http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522-3186

ADFJ ISSN 2522 – 3186.

African Development Finance Journal

VOLUME 8 (X)

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Date Received: November, 2, 2025

Date Published: December, 19, 2025

African Development Finance Journal http://journals.uonbi.ac.ke/index.php/adfj
December Vol 8 No.10, 2025 PP 192-221 ISSN 2522-3186

Fiscal Framework and Economic Growth of East African Member Countries

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Abstract
This study examined the relationship between public debt and economic growth in EAC member states. Using a longitudinal research design and secondary data from Kenya, Uganda, Tanzania, Burundi, and Rwanda. The research uses data collected from 2014 to 2023 for countries that were members of the EAC block by the year 2023. The analysis applied the Arellano-Bover System Generalized Method of Moments (GMM) to address endogeneity and dynamic panel concerns. To ensure reliability, diagnostic tests such as the Breusch-Pagan test for heteroscedasticity, the Hausman test, and the Arellano-Bond test for serial correlation were conducted, with results evaluated at the 5% significance level. The findings show that government expenditure has a positive but statistically insignificant effect on economic growth, reflecting the limited impact of recurrent-heavy spending on productivity, tax revenue has a negative and significant effect, suggesting that high tax rates coupled with a narrow tax base reduce private investment and household consumption and also that public debt has mixed outcomes: domestic debt had a positive though insignificant effect on growth, while external debt negatively and significantly influenced growth due to high servicing costs and currency risks.

Keywords: *Government Expenditure, Tax Revenue, Public Debt, Economic Growth*

1. Introduction

Fiscal policies have gained prominence as a key determinant of economic growth outcomes in the region (Kim *et al.*, 2021). This study thus notes that as East African Countries strive to achieve sustainable development goals towards achieving sustainable development, the involved relationship between fiscal frameworks and economic growth becomes paramount (Ovamba & Denis, 2018; Paparas *et al.*, 2015).

The East African Community (EAC) has experienced fluctuating GDP growth rates over the past two decades. The factors driving this growth include agriculture, industrialization, infrastructure development, trade policies, economic policies, and external economic shocks. The EAC has been one of the fastest-growing regions in Africa, with several countries recording above-average economic growth rates compared to the rest of the continent (McAuliffe *et al.*, 2017).

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Government spending is a key feature of fiscal policy, often used to regulate aggregate demand and stimulate economic activity (Nkalu & Agu, 2023). Taxation is the supply side of government spending as it provides the mechanism by which governments generate revenue to finance their expenditures (Salma *et al.*, 2016). Public debt is also a tool that is used by governments to influence the direction of the economy. It is mostly used to complement or substitute taxes (Schmidt, 2021; Prinz & Beck, 2021).

A combination of fiscal deficits, debt accumulation, and inefficient government spending in several EAC countries undermines economic growth by crowding out private investment and increasing inflationary pressures. High debt-to-GDP ratios, especially in Kenya and Uganda (67% and 49% in 2020, respectively), raise concerns over debt sustainability and its potential effects on future growth of the economy (International Monetary Fund, 2021). Prudent fiscal management in Rwanda has contributed to macroeconomic stability and higher levels of FDI, which are critical for sustained economic growth in the country (Kasekende & Atingi-Ego, 2018).

Expansionary fiscal policies in EAC have stimulated economic activity by financing large-scale infrastructure projects. The rising public debt burden has constrained fiscal space and increased debt-servicing obligations (Kabemba & Kabwe, 2024). Kenya has faced a growing fiscal deficit due to high public debt, diverting funds away from development programs and toward loan repayments (Muoki, 2021). Rwanda, on the other hand, has maintained relatively prudent fiscal policies, prioritizing capital investments while controlling recurrent expenditures, which has led to sustainable economic growth (Benimana, 2020). The effectiveness of fiscal policies in driving growth depends on how well public resources are allocated, when the recurrent expenditures are in excess, and the tax policies are inefficient; economic growth is undermined, while investment in productive sectors fosters sustainable development (Ssebulime & Mukisa, 2023).

Although economic growth is critical to explaining even developmental patterns of various countries across the world, research has demonstrated that the performance of East African Economies in terms of economic growth is deteriorating. East Africa's deteriorating economic growth is closely linked to weaknesses in its fiscal frameworks, primarily due to high fiscal deficits, debt vulnerabilities, and the need for structural reforms. The region's reliance on debt for

financing and high interest payments, coupled with the need for fiscal consolidation, is hindering sustainable growth (World Bank, 2021).

Also, recent data indicate a slowdown in economic growth across East African countries. For example, real GDP growth in the region is estimated to have declined from 4.1% in 2022 to 3.1% in 2023 (African Development Bank, 2024). Further, the African Development Bank notes that East Africa experienced the highest inflation rate in Africa in 2023 (African Development Bank, 2024). This demonstrates that the economic growth of East African countries is in urgent need of resuscitation.

Despite the existence of theoretical and empirical evidence on fiscal policy and economic growth, there remains a gap in understanding the specific dynamics within the East African Community. Some studies done in Africa show that fiscal policies have a significant effect on the rate of economic growth (Buthelezi, 2023). There are also mixed findings on the effect of the fiscal framework on economic growth. While Bathuure (2024) establishes that there is no relationship between fiscal framework and economic growth rate, Ovamba and Denis (2018) establish a positive effect, while Asiedu (2019) focuses primarily on individual countries rather than a regional comparative analysis, limiting the generalizability of findings. Therefore, this study is conducted to fill the current gaps by determining the relationship between the fiscal framework and economic growth of East African member states. The study was aimed at determining the relationship between the fiscal framework and economic growth of East African member states.

2. Literature Review

2.1 Theoretical Review

2.1.1 Keynesian Economics Theory

Keynesian Economic Theory, developed by British economist John Maynard Keynes in the 1930s, during the Great Depression, significantly influences fiscal policy and economic development for developing countries, as in the case of East African countries (Canale, 2019). This theory advocates for active government intervention in the economy to stimulate demand and stabilize economic fluctuations (Canale, 2019). This theory also advocates for countercyclical fiscal

policies to mitigate economic downturns for government spending if economic growth is to be attained (Aganbegyan, 2022).

Keynesian Economic Theory informs various aspects of fiscal policy and economic development strategies in East Africa, influencing government expenditure priorities, income tax systems, public debt management, and market liquidity dynamics. The theory is relevant to this study as the Keynesian Economic theory advocated for government intervention through fiscal policies, hence explaining the need for a fiscal framework.

