information Criterion, with the lowest values compared to other values in each observation. So, based on Akaike Information Criteria, the lowest values are 54.71921*, which is dependent on lag 2 and was chosen latency 2. Other criteria include Schwartz Information Criteria (SC); the minimum values are 55.71018 based on lag 1. So, based on Schwartz Information Criteria, the ideal lag is lag1, and the lag order selection criteria is the Hannan-Quinn (HQ) Information Criterion, which has a minimum value of 54.97112 and so is optimum. Therefore, our data reveal that the lowest values of AIC 54.71921, which is in a second lag (Lag 2). This suggests that lag 1 is appropriate for the research since the value of HQ is lower than lag 0 and lag 2.

Table 1

VAR Lag Order Selection Criteria

Lag	SC	HQ	AIC
0	55.0970	68.90688	67.07000
1	**67.09678**	**78.90788***	**68.09000***
2	61.9890*	89.9098	78.09099

***** Designates lag order nominated by the standard

Where by:

Alternative hypothesis (H_1) assumes that the variables are stationary and free from a unit root.

4.2 Stationary test of all variables

The data of a time series is called stationary if its value tends to return to its long-run average value and the contents of the data sequence are not altered due to the change in period one. Using the ADF test for unit root test in table 4.2, we see that the p value is 0.7950, which is more than the 0.05 significant threshold, indicating that the variables are not stationary or have a unit root, hence we accept Ho in favour of H1. As a result, differentiating the series was required to get a stationary series. Similarly, Muibi and Sinbo (2013) and Botlhole (2010) used the same benchmark and discovered that the stationarity test at level is greater than 50% due to its normal distribution curve; thus, it is agreed that variables exhibit a long run connection; otherwise, there is no long run association among the variables.

However, hatsq should not be employed since, if our ideal is accurately articulated, the squared forecasts will have no descriptive control. That is, if our ideal is expressed correctly, we should not expect hatsq to be a major forecaster (Muibi & Sinbo, 2013). Similarly, Muibi and Sinbo (2013), used the same benchmark and observed that the stationarity test at the level is more than 50%, showing that the variables have a long-run relationship; otherwise, there is no long-run connection among them. From table 4.5; the Augmented Dickey-Fuller test for the unit root indicates that the probability values for the per capita of GDP is 0.0171 which is less that the statistical significance level of 5%, and in that regard, we reject the null hypothesis that the series is non-stationary at level I (1), and accept the H (1) that the per capita of GDP is stationary at I(1). Table 4.2 shows that the Augmented Dickey-Fuller test for the unit root indicates that the probability value for per capital income is 0.6266, which is greater than the arithmetic meaning level of 5%, and thus the null hypothesis is accepted on the basis of the contention that the series is non-stationary at level I (0). According

to the study, the Augmented Dickey-Fuller represents 62.6% of the total confidence level (Muibi & Sinbo, 2013). Similarly, Botlhole (2010) employed the same benchmark and discovered that the correlogram shows several bars that are beyond the confidence bound. It is therefore accepted that variables reflect the long run association; otherwise, there is no long run connotation among the variables

Table 2 shows that the Augmented Dickey-Fuller test for the unit root designates that the probability value for the Trade Openness of GDP is 0.0062, which is less than the arithmetic implication level of 5%, and in that regard, we reject the null hypothesis that the series is non-stationary at level I (1) and accept the H (1) that the Trade Openness is stationary at I (1) (Muibi & Sinbo (2013). According to the study, the Augmented Dickey-Fuller represents 4.6% of overall confidence (Muibi & Sinbo, 2013). This suggests that in the stationary test at the first difference, Trade Openness boosts revenue collection by 4.6%

Table 2

Stationarity Test at level

Augmented Dickey-Fuller test statistic			t-Statistic	Prob.*
			-3.516639	0.950
Test critical values:	10% level	Tax Revenue	-5.394309	
	5% level		3.612199	
	1% level		-1.243079	
	10% level	Per capital Income	2.90900	0.0018
	5% level		-2.58629	
	1% level		-6.79259	
	10% level	Education outcomes	-7.416345	0.4801
	5% level		-2.622033	
	1% level		-1.248592	
	10% level	Investment ratio	-8.416345	0.0171
	5% level		-6.896900	
	1% level		-7.933668	
	10% level	**Trade Openness**	-2.416345	0.6266
	5% level		-5.622033	
	1% level		-4.787699	

