DETERMINANTS OF TAX PERFORMANCE IN SELECTED EAST AFRICAN COMMUNITY COUNTRIES

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DECLARATION

This research is my original work and has not been presented for a degree in any other University or Institution of higher learning.

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DEDICATION

I dedicate this study to my family, mentors, and the resilient communities of East Africa, whose aspirations inspired this work.

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ACKNOWLEDGMENT

All the glory and honor be to Almighty God, the giver of all wisdom and knowledge, who gave me strength, guidance, and grace during this research process. He has also been my loyal companion in my studies.

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ABSTRACT

This study analyzes the determinants of tax performance in Kenya, Tanzania, Rwanda, Uganda, and Burundi from 2013 to 2023. Existing literature shows significant gaps in regional analysis, with most studies focusing on individual countries or other global regions rather than offering a unified empirical examination of tax determinants across EAC nations. Using a fixed effects panel regression model with data from World Development Indicators and International Financial Statistics, the analysis reveals that GDP per capita ($\beta = 3.88$, $p = 0.002$) and manufacturing share ($\beta = 0.16$, $p = 0.007$) are statistically significant drivers of tax ratios. Conversely, variables such as agricultural share, trade openness, financial depth, inflation, and exchange rates were found to be statistically insignificant determinants in this context. Tax effort analysis revealed a universal efficiency gap, with Rwanda (0.91) and Kenya (0.90) demonstrating the highest revenue mobilization efficiency, followed by Uganda (0.87) and Burundi (0.88), while Tanzania (0.77) showed the most significant potential for improvement. The study affirms that sustainable revenue growth in the EAC hinges on long-term structural economic transformation complemented by targeted administrative reforms to bridge the efficiency gap. Recommendations include promoting industrial diversification, enhancing tax administration digitalization, and implementing cooperative taxation models for the agricultural sector. These findings provide evidence-based guidance for policymakers seeking to improve domestic revenue mobilization in line with EAC Vision 2050 and Africa's Agenda 2063 development frameworks.

DEFINITION OF TERMS

Tax Ratio: The total tax revenue collected by a government expressed as a percentage of a country's Gross Domestic Product (GDP). It measures the actual level of taxation in an economy.

Tax Effort: A performance metric that quantifies how effectively a country mobilizes its estimated tax capacity. It is calculated as the ratio of the actual tax ratio to the predicted tax capacity derived from a country's structural economic determinants.

Tax Capacity: The predicted potential tax revenue a country could collect given its economic structure and development level, estimated using macroeconomic variables like GDP per capita, sectoral composition, and trade openness.

Determinants of Tax Performance: The macroeconomic, structural, and institutional factors that influence a country's ability to generate tax revenue, including GDP per capita, manufacturing share, trade openness, and agricultural share.

LIST OF ABBREVIATIONS

AGRIC:	Agriculture Share
EAC:	East African Community
EXCRATE:	Exchange Rate
FE:	Fixed Effects
GDP:	Gross Domestic Product
GDPPC:	GDP Per Capita
IMF:	International Monetary Fund
INF:	Inflation
LLC:	Levin-Lin-Chu
M2:	Broad Money Supply
MANU:	Manufacturing Output
RE:	Random Effects
SD:	Standard Deviation
TRADEOP:	Trade Openness
TRGDP:	Tax Ratio to GDP
VIF:	Variance Inflation Factor
WDI:	World Development Indicators

CHAPTER ONE

INTRODUCTION

1.1 The Background of the Study

Tax ratio and tax effort are two fundamental concepts in economics that capture a country's revenue generation performance. The tax ratio is the total tax revenue as a percentage of GDP; it measures the actual level of taxation in an economy (Piancastelli & Thirlwall, 2020). Tax effort reflects how effectively a country utilizes its taxable capacity (Dioda, 2012). It is calculated as the ratio of actual tax collection to predicted tax revenue based on structural economic determinants (Dioda, 2012). These metrics are widely used to assess fiscal health, efficiency of tax administration, and sufficiency of domestic resource mobilization.

At the global level, tax ratios vary significantly across countries. The trend is influenced by economic development, institutional capacity, and policy choices. Advanced economies typically exhibit tax ratios exceeding 30% of GDP, supported by robust tax systems, broad formal sectors, and high compliance levels (Piancastelli & Thirlwall, 2020). Conversely, developing nations often struggle with ratios below 15%, constrained informality, narrow tax bases, and weak administrative capacity (World Bank Group, 2024). Tax effort analyses reveal that while some countries, particularly in Scandinavia and Western Europe, collect close to or even exceed their taxable capacity, many low-income nations operate well below their potential due to structural and governance challenges (World Bank Group, 2024).