2.1.2 Endogenous Growth Theory

Endogenous Growth Theory emerged in 1986 and was pioneered by economists Paul Romer and Robert Lucas (Pack, 1994). This theory significantly influences fiscal policy and economic development strategies in developing countries, for which, unlike the traditional growth theories, endogenous growth theory posits that investments in human capital, technology, and innovation play crucial roles in driving long-term economic growth (Rangongo & Ngwakwe, 2018; Henrekson *et al.*, 2024; Howitt, 2018).

EAC countries aim to achieve economic growth by investing in certain sectors of the economy that will enhance the quality of labor. The theory also emphasizes on the importance of tax incentives and regulatory frameworks that promote innovation and entrepreneurship (Alcouffe, 2004). Government public debt management strategies in East Africa are also influenced by endogenous growth theory's focus on sustainable investment and resource allocation (Howitt, 2018). The theory explains government expenditure as a variable in this study.

2.1.3 Ricardian Equivalence Theory

The Ricardian equivalence theory, proposed by David Ricardo in 1974, is a foundational concept in public finance and macroeconomics (Buchanan, 1976). The impact of taxation on economic growth has been a central concern in economic policy debates. According to traditional economic theory, high tax rates can disincentives investment and consumption, potentially stunting growth (Feldstein, 1995). However, proponents of Ricardian equivalence argue that the way consumers perceive taxes matters. If individuals believe that current taxes are a precursor to higher future

taxes, they choose to save more, which could offset the negative effects of taxation on consumption and investment (Barro, 1989).

This theory provides a framework for understanding the relationship between taxes, public debt, and economic growth. This theory posits that the mode in which the government uses to finances its expenditure does not affect aggregate expenditure. Consumers adjust their behavior when anticipating future taxes to finance current government debts. However, empirical evidence shows that the theory does not always apply in different settings.

2.2 Empirical Review

2.2.1 Public Expenditure and Economic Growth

Kalmaz and Giritli (2025) examined the relationship between public expenditure and economic growth in the United Kingdom using a wavelet approach. They found that this relationship varied over time, with stronger positive effects observed during economic downturns, while periods of stable growth showed weaker or even negative links. This suggested that fiscal policy impacts were context-dependent, shaped by macroeconomic cycles and structural shifts. Similarly, Degefa and Daba (2025) analyzed government expenditure in Ethiopia and found that government spending significantly contributed to long-term economic growth. Their study emphasized that productive spending, such as on infrastructure and education, had a greater positive effect than recurrent expenditures, highlighting the importance of how funds were allocated.

In Nigeria, Ikechukwu *et al*. (2025) reported that government expenditure could stimulate growth, but its effectiveness depended on proper allocation and minimizing corruption. They noted that mismanagement of public funds could undermine the benefits of fiscal spending, signaling the need for governance reforms. In Morocco, Lhajhouji *et al*. (2025) applied an ARDL approach and found that government spending had a significant positive long-term effect on economic growth, although its short-term impact was limited. They stressed the importance of investing in infrastructure and productive sectors to sustain economic expansion.

Ndanshau and Mdadila (2023) investigated the effect of government consumption on economic growth in Tanzania using data from 1967 to 2020. Applying ARDL modeling, cointegration tests,

and Granger causality analysis, they found a bidirectional relationship between government consumption expenditure and growth rates. However, the short-run effects of government size on economic growth were negative and statistically insignificant.

2.2.2 Tax Income and Economic Growth

Income tax has long been the most prevalent form of taxation, applied to all earnings of individuals and corporations (Khadka, 2015; Mashamba & Gani, 2023). It typically generates the largest share of revenues used to finance government budgets, making it critical to determine an optimal tax rate that maximizes revenue without stifling business activity.

In the European Union, Balasoiu *et al*. (2023) studied the impact of direct taxation on growth in Europe, using panel data from all 27 EU countries from 2008 to 2020. Employing fixed effects and the Generalized Method of Moments (GMM), they found that corporate income taxes significantly reduced economic growth. Additionally, in EU countries with limited fiscal efficiency, personal income taxes were also associated with slower GDP growth.

In Nigeria, Adefolake and Omodero (2022) evaluated the effects of tax revenue on growth using time series data from 2000 to 2021. Applying an error correction model, they found that petroleum profit tax (PPT) and value-added tax (VAT) positively and significantly influenced GDP, whereas company income tax had a significant but negative effect on economic growth. Ovamba and Denis (2018) assessed fiscal policy effects in Kenya using data from 1991 to 2012. Through correlational and autoregressive analyses, they reported that tax rates positively and significantly affected economic growth, while government expenditure exerted a significant negative effect on growth rates.

2.2.3 Public Debt and Economic Growth

Government public debt, also referred to as national debt, represents the total amount of money a government owes to both domestic and foreign creditors, typically arising when expenditures exceed revenues (Addison *et al*., 2018). Public debt can stimulate economic development if borrowed funds are directed toward productive sectors; however, excessive debt often results in

economic instability, inflation, and the crowding out of private investment (Adefolake & Omodero, 2022).

Ndoricimpa (2020) revisited the threshold effects of public debt in Africa using a panel smooth transition regression approach. The study concluded that high public debt consistently harmed economic growth, revealing a significant negative relationship. Similarly, Fatoki and Muoki (2021) assessed the effects of debt in three East African countries using data from 1963 to 2019 and a fixed effects macro panel regression model. They found that external commercial debt and concessional loans positively influenced growth, while domestic debt and internal borrowing negatively affected it.

Jama (2021) examined external debt and growth in East Africa from 2011 to 2019 using ARDL and fixed effects models. The results indicated no significant long-term relationship, with a negative but insignificant correlation between external debt and growth. Finally, Sani *et al*. (2019) explored the interaction between public debt and institutional quality using the Generalized Method of Moments (GMM), showing that institutional quality directly and indirectly influenced growth and significantly shaped the debt-growth relationship.

3. Research Methodology

This study used a longitudinal research design to collect and analyze data. The choice of longitudinal research design is motivated by the need to track trends in GDP growth rate and the fiscal framework in EAC over time, which is best done using a longitudinal research approach (Hunziker & Blankenage, 2024). This study used macro panel data to establish the effects of fiscal policy variables, Government Expenditure, Government Public Debt, and Government Income tax on economic growth. The study employed a quantitative approach to identify the relationship between the variables.