Source: STATA, 2022

Using a correlogram, the series indicates that there are spikes beyond the confidence boundaries shown by the dotted line, although for a stationary time series, the ACF and PACF spikes should be inside the confidence bounds (Figure 2). Based on the stated grounds, the series is non-stationary at levels; therefore its statistics and variances may change with time (Muibi & Sinbo, 2013). Similarly, Botlhole (2010) employed the same benchmark and discovered that the stationarity test at the level is larger than 50%, indicating that the variables display a long-run link; otherwise, there is no long-run correlation among the variables.

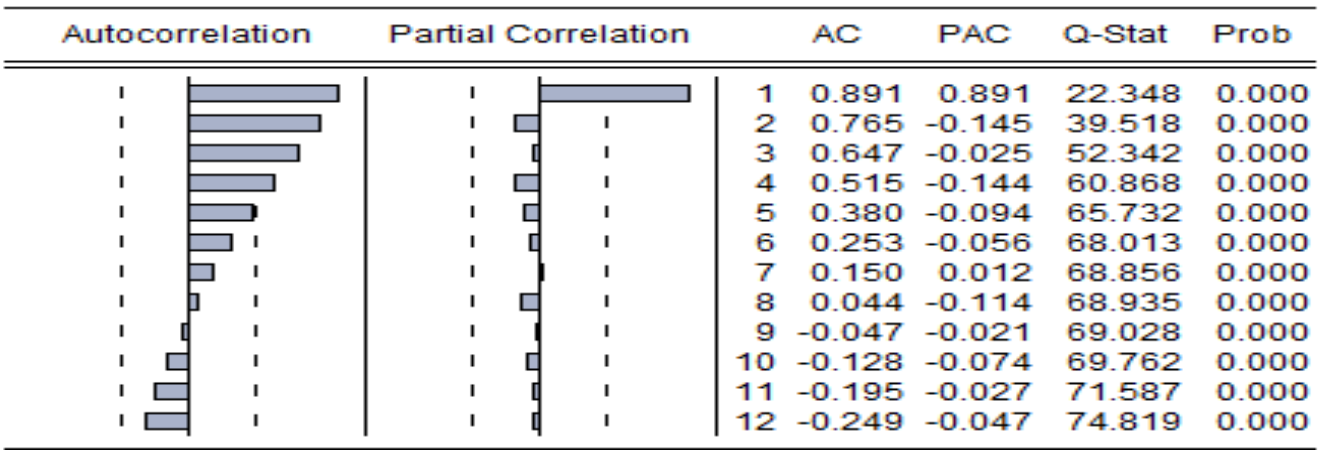
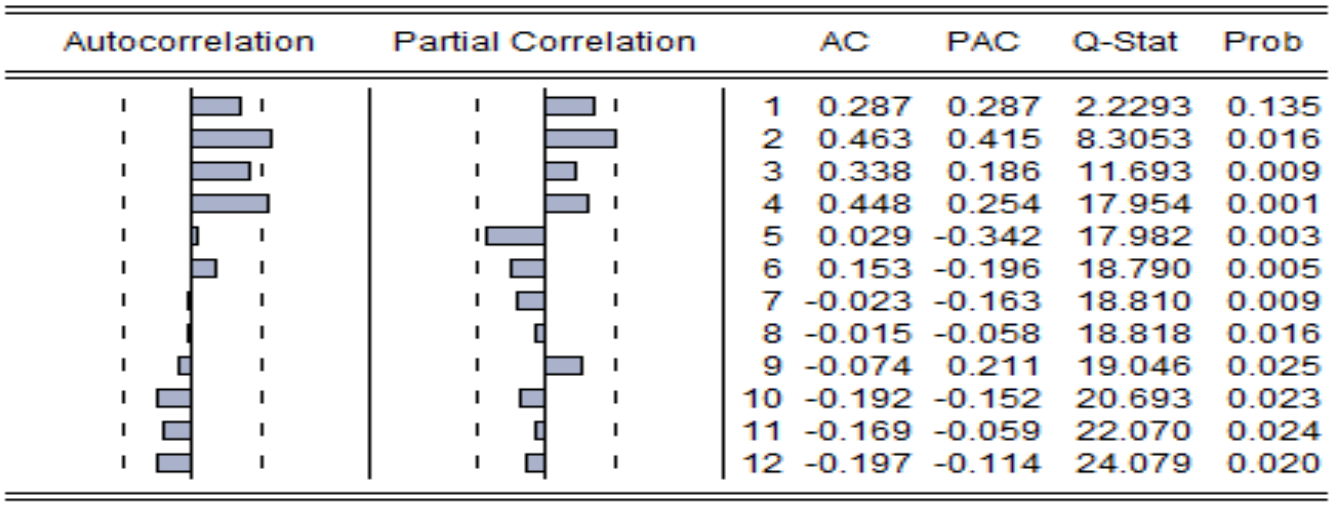