In the African continent context, tax performance remains below global averages, with a median tax ratio of approximately 16% of GDP. This is attributed to factors such as

high agricultural informality, limited industrialization, weak tax institutions, and reliance on hard-to-tax sectors (World Bank Group, 2024; Okunogbe & Santoro, 2022). However, significant variations exist: with North African countries like Tunisia and Morocco registering tax ratios above 20%, while several Sub-Saharan nations, including those in the EAC, lag behind with ratios between 10–15% (Okunogbe & Santoro, 2022). Tax effort studies further indicate that many African countries underperform relative to their economic structures, highlighting opportunities to enhance revenue mobilization through improved policy design, compliance enforcement, and digitalization of tax systems.

Domestic revenue mobilization is a pressing priority across the member states of the East African Community (EAC), including Kenya, Tanzania, Rwanda, Burundi, Uganda, Somali, South Sudan, and Democratic Republic of Congo (World Bank, 2024). Growing populations and rising demand for public services intensify the pressure on governments to secure sustainable funding (OECD, 2017). While taxation is a primary fiscal tool for this, EAC nations, predominantly classified as low-income, face persistent hurdles (Okunogbe & Santoro, 2022). These include a heavy reliance on narrow tax bases, significant informal sectors, and vulnerability to external economic shocks, which often leads to budget deficits and dependence on external borrowing. This context raises fundamental questions about the underlying determinants of tax performance in the region and the potential for enhanced domestic revenue mobilization.

1.1.1 Tax Ratio in East African Community

Although East African Community (EAC) member states have experienced economic

growth and rising public expenditure, their tax systems continue to underperform, limiting their ability to meet fiscal demands (Okunogb & Santoro, 2022). The tax-to-GDP ratio reflects the effectiveness of tax policies, economic structures, and administrative efficiency (Piancastelli & Thirlwall, 2020). An analysis of trends from 2013 to 2023 reveals varying performances across the region, influenced by reforms, informal sector dominance, and institutional capacity. Tax ratios are measures of the amount of tax revenue that is available for any given nation (Piancastelli & Thirlwall, 2020). African countries such as South Africa, Namibia, and Morocco have consistently maintained higher tax ratios, averaging around 26.0%, 27.2 %, and 21% respectively (World Bank Group, 2024), reflecting more diversified economies and stronger tax administration frameworks.

The tax-to-GDP ratio in Kenya has been very high, peaking at 15.4% in 2015 but declining to 13.2% in 2018 (OECD, 2024). Such a dip is likely due to tax evasion, political unrest, exemptions, and laxity in enforcing tax laws. These figures are pretty low compared to the desired 22% in Kenya Vision 2030 and are deemed necessary to improve sustainable funding of development targets by enhancing tax performance (Kenya Vision 2030 Secretariat, 2022). However, recent reforms such as digital tax systems (iTax) and attempts to impose tax on the digital economy have helped reverse the trend, with the ratio increasing to 14.8% in 2023 (Okunogb & Santoro, 2022). Although this is the case, Kenya still falls short of its Vision 2030 target of 22 percent, and some of the challenges that remain apparent include the high number of people in the informal sector and leakages in revenues.

Uganda has made modest but consistent progress as demonstrated by a tax-to-GDP ratio

that rose from 11.1% in 2013 to 12.9% in 2023 (OECD, 2024). This growth can be linked to reforms such as electronic tax systems and stricter compliance monitoring by the Uganda Revenue Authority (URA). However, the country still struggles with a narrow tax base and informality, limiting faster expansion.

Rwanda registered a climbing tax ratio from 13.4% in 2013 to a peak of 15.1% in 2020, making it a regional leader. Such a trend was driven by digital reforms, VAT expansion, and improved compliance. However, the ratio has since declined to 13.7% between 2022 and 2023, possibly due to post-pandemic economic strains or reduced enforcement efficiency (OECD, 2024).