The target population included all the countries in East Africa that were in the East African Community by 2014. These are the countries with consistent and relevant data for the study period (2014-2023). These member states include Burundi, Kenya, Uganda, Tanzania, and Rwanda; the countries that were in the EAC block by the year 2023.

This study collected secondary data for Kenya, Uganda, Tanzania, Rwanda, and Burundi from 2014 to 2023 using a data collection matrix as provided in the appendix. The selection of the five countries is justified by their continuous membership in the EAC over the past decade, thereby providing a comprehensive representation of the community's historical trajectory. Data on Economic Growth, Public Expenditure, Tax Income, and public debt were collected. Annual data were collected for the 10-year study period, starting from 2014 to the year 2023.

The data analysis was conducted using STATA statistical software. Given that the number of periods exceeds the number of panels, the dataset qualifies as a macro-panel. To capture country-specific heterogeneity while maintaining efficiency in estimation, this study adopted the random effects (RE) model. The random effects estimator assumes that unobserved country-specific effects are uncorrelated with the explanatory variables, allowing both within-country and between-country variation to be exploited. This makes it more efficient than the fixed effects (FE) estimator, which controls only for within-country variation and eliminates time-invariant variables from the analysis.

The Hausman specification test was employed to guide the choice between FE and RE models; the non-rejection of the null hypothesis indicated that the RE model was appropriate for this study.

The econometric model estimated is specified as:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \mu_i + \varepsilon_{it}$$

whereY_{it} is Economic growth measured by GDP growth rate in country i at time t, X_{1it} is public expenditure as a percentage of GDP, X_{2it} is public debt as a percentage of GDP,X_{3it} is tax income as a percentage of GDP, μ_i is Random country-specific effects assumed to be uncorrelated with regressors, ε_{it} is Idiosyncratic error term, β_0 is Constant term and β_i, for $i = 1,2,3$ are Coefficients measuring the effects of fiscal variables on economic growth.

The choice of the RE model is further justified by the nature of the study variables, which include both time-varying and time-invariant components. Unlike FE, which would eliminate the latter, the RE specification retains and exploits this variation, providing a more comprehensive

understanding of the fiscal–growth nexus within the East African Community countries. Hence, under the assumption of orthogonality, the RE estimator is both consistent and efficient, making it suitable for the empirical analysis.

Diagnostic tests are crucial in panel data regression as they help authenticate the model results. The study conducted the stationary test using panel unit root tests, specifically the Fisher-type Phillips–Perron test; multicollinearity using the Variance Inflation Factor (VIF); autocorrelation test using the Wooldridge test; Heteroscedasticity test using the Modified Wald test, and the Hausman specification test.

4. Findings and Discussions

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics of the key variables used in the analysis, namely economic growth, public expenditure, tax income, and public debt.

Table 1: Descriptive Statistics

Variable	Type	Mean	Std. Dev.	Min	Max	Observations
Economic Growth	overall	4.42999	1.707081	-.2452	8.0198	N = 50
	between		1.088598	2.63108	5.37568	n = 5
	within		1.395256	-.26789	7.07411	T = 10
Public Expenditure	overall	23.73828	3.426366	16.1166	31.824	N = 50
	between		1.363857	21.99516	25.17319	n = 5
	within		3.197113	17.85972	30.97294	T = 10
Tax Income	overall	12.99939	1.142354	10.4414	15.5098	N = 50
	between		0.7186745	12.27234	13.82522	n = 5
	within		0.9398645	11.10597	14.87313	T = 10
Public Debt	overall	50.16164	7.893694	33.6632	67.4443	N = 50
	between		3.455743	44.94659	52.85989	n = 5
	within		7.249945	35.5531	65.31235	T = 10

Economic growth exhibited a mean value of 4.43 percent with a standard deviation of 1.71, suggesting moderate variation across observations. The minimum recorded value was negative (-0.25), indicating the presence of economic contraction in at least one period, while the maximum

of 8.02 reflects episodes of strong growth. The decomposition of the variance showed that most of the variability was explained within units over time (within standard deviation = 1.40) rather than across units (between standard deviation = 1.09), implying that growth fluctuations are more temporal than cross-sectional. Public expenditure recorded an overall mean of 23.74 percent with a standard deviation of 3.43, ranging between 16.12 and 31.82. The between variation (1.36) was relatively smaller compared to the within variation (3.20), suggesting that differences in expenditure levels are more pronounced across years within the same unit than across units.

Tax income showed a relatively stable pattern, with a mean of 13.00 percent and an overall standard deviation of 1.14, ranging from 10.44 to 15.51. Here, the between variation (0.72) was slightly lower than the within variation (0.94), pointing to greater yearly fluctuations within individual units than structural differences across them. Public debt emerged as the most volatile variable, with an overall mean of 50.16 percent and a high standard deviation of 7.89, ranging from 33.66 to 67.44. The within variation (7.25) substantially outweighs the between variation (3.46), indicating that debt levels vary more significantly within units over time than across units.

Figure 1 presents the line graph of the study variables, showing the yearly mean trends for GDP Growth, Tax Income, Public Expenditure, and Public Debt from 2014 to 2023. Public Debt consistently recorded the highest mean values among the variables and exhibited notable fluctuations, culminating in a peak in 2023. This pattern suggested increasing reliance on borrowing, possibly to finance development initiatives or manage fiscal deficits. Public Expenditure remained relatively stable, with a slight upward shift around 2020, which may have reflected increased government spending in response to economic or social pressures. Tax Income was consistently lower than both Public Expenditure and Public Debt, showing minimal variation, which implied limited growth in domestic revenue mobilization and a potential mismatch between revenue and spending.