Figure 1

Correlogram at Level

Figure 3 of the correlogram clearly shows that all of the blocks are inside the assurance limits, indicating that the revenue collection performance series is stable at I (1) (Muibi & Sinbo, 2013). Similarly, Botlhole (2010) employed

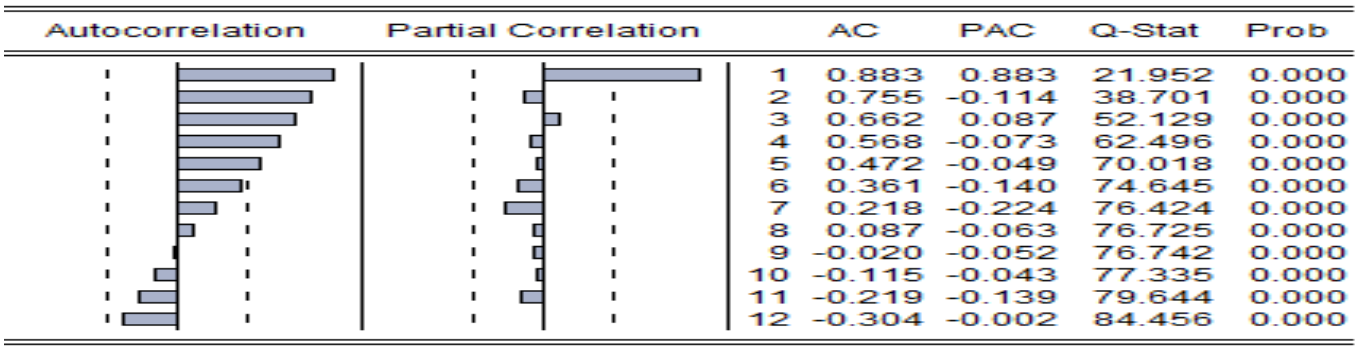
the same benchmark and discovered that the stationarity test at the level is larger than 50%, indicating that the variables display a long-run link; otherwise, there is no long-run relationship among the variables.



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.287	0.287	2.2293	0.135
		2	0.463	0.415	8.3053	0.016
		3	0.338	0.186	11.693	0.009
		4	0.448	0.254	17.954	0.001
		5	0.029	-0.342	17.982	0.003
		6	0.153	-0.196	18.790	0.005
		7	-0.023	-0.163	18.810	0.009
		8	-0.015	-0.058	18.818	0.016
		9	-0.074	0.211	19.046	0.025
		10	-0.192	-0.152	20.693	0.023
		11	-0.169	-0.059	22.070	0.024
		12	-0.197	-0.114	24.079	0.020

Figure 2
Correlogram at Level for Per Capita GDP

In general, the Augmented Dickey-Fuller limits challenging strategy is more appropriate and has better outcomes for small example sets. This technique uses a rummage sale to approximate the dynamics of both short-run and long-run parameters, including the rate of adjustment after a shock, inside the same framework. Furthermore, because strong lag durations are critical to this approach, over-parameterization is prevented. The ADF technique has the disadvantage of not using I(2) variables in its analysis (Nkwatoh, 2014). According to Bertelli (2022), the criteria for the Augmented Dickey-Fuller technique is a probability of length more than 30% of the entire confidence level. Figure 4.4 shows a correlogram at the level of per capita income, with some bars outside and some inside the confidence bound. This reveals that variables have a long-run correlation, as corroborated by Botlhole (2010), who did the analysis using the same benchmark and discovered that the correlogram shows that certain bars are inside the confidence bound.