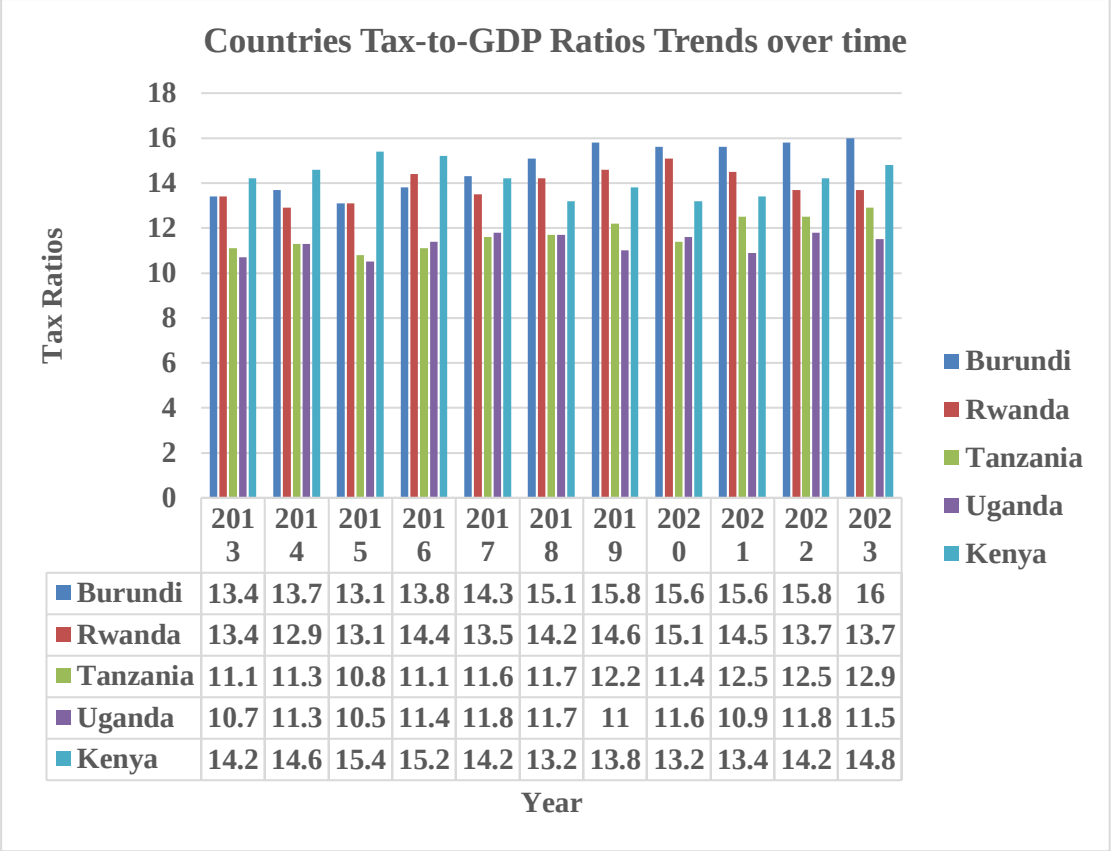
Although Burundi has the lowest tax capacity in the region, it registers a consistent upward trend. The country registered a rising tax-to-GDP ratio from 13.4% in 2013 to 16.0% in 2023, which was the highest in the EAC (OECD, 2024). This growth may stem from stricter revenue collection efforts by the *Office Burundais des Recettes.* However, political instability, aid dependency, and a weak formal economy continue to hinder optimal performance. The table below represents selected East African Community Countries Tax-to-GDP Ratios trends over time (Ndoricimpa, 2021).

Table 1: **Countries Tax-to-GDP Ratios Trends Over Time**

Year	Burundi	Rwanda	Tanzania	Uganda	Kenya
2013	13.4	13.4	11.1	10.7	14.2
2014	13.7	12.9	11.3	11.3	14.6
2015	13.1	13.1	10.8	10.5	15.4
2016	13.8	14.4	11.1	11.4	15.2
2017	14.3	13.5	11.6	11.8	14.2
2018	15.1	14.2	11.7	11.7	13.2
2019	15.8	14.6	12.2	11.02	13.8
2020	15.6	15.1	11.4	11.6	13.2
2021	15.6	14.5	12.5	10.9	13.4
2022	15.8	13.7	12.5	11.8	14.2
2023	16	13.7	12.9	11.5	14.8

Source: World Bank Group, 2024.

The figure below underscores graphical representation of selected East African Community Countries Tax-to-GDP Ratios trends over time.