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ISSN 2522-3186

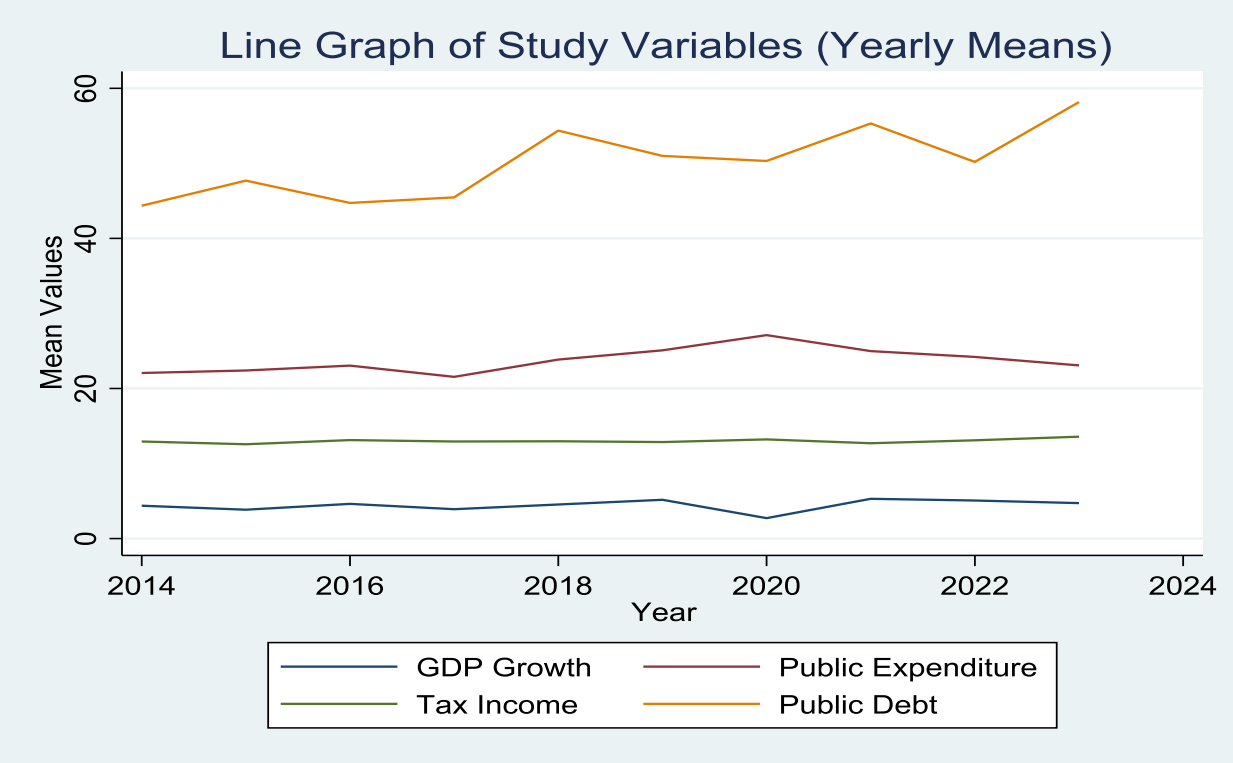

Figure 1: Line Graph of the Study Variables

GDP Growth registered the lowest mean values and displayed only modest fluctuations, indicating subdued economic expansion throughout the period. Collectively, the graph highlighted a persistent fiscal imbalance, where rising debt and expenditure outpaced revenue and growth, underscoring the need for strategic reforms to enhance revenue generation and ensure long-term fiscal sustainability.

4.2 Trend Analysis

Trend analysis of the study variables explores the patterns and variations in spending over time, emphasizing notable rises, declines, or phases of stability. This evaluation aids in detecting long-term movements, seasonal changes, and possible links with external influences, offering insights into how resources are allocated and their efficiency within social programs. The section provides results using graphical representations that display the trends and interactions among the variables in the dataset.

4.2.1 Trend Analysis of Economic Growth Variable

Figure 2 gives the economic growth trends of the Economic Growth variable.

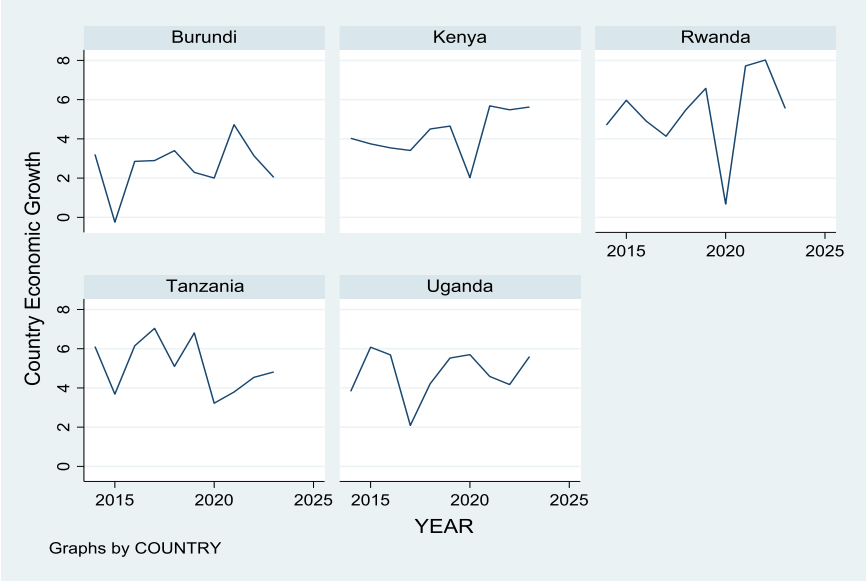

Figure 2: Trend Analysis of Economic Growth Variable

Burundi showed modest growth, generally between 0% and 5%, with a sharp decline around 2015 reflecting political instability, followed by gradual recovery. Kenya maintained relatively stable growth between 2% and 6%, with a noticeable dip around 2020 linked to the COVID-19 pandemic. Rwanda exhibited high volatility, experiencing a steep decline in 2020 but rebounding rapidly to rates above 8%, demonstrating strong post-crisis resilience. Tanzania recorded consistently higher growth, peaking above 7%, despite a slight slowdown in 2019–2020. Uganda's growth fluctuated between 2% and 6%, with a decline in 2017–2018 followed by recovery.

4.2.2 Trend Analysis of Public Expenditure Variable

Figure 3 depicted the public expenditure trends of the Public Expenditure variable.