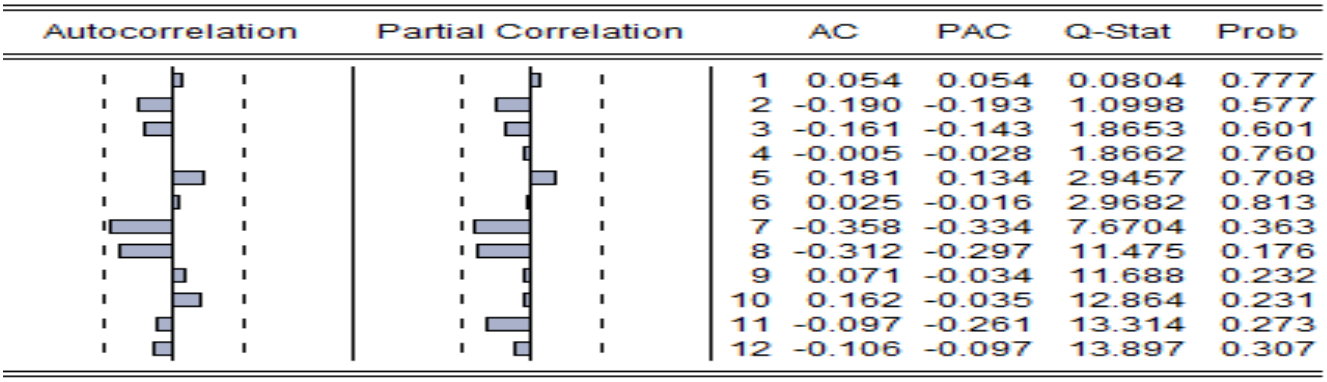


Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.883	0.883	21.952	0.000
		2	0.755	-0.114	38.701	0.000
		3	0.662	0.087	52.129	0.000
		4	0.568	-0.073	62.496	0.000
		5	0.472	-0.049	70.018	0.000
		6	0.361	-0.140	74.645	0.000
		7	0.218	-0.224	76.424	0.000
		8	0.087	-0.063	76.725	0.000
		9	-0.020	-0.052	76.742	0.000
		10	-0.115	-0.043	77.335	0.000
		11	-0.219	-0.139	79.644	0.000
		12	-0.304	-0.002	84.456	0.000

Figure 3
Correlogram at Level for Per Capita Income

4.2.1 Stationarity at First Difference for Per Capita of GDP

In Figure 4, the correlogram shows that some bars are within the confidence bound. Similarly, Botlhole (2010) employed the same benchmark and found that the correlogram shows that certain bars are within the confidence bound. It is so acknowledged that variables demonstrate long-run association; otherwise, no long-run connection exists between the variables.



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.054	0.054	0.0804	0.777
		2	-0.190	-0.193	1.0998	0.577
		3	-0.161	-0.143	1.8653	0.601
		4	-0.005	-0.028	1.8662	0.760
		5	0.181	0.134	2.9457	0.708
		6	0.025	-0.016	2.9682	0.813
		7	-0.358	-0.334	7.6704	0.363
		8	-0.312	-0.297	11.475	0.176
		9	0.071	-0.034	11.688	0.232
		10	0.162	-0.035	12.864	0.231
		11	-0.097	-0.261	13.314	0.273
		12	-0.106	-0.097	13.897	0.307

Figure 4
Correlogram at Level for Trade Openness

4.3 Long run Model

Per capita GDP has an optimistic long-run influence on symmetry location, with impact normalised values of -10137.37 and -7638.023, respectively. This occurs when tax collection performance is a dependent variable and per capita GDP and trade openness are regressors (Muibi & Sinbo, 2013). Similarly, Bello et al. (2019) employed the same benchmark and found that a P-value of less than 0.05 specifies a link between variables.