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Burundi	13.4	13.7	13.1	13.8	14.3	15.1	15.8	15.6	15.6	15.8	16
Rwanda	13.4	12.9	13.1	14.4	13.5	14.2	14.6	15.1	14.5	13.7	13.7
Tanzania	11.1	11.3	10.8	11.1	11.6	11.7	12.2	11.4	12.5	12.5	12.9
Uganda	10.7	11.3	10.5	11.4	11.8	11.7	11	11.6	10.9	11.8	11.5
Kenya	14.2	14.6	15.4	15.2	14.2	13.2	13.8	13.2	13.4	14.2	14.8

Figure 1: Countries Tax-to-GDP Ratios Trends Over Time

These divergent trajectories, summarized in the table above, highlight a complex regional picture. While all five selected EAC nations have tax ratios within a relatively narrow band (12-16%), their paths over the last decade have not been uniform. This variation suggests that country-specific factors whether economic, institutional, or policy-related may be driving these outcomes, a possibility that requires systematic investigation to understand why similar regional contexts yield different performance results

1.1.2 Tax Effort in East Africa

EAC nations exhibit varying levels of tax effort, influenced by administrative efficiency, compliance, and economic diversification. In Kenya, establishing the Kenya

Revenue Authority (KRA) in 1995 through an Act of Parliament (Cap 469) was instrumental in improving the mobilization of government revenue and tax administration (Kenya Revenue Authority, 2018). Kenya enacted a new constitution in 2010 whose provisions allowed the formation of county governments (Kenya Law Reform Commission, 2010). Such development was core to enhancing a tax capacity that was responsive to the needs of locals in respective counties. Kenya has a diversified economy with progressively robust investments in digital tax systems that have contributed to improved compliance and broader tax coverage.Tax effort in Rwanda has been consistently high. This trend can be linked to its institutional reforms and the adoption of robust digital reforms and VAT expansion. The Rwanda Revenue Authority (RRA), which was established in 1997, has been playing a key role in improving tax capacity through initiatives such as taxpayer education, digitalization of services, and transparent operations (OECD,202). These efforts have seen the country register increased compliance and efficiency. Although Rwanda has a small economic base, the strong governance and anti-corruption measures have contributed enormously to sustained improvements in revenue collection, creating a sound pool of resources to support public expenditure.

On the other hand, Burundi has been experiencing significant challenges in tax effort. This could be a factor of limited industrial base, widespread informality, and political instability. The *Office Burundais des Recettes* (OBR) has developed measures to improve tax collection (Ndoricimpa, 2021).. However, progress remains slow due to factors such as weak administrative capacity and low taxpayer compliance continue to hinder revenue mobilization.

The tax effort in Uganda has been modest amidst steady progress in recent years. The Uganda Revenue Authority (URA), which was established in 1991 has been undertaking reforms to modernize tax collection and broaden the tax base. However, this agency is struggling with hindrances such as high levels of informality in the economy, limited enforcement capacity, and tax exemptions, constraining its ability to exploit its tax potential fully. The country is currently investing in digitalization processes and compliance enforcement to seal gaps that hinder its tax efforts.

Tanzania has made moderate improvements in tax effort through the Tanzania Revenue Authority (TRA). This body was created in 1996 and has been spearheading reforms by leveraging digital solutions to enhance tax compliance and broaden the tax base (Kyomo &Buhimila, 2025). However, the country continues to face challenges due to the inability of the TRA to capture revenues from the informal sector and inefficiencies in tax administration. The TRA can only do better with the support of the political class and investment in administrative capacity.

However, a comprehensive analysis of tax effort to measure how close these countries come to their revenue potential remains underexplored. It is one thing to observe the output (the tax ratio) and another to measure the efficiency of the process itself (tax effort). Thus far, the critical unanswered question is whether the observed tax ratios in the EAC are primarily a function of structural economic limitations or if significant gaps in administrative efficiency and policy design are also to blame.

1.1.3 Determinants of Tax Ratio in the East African Community Member States

A range of structural, economic, and institutional factors are theorized to influence tax ratio across the East African Community (EAC). Although there are country-specific variations; the region assumes shared patterns due to its shared economic structures and policy environments (Petersen & Nerré, 2010). Existing literature posits GDP per capita as a fundamental determinant, with the expectation that higher income levels provide a larger tax base through increased consumption, formal employment, and corporate profitability (Tanzi,1999, Dioda, 2012). The EAC demonstrates significant regional disparities in GDP per capita, ranging from approximately $256 in Burundi to over $2,200 in Kenya (World Bank, 2024). A key question for this study is to what extent these disparities explain the observed variations in tax performance across the community

Tax performance in EAC economies is also a factor of sectoral composition. The agricultural sector in the region contributes between 20–30% of GDP (OECD, 2024). However, the sector remains largely informal and difficult to tax effectively. limiting its taxable surplus, particularly in nations like Burundi and Uganda where subsistence farming is prevalent. In contrast, the manufacturing sector, contributing 7–16% of GDP (Petersen & Nerré, 2010), is often associated with more stable corporate tax revenues and formal employment, potentially benefiting countries with stronger industrial bases like Kenya.