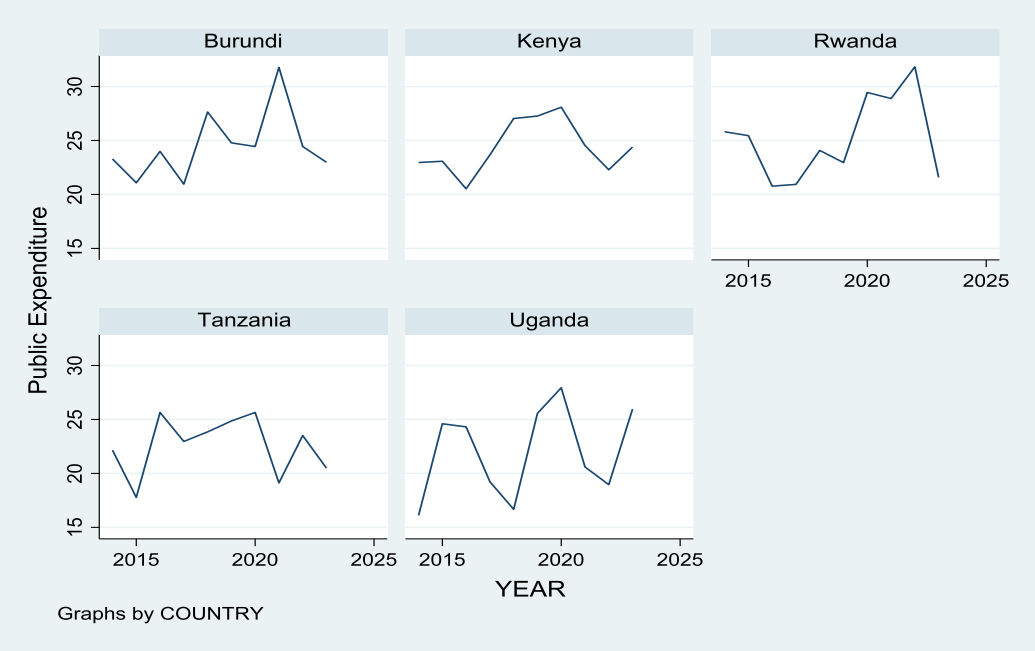

Figure 3: Trend Analysis of Public Expenditure Variable

Burundi exhibits moderate fluctuations in public expenditure, generally ranging between 20% and 30%, with notable peaks around 2020–2021, suggesting periodic increases in government spending possibly linked to development initiatives or external support. Kenya demonstrates a relatively stable upward trend, with expenditures mostly between 20% and 28%, reflecting consistent allocation of public resources, albeit with a slight dip in 2015. Rwanda shows more pronounced variability, with expenditure rising sharply around 2019–2021 before declining, indicating responsive fiscal adjustments to economic or developmental priorities. Tanzania maintains fairly steady expenditure levels between 20% and 27%, with occasional peaks, while Uganda exhibits substantial fluctuations, ranging from 15% to 28%, with a marked increase toward 2024, reflecting episodic fiscal interventions. Overall, the figure highlights heterogeneity in government spending across EAC countries, suggesting differences in fiscal policy, development priorities, and responsiveness to economic conditions.

4.2.3 Trend Analysis of Tax Income Variable

Figure 4 also depicts the tax income trends of the five Tax Income variable.

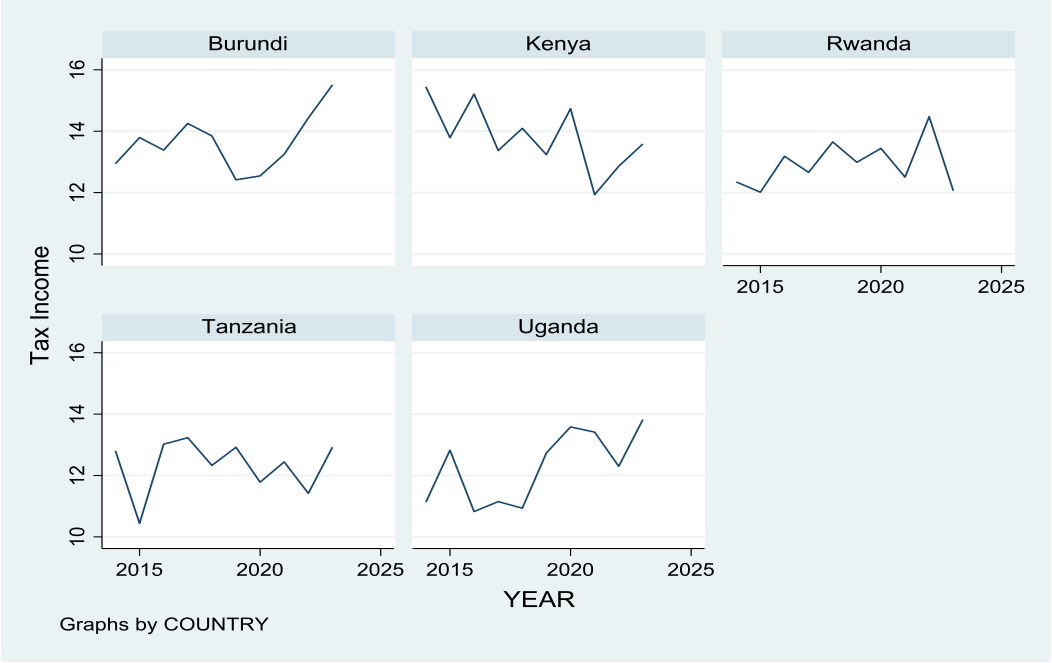

Figure 4: Trend Analysis of Tax Income Variable

Burundi exhibited a consistent upward trajectory, with a marked acceleration in tax income growth after 2020, which suggested improved revenue mobilization or economic expansion during those years. In contrast, Kenya's graph revealed volatility, with a decline between 2015 and 2018, followed by a partial recovery and another dip as 2025 approached, indicating possible fiscal disruptions or policy inconsistencies. Rwanda's tax income remained relatively stable throughout the decade, reflecting a steady fiscal environment with minimal fluctuations. Tanzania's pattern was more erratic, lacking a clear directional trend, which may have pointed to underlying structural or administrative challenges in tax collection. Uganda showed a dip around 2018, followed by a gradual recovery and moderate growth toward 2025, hinting at successful reforms or stabilization efforts after a period of decline.

4.2.4 Trend Analysis of Public Debt Variable

Similarly, Figure 5 depicted the public debt trends of Public Debt variable.