Table 3
Standard error in parentheses

Tax revenue generation	**GDP Per Capita**
1.000000	-12.45
	(9.54)

Generally, every independent per capital income has a positive association with the response variable (tax revenue collection). The findings are consistent with previous research by Gaalya et al. (2017). According to the benchmark, the P-Value is less than or equal to 0.05. Similarly, Roman and Kartiko (2020) used the same criteria and discovered that a P-value of less than 0.05 shows a relationship between variables (Muibi & Sinbo, 2013). Roman and Kartiko (2020) define the benchmark as a P-value less than or equal to 0.05. Similarly, Bello et al. (2019) used the same benchmark and found that a P-Value of less than 0.05 shows a relationship between variables.

4.4 Error Correction Model (ECM)

The Error Correction Model (ECM) is an alternative to the Vector Error Correction Model. When the VECM is unsuccessful or fails to fit the data correctly, the ECM is used to explain both short-term changes and long-term correlations between variables. Antzoulatos (1996) investigated the classic error correction framework by plotting consumption growth as a function of the error correction term, together with lagged values for consumption and income growth. The study also discovered that delayed consumption and income indicators are useful for predicting future income growth. Furthermore, the constant of the error correction term is frequently predicted to be unfavourable, illustrating the adjustment process for restoring long-run equilibrium after short-run disturbances.

Per capita GDP has a positive long-term impact on equilibrium position, with impression normalised values of -10137.37 and -7638.023, respectively. This occurs when the response variable is revenue collection performance and the regressor is per capita GDP (Lee and Rhee, 2022). Roman and Kartiko (2020) set the benchmark as a P-value of less than or equal to 0.05. Similarly, Bello et al. (2019) utilised the same benchmark to find that negative cointegration indicates a negative link between variables.

Table 4
Error Correction Estimates

Cointegrating Eq:	**CointEq1**
Revenue Collection Performance _Mil(-1)	3.000000
GDP_Per_Capita (-1)	**-2.111.37**
	(0.29)
	[-2.95155]

4.5 Vector Error Correction Model (VECM)

The ECT is shown below, using revenue collection performance as the response variable and per capita income as the independent variable (Lee and Rhee, 2022). According to Bello et al. (2019), the benchmark is a P-value of less

than or equal to 0.05. Similarly, Lee and Rhee (2022) employed the same benchmark and noticed that when the Cointegration is negative, it indicates a negative link between variables.

Table 5 shows the ECT, which is c (1) = - 0.2587, which is a positive indication of symmetry change on behalf of 25.87%, sense that the model was modified by 26.66% in the long run. The likelihood value is 0.0222, which is less than the 0.05 implication level. Correspondingly, c (2) to c (9) are the model's short-run shock coefficients, whereas c (10) is a constant (Cumby and Huizinga, 1992). According to Roman and Kartiko (2020), the benchmark occurs when the adjustment to equilibrium indicates a good result. Similarly, Bello et al. (2019) used the same benchmark and discovered that negative cointegration shows a negative relationship between variables.

Table 5
Vector Error Correlation

	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
D(0)	**-0.578680**	0.567800	-1.097600	**0.0020**
D1)	-0.810900	0.678999	-1.876890	0.0011
D(2)	0.5790467	0.678900	0.687777	0.0131
D(3	-7900.999	0.898900	-0.099999	0.2220
D(4)	-3678090	0.712345	-1.821450	0.4578
D(5)	-9035670	0.632122	-1.521300	0.5097

The mean of a non-symmetric distribution is not at the middle (Tabachnick and Fidell, 2007). Kurtosis describes how far the data diverges from or methods the mean. In other words, it relates to the standard deviation of the data. When the standard deviation is low, the spreading is pointy (leptokurtic, short-tailed), and when it is high, it flattens. Figure 6 clearly portrays the normal curve employing Jarque Bera with a probability of 75.77%, which is more than the 5% significance threshold. As an outcome, all of the variables studied are regularly dispersed. According to Roman and Kartiko (2020), the benchmark is when the chance exceeds 50%. Similarly, Bello et al. (2019) employed the same benchmark and discovered that a Jarque Bera larger than 50% indicates a favourable connection between variables (Okoro and Egberi, 2019). In addition, Bello et al. (2019) employed the same benchmark and discovered that an Obs*R-squared larger than 50% implies a good association between variables.