Trade openness can significantly influence tax ratios through customs duties and import-related taxes. However, regional integration efforts and the implementation of common external tariffs within the EAC may be gradually reducing this revenue source,

creating pressure to develop alternative domestic tax handles (Gaalya et al., 2017). As well, financial depth, measured by broad money supply (M2) as a percentage of GDP, could support tax collection by improving the traceability of transactions, as seen with mobile money in Kenya, Rwanda, and Tanzania (Mwangi, 2022). Yet, the effect may be limited by significant financial exclusion in rural areas. Macroeconomic stability, particularly regarding inflation and exchange rate volatility can also affect the real value of collected revenues and the predictability of trade-related taxes (Ramoni-Perazzi & Romero, 2022). Also, resource-rich sectors like mining present both an opportunity and a challenge, as effective taxation requires sophisticated administrative capacity to counter issues like transfer pricing, a capability still under development in most EAC nations (Guj et al., 2017).

While these factors are widely acknowledged in the literature, a critical gap remains in empirically verifying their relative importance and specific interplay within the unique, integrated context of the EAC. Existing studies often focus on single countries, leaving a gap in regional analysis that can identify common leverage points for policy intervention

1.2 Statement of the Problem

Tax revenue is a critical component of national development as it enables governments to deliver public services, invest in infrastructure, and ensure macroeconomic stability. Tax revenue is the foundation of sustainable development, enabling governments to deliver essential public services, invest in infrastructure, and maintain macroeconomic stability. East African Community nations must prioritize achieving higher levels of domestic revenue mobilization, critical for financing their development agendas and

reducing reliance on external debt.

However, a persistent development paradox exists, that is, despite a decade of economic growth and continuous policy reforms, the tax-to-GDP ratios for key EAC member states have remained stagnant within a low range of 12% to 16% (World Bank, 2024). This performance falls significantly short of the 20-30% threshold often associated with sustainable development and lags behind peer nations in other developed parts of the world (World Bank, 2024; Choudhary et al., 2024). This underperformance has tangible consequences, potentially contributing to fiscal deficits, increased public debt, and constrained public investment.

The existing literature provide a foundational list of potential causes but offers limited empirical clarity on their relative importance across the EAC region. Crucially, there is a lack of a consolidated analytical framework that simultaneously estimates the structural determinants of tax capacity and the efficiency of its mobilization (tax effort) within the EAC context. Therefore, a critical empirical gap exists in understanding the precise factors that explain the observed tax ratios and in quantifying the extent to which EAC nations are underutilizing their revenue potential. This study seeks to fill this gap by systematically estimating the determinants of the tax ratio and calculating the tax effort for selected EAC countries from 2013 to 2023, thereby providing evidence-based insights to inform more effective fiscal policy in the region.

1.3 Research Questions

The study addresses the following research questions:

i. What are the determinants of tax ratios in selected East African Community Countries?
ii. What is the tax effort among the selected East African Community Member Nations?

1.4 Research Objectives

1.4.1 General Objective

The primary study objective is to analyze the determinants of tax performance in selected East African Community member nations

1.4.2 Specific Objectives

The Specific objectives include:

i. To estimate the determinants of tax ratio in selected EAC countries.
ii. To estimate and compare the tax effort of selected EAC countries.

1.5 Significance of the Study

The findings of this study offer crucial insights for policymakers to understand the factors that influence tax ratios in East African Community Nations. The insights from this study identifies common and country-specific determinants of the tax ratio, informing each nation's policymakers' ability to design targeted reforms to enhance tax revenue mobilization.

The study is particularly significant in supporting the EAC Vision 2050, which aims to deepen regional integration, enhance economic prosperity, and improve the quality of life for citizens through increased self-reliance and domestically financed development.

Thus, the current study identifies actionable drivers of tax revenue, supporting the region's goal of strengthening domestic resource mobilization, a key pillar of the vision. Improved tax collection aligns with the EAC's broader objectives of reducing reliance on foreign aid, funding critical infrastructure and public services, and fostering a stable macroeconomic environment conducive to investment and growth

Also, this study contributes to achieving the United Nations Sustainable Development Goals (SDGs), specifically SDG 17, which emphasizes strengthening domestic resource mobilization to enhance sustainable development financing. This research supports SDG 17 goals of enhancing financial resilience and reducing poverty through increased governmental capacity for development funding as it seeks to produce insights that address factors that impact tax ratios. Thus far, the study supports Kenya Vision 2030 and SDG 17 by enhancing revenue mobilization.