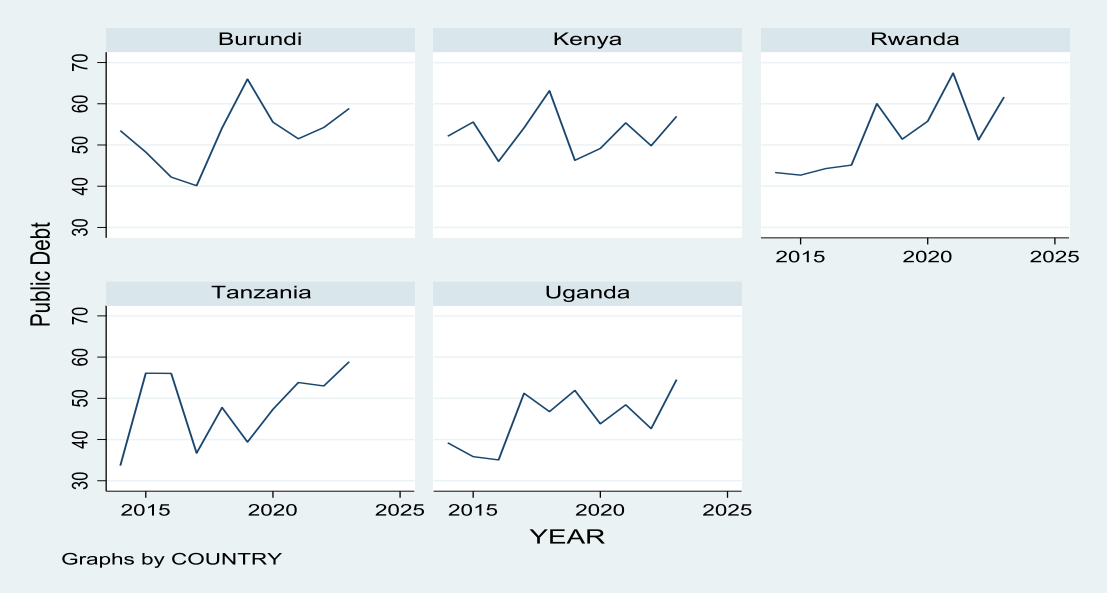

Figure 5: Trend Analysis of Public Debt Variable

Burundi's public debt showed a steady upward trajectory, indicating a sustained increase in borrowing that may have reflected efforts to finance development or cover budget deficits. Kenya experienced a sharp rise in public debt, particularly after 2016, which suggested aggressive infrastructure spending or widening fiscal gaps. Rwanda's debt levels remained relatively moderate and stable, pointing to prudent fiscal management and controlled borrowing practices. Tanzania's graph revealed a gradual increase in public debt with intermittent fluctuations, implying a mix of strategic borrowing and possible external shocks. Uganda's debt trend also rose steadily, especially after 2018, hinting at increased reliance on public financing to support national programs or respond to economic challenges.

4.3 Diagnostic tests

Diagnostic checks were performed on the processed dataset to verify adherence to regression assumptions. The tests conducted included assessments for stationarity, autocorrelation, heteroscedasticity, and the Hausman specification test. The results of these tests are presented in this section.

4.3.1 Stationarity Test

Table 2 presents the results of the Fisher-type Phillips–Perron panel unit root tests for economic growth, public expenditure, tax income, and public debt.

Table 2. Philips-Perron unit-root test

Variable	Inverse Chi-sq (P)	p-value	Inverse Normal (Z)	p-value	Inverse Logit t (L*)	p-value	Modified Inv. Chi-sq (Pm)	p-value	Decision (5% level)
Economic Growth	33.2545	0.0002	-3.9231	0.0000	-4.0982	0.0002	5.1999	0.0000	Stationary
Public Expenditure	25.5702	0.0044	-2.8154	0.0024	-2.9307	0.0033	3.4816	0.0002	Stationary
Tax Income	39.5634	0.0000	-3.6832	0.0001	-4.5260	0.0000	6.6106	0.0000	Stationary
Public Debt	25.1323	0.0051	-2.4588	0.0070	-2.7472	0.0051	3.3837	0.0004	Stationary

The null hypothesis for these tests was that all panels contain a unit root (non-stationary), while the alternative hypothesis states that at least one panel was stationary. Across all four variables, the reported statistics Inverse Chi-squared (P), Inverse Normal (Z), Inverse Logit t (L*), and Modified Inverse Chi-squared (Pm) were consistently significant at the 5 percent level. Specifically, for economic growth, the p-values for all four statistics are below 0.01, indicating strong evidence against the null hypothesis of a unit root. Similarly, public expenditure, tax income, and public debt all exhibit highly significant test results, confirming their stationarity.

These findings suggest that the variables do not suffer from non-stationarity issues and therefore maintain stable statistical properties over time. This was a crucial outcome for the reliability of the econometric analysis, as non-stationary variables can generate spurious regression results and invalidate statistical inference. The confirmation of stationarity implies that the dataset was well-suited for panel econometric modeling, particularly in cases where both cross-sectional and temporal dynamics are considered. Hence, the results provide a robust foundation for subsequent modeling of the relationships among fiscal variables and economic growth.

4.3.2 Multicollinearity Test

Table 3 reports the results of the Variance Inflation Factor (VIF) test, which was conducted to assess the presence of multicollinearity among the explanatory variables included in the regression model.

Table 3: Variance inflation factor

	VIF	1/VIF
Public Expenditure	1.187	.843
Tax Income	1.158	.864
Public Debt	1.055	.948
Mean VIF	1.133	.

A VIF value greater than 10 was typically considered indicative of severe multicollinearity, while values close to 1 suggest the absence of problematic correlation between regressors. As shown, public expenditure, tax income, and public debt record VIF values of 1.187, 1.158, and 1.055, respectively, with corresponding tolerance values (1/VIF) well above the conventional threshold of 0.1. The mean VIF was 1.133, further confirming that multicollinearity was not a concern in the dataset.

The low VIF values imply that the explanatory variables are sufficiently independent of one another, thereby ensuring stable and reliable coefficient estimates in the regression analysis. This strengthens the validity of the econometric results, as high collinearity among predictors can inflate standard errors, distort the statistical significance of variables, and undermine inference. Consequently, the absence of multicollinearity in this study provides confidence that the estimated effects of fiscal variables on economic growth are not biased by redundancy among the regressors.

4.3.3 Serial Correlation Test

Table 4 presents the results of the Wooldridge test for serial correlation in panel data. The null hypothesis of this test was that there was no first-order autocorrelation in the residuals, while the alternative hypothesis suggests the presence of serial correlation. The test yields a Wald Chi-squared statistic of 7.92 with an associated p-value of 0.0947. Since the p-value exceeds the 5 percent significance threshold, the null hypothesis cannot be rejected.

Table 4: Wooldridge Test for Serial Correlation

Wald Chi2(5)	Prob>Chi2
7.92	0.0947

This result indicates that the dataset does not exhibit significant first-order serial correlation. The absence of serial correlation was important, as it ensures that the error terms are not systematically related across time periods, thereby supporting the validity of standard error estimates and hypothesis testing. Consequently, the regression results based on this dataset are unlikely to suffer from inefficiency or bias due to auto correlated disturbances, strengthening the reliability of the econometric modeling.

4.3.4 Heteroscedasticity Test

Table 5 reports the results of the Modified Wald test for group wise heteroskedasticity in the panel data model.