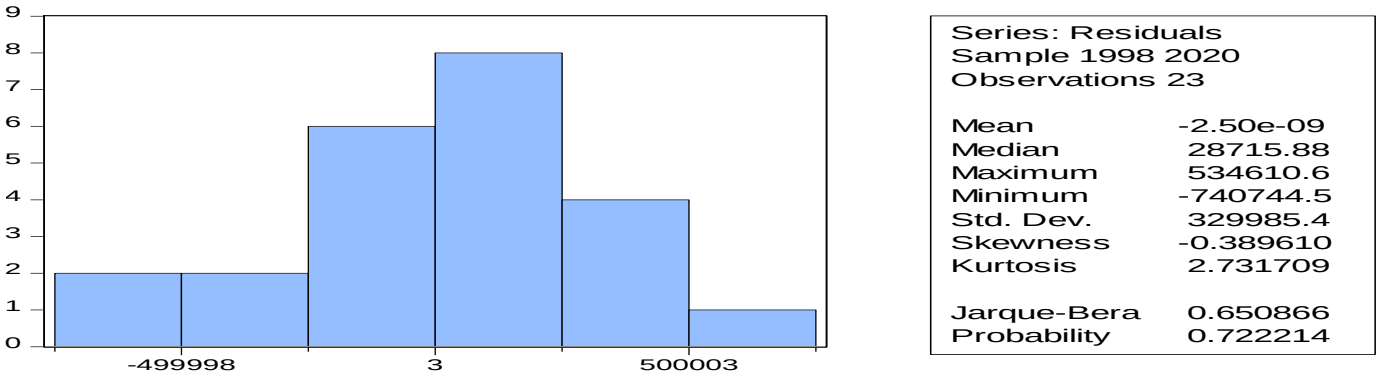


Figure 5
Normality Test

4.6 Stability Test

Figure 7 displays the normal curve using Jarque Bera with a probability of 72.22%, which above the 5% level of significance. As a consequence, all variables analysed follow a regular distribution. According to Roman and Kartiko (2020), the benchmark is a probability greater than 50%. Bello et al. (2019) used the same benchmark and discovered that when Jarque Bera is more than 50%, there is a positive relationship between variables (Okoro and Egberi, 2019). In addition, Bello et al. (2019) used the same benchmark and observed that when the Obs*R-squared is greater than 50%, there is a positive relationship between variables.