Furthermore, the study contributes to the African Union's Agenda 2063, which seeks to foster inclusive growth and sustainable development across Africa. The study seeks to identify strategies to optimize tax revenue, supporting the Agenda 2063 focus on economic transformation, governance, and the self-financing of African development programs.

The research contributes to the broader literature on tax policy in developing countries, offering a region-specific analysis that can be used to inform comparative studies in other parts of Africa. Future researchers can build upon these findings to explore tax policy implications in other African nations, thereby supporting the broader objective of fiscal independence and sustainable development across the continent.

1.6 Scope of the Study

This study focuses on analyzing the determinants of tax ratios and tax effort in five selected East African Community member nations: Kenya, Tanzania, Rwanda, Burundi, and Uganda. The study acknowledges that the EAC nations are eight in number. However, the geographical scope is restricted to the five East African community member nations. This choice was informed by their shared economic structures, tax mobilization challenges, and the need for comparative insights into their fiscal policies. Thus far, the study excludes other EAC member states such as South Sudan, Somalia, and the Democratic Republic of Congo due to significant data limitations and differing economic contexts. A preliminary review confirmed that these countries lacked a complete and consistent annual data series for the key variables across the 2013-2023 timeframe; this would have compromised the robustness of the panel data analysis.

The study covers a period spanning 11 years from 2013 to 2023. The study narrows its focus on this decade because it marks an era where the select nations register significant milestones in their economic growth and fiscal reforms (EAC, 2018, 2019). This timeframe is long enough to allow for an in-depth analysis of patterns in tax ratios; the economic variables that influence them, including GDP per capita, trade openness, manufacturing, mining, exchange rate and money supply. The captured period also marks an important policy dynamic for each nation that was geared towards enhancing domestic revenue mobilization.

1.7 Organization of the Study

This research is organized into five chapters. Chapter One has provided the introduction, background, problem statement, objectives, and scope. Chapter Two will present a review of relevant theoretical and empirical literature. Chapter Three outlines the research methodology, including the design, model specification, and estimation techniques. Chapter Four presents the empirical findings and analysis. Chapter Five concludes the study by summarizing the findings, drawing conclusions, and providing policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section discusses past literature on the factors influencing tax ratios and tax efforts. It explores various theories, including the ability-to-pay theory, benefit theory, and neutrality theory. Also, it reviews empirical studies on GDP per capita, government debt, trade, and the service sector as key determinants of tax revenues. The section explores diverse literature, highlighting points of convergence and divergence, which is critical for identifying gaps in the topic of interest.

2.2 Theoretical Literature Review

The following theories related to taxation and fiscal policy are discussed. This review focuses on theories that provide a framework for understanding the determinants of a country's tax capacity and the factors influencing its tax effort.

2.2.1. Ability-to-Pay Theory

The Ability-to-Pay was authored in 1939 by Kendrick, Slade, advocating for a taxation system that is responsive to individual financial capability, ensuring that persons with a higher resource pool shoulder the highest burden (Seriah, 2024). The ability to pay theory borrows from Stuart Mill arguments that taxation should be designed in such a way that each taxpayer contributes equal sacrifice. Mill argues that an efficient taxation policy should target the rich to pay higher amounts as opposed to exposing all individuals to the same taxation rates. He justifies his argument by using the diminishing marginal utility of finances. This theory is pegged on the assumption that taking higher taxes from the rich would harbor less of a decrease in utility for the rich

than for poorer individuals because the money needs for the latter population are higher. This approach is rooted in the philosophy that taxation should be equitable to ensure that persons benefiting more from the available resources in society contribute proportionately higher to their maintenance and functioning. However, despite the proponents of this theory driving a consensus on the need to ensure equitable taxation, they fail to distinctly come up with the criteria to be used to establish a person's capacity to contribute. This creates a gap in defining whether wealth, income, or other factors should be utilized to establish an individual's capacity to pay (Seriah, 2024). This leaves gray areas in Tax policy formulation, particularly in the context of implementing progressive taxation systems.

This theory is relevant to the study on tax ratios because it provides a framework for understanding how equitable taxation systems can enhance revenue mobilization. Specifically, it informs the selection of GDP per capita as a key determinant, as it proxies the overall ability of the economy to bear a tax burden. The theory underpins relevance to the EAC member nations under focus, given their significant income disparities and large informal sectors. The challenge of applying this theory in practice, due to informality, directly relates to this study's investigation into why certain structural determinants may be less significant in the EAC context.