Table 5: Modified Wald Test for Groupwise Heteroskedasticity

Chi2(5)	Prob>Chi2
10.49	0.0625

The null hypothesis assumes homoskedasticity of the residuals across the cross-sectional units, while the alternative hypothesis suggests the presence of group wise heteroskedasticity. The test produces a Chi-squared statistic of 10.49 with a corresponding p-value of 0.0625. Since the p-value was greater than the conventional 5 percent significance level, the null hypothesis of homoskedasticity cannot be rejected.

This outcome implies that the variance of the error terms was constant across the panels, meaning the dataset does not suffer from heteroskedasticity problems. The absence of heteroskedasticity ensures that the estimated coefficients are efficient and that statistical inference based on standard errors remains valid. Consequently, the results strengthen the robustness of the econometric analysis, confirming that the model was not compromised by unequal error variances across units.

4.3.5 Hausman Test

Table 6 presents the results of the Hausman specification test, which was employed to determine the most appropriate model between fixed effects (FE) and random effects (RE) estimators. The test compares the consistency of the random effects and fixed effects estimator under the null hypothesis that the random effects model was the preferred specification due to its efficiency, while the alternative hypothesis supports the fixed effects model when the estimators systematically differ.

Table 6: Hausman Test for Fixed and Random Effects

Variable	(b) fixed	(B) random	(b-B) Difference	S.E.
Public Expenditure	0.1643945	0.164928	-0.0005335	0.0049206
Tax Income	0.0020533	-0.0490651	0.0511184	0.0439821
Public Debt	-0.0233514	-0.0263088	0.0029574	0.003679
Chi2(4) = 1.53				
Prob>Chi2= 0.6752				

As shown, the differences between the FE and RE coefficients for public expenditure, tax income, and public debt are small and statistically insignificant. The Chi-squared test statistic was 1.53 with an associated p-value of 0.6752, which was far above the 5 percent significance threshold. Consequently, the null hypothesis cannot be rejected, indicating that the random effects model was the more appropriate choice for this study.

This finding implies that the unobserved individual-specific effects are not correlated with the regressors, making the random effects estimator both efficient and consistent. The choice of the RE model allows for the exploitation of both within- and between-unit variations, thereby enhancing the efficiency of the parameter estimates and ensuring a more comprehensive understanding of the relationship between fiscal variables and economic growth.

4.4 Inferential Analysis

The inferential analysis for this study was performed using correlation analysis and random effects regression, as outlined below.

4.4.1 Correlation Analysis

Table 7 presents the results of the pairwise correlation analysis among the study variables: economic growth, public expenditure, tax income, and public debt. The correlations provide preliminary insights into the direction and strength of associations before proceeding to regression analysis.

Table 7: Pairwise Correlation Analysis

Variables	Economic Growth	Public Expenditure	Tax Income	Public Debt
Economic Growth	1.000			
Public Expenditure	0.226	1.000		
	(0.115)			
Tax Income	-0.139	0.362*	1.000	
	(0.336)	(0.010)		
Public Debt	-0.148	0.215	0.149	1.000
	(0.306)	(0.135)	(0.301)	

**** p<0.01, ** p<0.05, * p<0.1*

Economic growth exhibits a weak positive correlation with public expenditure (0.226) and a weak negative correlation with both tax income (-0.139) and public debt (-0.148). However, none of these relationships are statistically significant, as indicated by the p-values in parentheses. This suggests that while fiscal variables influence economic growth, their effects are not straightforward and require more robust econometric modeling to establish causal linkages.

Among the fiscal variables, public expenditure shows a positive and statistically significant correlation with tax income (0.362, *p < 0.1). This indicates that higher levels of government spending are associated with increased tax revenues, consistent with the notion that fiscal expansion stimulates economic activity and broadens the tax base. Public expenditure also correlates positively with public debt (0.215), though the relationship was not statistically significant, reflecting the possibility that increases in expenditure at times are financed through borrowing.

Tax income and public debt exhibit a weak positive correlation (0.149), but again, this relationship lacks statistical significance. This suggests that variations in public debt levels are not strongly tied

to changes in tax revenues within the sample period, possibly due to reliance on external borrowing or structural inefficiencies in revenue mobilization.

The correlation analysis indicates limited multicollinearity among the explanatory variables, as the coefficients are relatively low and only one relationship (public expenditure and tax income) reaches statistical significance. This supports the earlier Variance Inflation Factor (VIF) results in Table 3, confirming that multicollinearity was not a major concern in the dataset.

4.4.2 Regression Analysis

Table 8 reports the results of the random effects regression model estimating the relationship between economic growth and selected fiscal variables: public expenditure, tax income, and public debt. The model was statistically meaningful, with a joint Chi-square statistic of 7.463 and a corresponding p-value of 0.059, which was significant at the 10 percent level, indicating that the explanatory variables collectively contribute to variations in economic growth.

Table 8: Random Effects Regression Model Results

Economic Growth	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Public Expenditure	.165	.064	2.59	.01	.04	.29	***
Tax Income	-.049	.212	-0.23	.817	-.465	.367	
Public Debt	-.026	.027	-0.98	.328	-.079	.026	
Constant	2.472	3.118	0.79	.428	-3.638	8.583	
Mean dependent var		4.430	SD dependent var			1.707	
Overall r-squared		0.093	Number of obs			50	
Chi-square		7.463	Prob > chi2			0.059	
R-squared within		0.147	R-squared between			0.000	

**** p<.01, ** p<.05, * p<.1*

Public expenditure emerges as the only statistically significant predictor, with a positive coefficient of 0.165 ($p < 0.01$). This suggests that a one-unit increase in public expenditure was associated with an approximate 0.17 percentage point increase in economic growth, holding other factors constant. This result underscores the growth-enhancing role of government spending, aligning with fiscal policy literature that emphasizes the importance of productive public investments in stimulating economic performance.

By contrast, tax income has a negative but statistically insignificant effect on economic growth, with a coefficient of -0.049 (p = 0.817). This implies that variations in tax revenues do not exert a strong or consistent influence on growth within the study context. The insignificance reflects structural challenges in revenue mobilization or inefficiencies in tax administration that dilute the potential developmental impact of taxation. Similarly, public debt displays a negative coefficient (-0.026) but was not statistically significant (p = 0.328). While the negative sign was consistent with debt overhang and crowding-out hypotheses, the absence of significance suggests that debt levels, within the observed range, do not critically constrain growth.