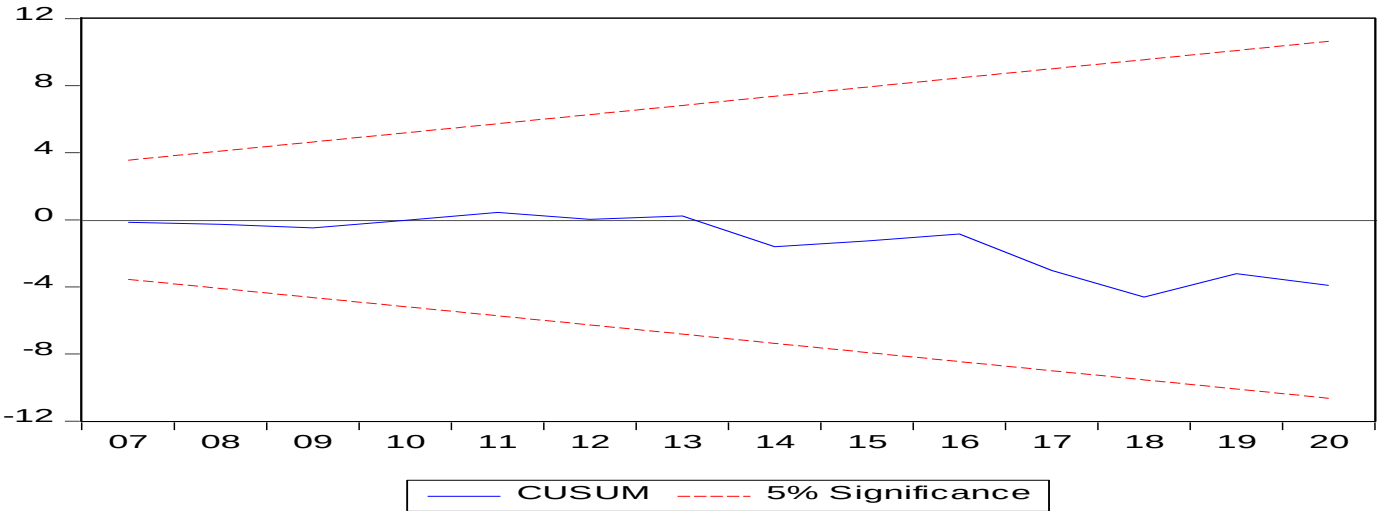


Figure 6
Test of Stability

Figure 6 also shows that the blue line is inside the 5% significance level, indicating that the model is stable; however, if the blue line is outside of the 5% significance threshold, the model is not exceptional. Breusch-pagan's P-values (0.0738) fall below our 10% level of implication (0.1). If the null hypothesis is not uniform, variation may lead to unstable estimates (Ayele et al., 2020). Hubbard and Lindsay (2008) define the benchmark as a P-value that is less than or equal to 50%. Similarly, Bello et al. (2023) used the same criteria and discovered that a P-value greater than 50% implies a positive link between variables.

Table 6
Regression Results of all Variables on tax revenue generation in Developing countries

Tax to GDP	**Coef.**	**St. Err.**	**t-value**	**P-value**	**[95% Conf**	**Interval**	Sig
Per capita Income	0.11	0.010	1.16	0.248	-0.008	0.030	
Trade openness	2.310	0.687	3.36	0.001	0.962	3.659	***
Quality Institutional	2.899	0.523	3.22	0.006	0.999	3.100	
Educational Outcome	3.210	0532	3.61	-0.001	0.009	2.000	
Const	0.021	0.013	1.76	0.255	-0.006	0.020	
Mean dependent var	0.833	SD dependent var	0.899				
R-squared	0.2332	Number of obs	122.99				
F-test	17.99	Prob > F	0.800				
Akaike crit. (AIC)	500.000	Bayesian crit. (BIC)	578.99				
Const	0.021	0.013	1.76	0.255	-0.006	0.020	

Per capita income has a 0.001 P-value on the relationship between tax and GDP. According to Nkwatoh (2014), the global criterion for variable selection is a P-value less than or equal to 0.05. Per capita income impacts excellent tax revenue performance. Similarly, Rath and Akram (2021) used the same benchmark and discovered a positive relationship between variables when the P-values are equal and the significance level is less than 5%. In the long run, the findings of the Vector Error Correlation Model (VCM) revealed a statistically significant association between per capita income and tax collection performance in Tanzania, notably in the Tanzania areas. The consequences of this learning differ from some previous empirical findings, while at the same time supporting other studies concerning the relationship between tax revenue generation and per capita income. For example, the unbalanced panel analysis conducted by Castañeda Rodríguez (2018) established that per capita income plays a significant role in attractive revenue collection efficiency in developing economies. In the same perspectives, Thika (2014), Chindengwike (2023), who support the findings.

Conversely, these findings are inconsistent with the study by Mtasiwa (2013), which investigated the causes of inefficiency in Tanzania's tax collection system. Using the Tanzania Revenue Authority Temeke Tax Region in Dar es Salaam as a case study, the research reported an inverse relationship between per capita income and revenue collection performance. Similarly, Pantamee et al. (2020), Chindengwike (2024) and Chindengwike (2025) through the application of the Toda–Yamamoto Causality Test in Nigeria, found no significant association between per capita income and tax revenue collection performance. Moreover, the Johansen cointegration test employed in this study rejected the null hypothesis, which stated that per capita income does not influence tax revenue collection in Tanzania. The findings presented in Table 4.11 therefore provide support for the alternative hypothesis (H1), indicating that per capita income

has a significant effect on tax collection performance in Tanzania. Hence, the study confirmed the existence of a long-run relationship between per capita income and tax revenue performance.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study found that per capita income has a considerable impact on tax revenue generation in underdeveloped nations. This suggests that raising residents' incomes can help the government collect more taxes. The study emphasizes the need of developing a realistic and effective tax system that may foster greater financial and commercial links between nations.

5.2 Recommendations

Governments should stimulate international trade and investment by creating a conducive business climate, which can boost economic growth and raise GDP. Furthermore, tax rate modifications should be performed with caution to avoid needless price increases that lower buying power and have a negative impact on tax revenue performance.

Declaration of Interest

The author declares that he does not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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