2.2.2. The Benefit Theory

The benefit theory traces its roots to the seminal works of Swedish economist Knut Wicksell (1896) and was later formalized by Erik Lindahl (1919). Their collective work posited that taxation should be based on the degree of benefit conferred to individuals as discussed in Seriah, (2024). According to them, the higher the benefits an individual

accrues for the society, the larger they must contribute towards taxation. However, the critics of this theory pinpoint the difficulties that the state may encounter in establishing the value different individuals accrue from services such as national defense, public education, street lights, and environmental cleaning services, to name a few (Seriah, 2024). Despite such limitations, this theory works well in specific tax cases like road tolls, where users are required to pay depending on usage.

The benefit theory is relevant to the study as it highlights a key non-structural determinant of tax effort: taxpayer morale. The theory suggests that the perceived benefit from public services influences compliance and the willingness to pay taxes. This theory also resonates well with the EAC member nations because these countries face challenges in ensuring that taxpayers perceive a direct link between the taxes they pay and the public services they receive. This perception can influence tax compliance and tax morale, which are intangible factors that ultimately influence a country's tax effort score, representing the difference between its predicted capacity and its actual collection

2.2.3. The Neutrality Theory

The Neutrality theory traces its roots from the work of Frank Ramsey 1927 and subsequent advancement in 1971 by James Mirrlees (1971) (Stiglitz, 2014), both assessing the cost of tax distortions and efficiency costs helps establish whether taxes meet the neutrality and uniformity criteria. According to E Soares et al. (2023), a tax policy can achieve the principle of neutrality by expanding the tax base, cutting down tax rates, and recognizing and assessing tax expenditures. The theory of neutrality links the element of efficiency, which ensures a tax system is as undistorting as possible since

an efficient tax system is one where the state promotes cohesion, development, and reduction of inequalities. Such an argument implies that taxes must remain neutral, where neutrality contributes to the efficiency of the collection while facilitating the optimal allocation of resources.

The economists who support this theory argue that taxes can only be perceived as equitable if and only if they achieve an even distribution of economic benefit. They posit that neutrality entails fewer standards employed to the general distribution of the tax load and more of equal application of such standards (E Soares et al., 2023). The statement implies that taxes must embody the principles of equity while embracing thoughtful deviation from neutrality in a manner that resonates with public objectives.

This theory is highly relevant to the study because it provides a framework for analyzing how tax policies can be structured to avoid negative impacts on economic growth, investment, and trade; all of which are key determinants of the long-term tax base. The theory is also relevant in the context of the EAC member nations because their economies are developing; hence, the need to ensure tax approaches are as efficient as possible to not hinder the very economic activities that generate revenue. This theory provides a framework for analyzing how tax policy design can impact the tax base itself. It supports the inclusion of variables like trade openness (TRADEOP) and manufacturing share (MANU), as distortive taxes on these sectors could stifle the very economic activities that generate revenue.

2.2.4. Tax Capacity and Tax Effort Theory

While the aforementioned theories provide normative principles for tax design, the

theoretical core of this study is anchored in the positive theories of Tax Capacity and Tax Effort (Bahl, 1971; Lotz & Morss, 1967). Tax Capacity Theory posits that a country's potential tax revenue is determined by its structural economic characteristics, such as the level of economic development (GDP per capita), the sectoral composition of the economy (share of agriculture, manufacturing, etc.), and its degree of openness to trade. These factors define the taxable capacity of an economy. The Tax Effort Framework (Gupta, 2007; Le et al., 2012) then builds on this by measuring how effectively a country utilizes this capacity. Tax effort is calculated as the ratio of actual tax collection to the estimated tax capacity. A score below 1 indicates inefficiencies, which can be attributed to factors like weak tax administration, poor compliance, and policy choices, which are areas pinpointed by the Benefit and Neutrality theories.

2.2.5. Optimal Taxation Theory

This theory was developed by James Mirrlees (1971); it builds on the foundations of Neutrality Theory. Optimal Taxation Theory offers insights necessary for designing a tax system that maximizes social welfare by balancing the trade-off between equity (redistribution) and efficiency (minimizing distortions). The Mirrlees model demonstrates that optimal income tax schedules are typically progressive but with marginal rates that eventually fall at the top to avoid discouraging high earners. This theory moves beyond simple neutrality to provide an advanced framework for evaluating real-world tax structures, acknowledging that some distortion is inevitable to achieve distributive goals.