The model explains approximately 9.3 percent of the overall variation in economic growth (overall R-squared = 0.093). The within R-squared of 0.147 indicates that fiscal variables explain a modest share of temporal fluctuations in growth, whereas the between R-squared was near zero, implying limited explanatory power across units. This highlights that most of the variation in growth dynamics was captured within countries over time rather than across them.

The results highlight the pivotal role of public expenditure as a driver of economic growth, while tax income and public debt appear less influential in this context. These findings suggest that fiscal policy interventions focused on productive expenditure yield stronger growth dividends than reliance on tax revenue adjustments or debt accumulation.

5. Conclusion and Recommendations

5.1 Summary of Results

This section presents a concise summary of the results discussed in Chapter Four. The findings are aligned with the specific objectives of the study. Each objective was addressed to highlight the key outcomes obtained from the analysis.

5.1.1 Public Expenditure and Economic Growth

The correlation analysis revealed a weak and positive association between public expenditure and the region's economic growth rate, suggesting that higher levels of government spending are generally linked with improved growth outcomes. The results indicate a positive but statistically insignificant relationship between economic growth and public expenditure in the EAC. This

means that while fiscal expansion appears to support growth, the effect was not strong enough to reach conventional levels of statistical significance. The lack of significance suggests inefficiencies in government spending or the influence of structural and institutional constraints that dilute the growth impact of public expenditure.

Notably, the positive coefficient was consistent with Keynesian economic theory, which posits that increased government spending stimulates aggregate demand and income growth. Nevertheless, the insignificant finding highlights that in the EAC, recurrent expenditure patterns and limited investment in high-multiplier sectors weaken the growth-enhancing effects of fiscal policy.

5.1.2 Tax Income and Economic Growth

The correlation analysis showed a weak and negative association between tax income and economic growth, suggesting that higher levels of taxation coincide with slower growth within the region. The regression analysis reinforced this result, revealing a negative and statistically insignificant relationship between tax income and economic growth. The negative coefficient implies that higher tax revenues exert downward pressure on growth, but the lack of statistical significance means this effect was not conclusive. This outcome indicates that taxation in the EAC does not strongly drive growth, likely due to inefficiencies in tax collection, heavy reliance on consumption-based taxes, and the channeling of revenues toward recurrent rather than productive expenditures.

The negative, though insignificant, effect diverges from the theoretical perspective that efficient taxation can stimulate growth by financing infrastructure, education, and other productive investments. Instead, it reflects the challenges of weak tax administration, a narrow tax base, and structural inefficiencies that constrain the growth potential of taxation in the EAC.

5.1.3 Public Debt and Economic Growth

The correlation analysis suggested a weak and negative relationship between public debt and economic growth, implying that rising debt levels tend to coincide with slower growth rates in the region. The regression analysis indicated a negative but statistically insignificant relationship between public debt and economic growth. The negative coefficient points to the possibility that

borrowing places a burden on the economy, but the lack of significance shows that debt does not have a decisive effect on growth within the EAC context. This outcome suggests that much of the debt in the region was allocated to recurrent expenditures or poorly managed projects rather than high-impact investments that stimulate long-term growth.

The negative but insignificant effect aligns with theoretical and empirical perspectives highlighting the dual nature of public debt: while borrowing can finance growth-enhancing projects, excessive or misallocated debt often undermines economic performance. In the EAC, weak fiscal discipline, rising debt-servicing obligations, and inefficient investment management appear to mute the potential growth benefits of public borrowing.

5.2 Conclusion

The analysis revealed a positive but statistically insignificant link between government spending and GDP growth. This indicates that while government expenditure has the potential to drive growth, its impact in the region is weakened by the dominance of recurrent rather than capital spending. Without prioritizing productive investments in infrastructure, health, and education, areas known to generate strong multiplier effects, government expenditure has a limited ability to deliver meaningful growth outcomes.

The results also reveal a negative but statistically insignificant effect, suggesting that higher taxation does not significantly support growth in the region. This finding points to inefficiencies in revenue collection, the heavy reliance on consumption-based taxes, and the tendency to allocate revenues toward recurrent rather than developmental expenditures. The outcome highlights the importance of tax reforms that broaden the revenue base, enhance compliance, and redirect fiscal resources toward investments that can unlock long-term growth.

On the effect of public debt on economic growth, the analysis revealed a negative but statistically insignificant relationship, indicating that borrowing has not been effectively leveraged to stimulate growth in the EAC. High debt-servicing costs, weak fiscal discipline, and inefficient allocation of borrowed resources reduce the developmental impact of public debt. While borrowing can provide

vital resources for development, its potential is undermined when funds are directed toward consumption or poorly managed projects.

The study shows that the effectiveness of fiscal policy in the EAC depends less on the scale of spending, taxation, or borrowing, and more on the way these instruments are designed and managed. Government spending showed a limited positive influence, tax income exerted a weak negative effect, and public debt reflected muted growth potential. These findings emphasize the need for more efficient resource allocation, growth-oriented tax reforms, and prudent debt management. A coordinated approach that improves the structure and use of fiscal instruments is vital for sustaining inclusive economic growth in the EAC region.

5.4 Recommendations

Based on the study's findings, it is recommended that EAC governments focus on enhancing the efficiency of government spending by reducing recurrent expenditures and eliminating wasteful allocation. Public resources should be directed toward growth-enhancing projects, including infrastructure development, technological investments, and initiatives that improve productivity. Strategic investment in critical sectors such as education, health, and innovation is essential, as these areas provide the foundation for a competitive economy, stimulate private sector activity, and generate employment opportunities, thereby promoting long-term economic growth.

Tax policy reforms are also crucial for supporting economic expansion. Governments should maintain tax income rates at optimal levels to avoid discouraging investment or reducing household consumption while broadening the tax base to include informal sector participants. Strengthening tax administration and compliance through transparent procedures, reducing corruption, and the use of technology can increase revenue mobilization and build taxpayer trust, creating a favorable environment for investment and economic stability.

Prudent public debt management is another key recommendation. Borrowing should be carefully targeted to finance projects with adequate economic returns rather than accumulating unsustainable debt that could crowd out private investment or create fiscal stress. Alternative financing mechanisms, such as public-private partnerships (PPPs), should be prioritized for large-

scale development projects, as they reduce reliance on public debt, mitigate financial risks, and encourage collaboration with the private sector. Collectively, these measures will enhance fiscal discipline, improve resource allocation, and support sustainable economic growth across the EAC region.

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