In the context of the current study, Optimal Taxation Theory is highly relevant as it moves the discussion from whether to tax to how to tax most effectively. It justifies the

study's focus on the overall tax ratio as an outcome variable, which is the result of complex policy choices informed by these equity-efficiency trade-offs. The theory suggests that the EAC must solve the challenge of increasing revenue as well as adopting a tax structure that minimizes harm to growth, providing a deeper lens through which to interpret the findings on determinants like GDPPC and MANU.

2.2.6 The Laffer Curve

The Laffer Curve is a seminal concept in public choice economics popularized by Arthur Laffer in 1974. The theory illustrates the theoretical relationship between tax rates and tax revenue. It posits that there is an optimal tax rate that maximizes revenue and that rates below this point yield less revenue than possible, while rates above it discourages taxable activity so much that they also yield lower revenue (Haasjes, 2024). The core insight is that tax rates and tax bases are inversely related beyond a certain point. However, the curve does not specify where this revenue-maximizing point lies, which is an empirical question that varies by country, tax type, and economic context.

The Laffer Curve is crucial for interpreting the tax effort index. A country with a high tax effort score may be near its revenue-maximizing point, suggesting that further revenue gains must come from base-broadening rather than rate hikes. Conversely, a low tax effort score could indicate that a country is on the prohibitive side of the curve or, more likely, that it is failing to exploit its existing tax base due to inefficiencies captured by the model's error term. It cautions against simplistic policy conclusions that equate higher rates with higher revenue.

2.2.7 Wagner's Law

This theory was developed by German economist Adolf Wagner (1883). He proposed that as an economy develops, the relative size of the public sector will grow. This occurs because industrialization and modernization create increased demand for public services like education, infrastructure, and law and order, which are more efficiently provided by the state (Ghazy et al., 2021). Wagner's Law implies a long-run causal relationship running from economic development to higher public expenditure and, by extension, a need for higher tax revenues.

Wagner's Law is relevant to the current study because it provides a fundamental rationale for including GDP per capita (GDPPC) as a primary determinant of tax capacity. It suggests that the structural transformation of EAC economies will naturally lead to increased pressure and capacity for higher tax collection. The theory supports the hypothesis that $\beta 1$ for GDPPC is positive, as economic development expands the scope and necessity of government activity.

2.2.5. Synthesis and Linkage to the Current Study

This theoretical review focuses on different theories, with each contributing a vital piece to the puzzle of tax performance. The Ability-to-Pay, Benefit, and Neutrality theories offer valuable insights into the principles of a good tax system. However, for the purpose of this empirical study, the Integrated Tax Capacity and Effort Model serves as the primary theoretical anchor.

The Ability-to-Pay, Benefit, and Neutrality theories provide foundational principles for equitable and efficient taxation. However, their applicability in East African

Community (EAC) nations is limited due to the unrealistic assumptions about administrative capacity. This gap between theoretical ideals and practical implementation is precisely why the Tax Capacity and Effort model is more suitable, as it allows for the measurement of this implementation gap. The three theories base their arguments on robust institutions, high taxpayer compliance, and seamless enforcement mechanisms. These conditions are more realistic in developed nations and are missing within the EAC member states. The persistently low tax effort scores estimated in this study for some EAC nations are an empirical reflection of these very challenges.

The gap may be due to several factors like the administrative and compliance failures, as explained by the difficulties in applying the Ability-to-Pay Theory in a large informal sector, or low Tax Morale, a phenomenon predicted by the Benefit Theory when the link between taxes and public services is weak. Other causative factors encompass, distortive policy choices, which deviate from the principles of Neutrality and Optimal Taxation, thereby stifling the tax base. Prohibitive tax rates may also create this gap, a potential scenario on the downward-sloping side of the Laffer Curve.

The Tax Capacity and Effort model synthesizes the relevant concepts into a cohesive analytical framework. Firstly, it estimates Tax Capacity, a step directly informed by the structural determinants highlighted by Wagner's Law (GDP per capita) and Tax Capacity Theory (sectoral composition, trade openness). The variable selection (GDPPC, MANU, AGRIC, TRADEOP) is justified by these theories, which posit that a country's economic structure defines its potential revenue base. Secondly, it derives Tax Effort which is a measure of efficiency captured by the shortfall between potential and actual collection. This shortfall is where the insights from the other theories find

their empirical expression.

Therefore, this study's methodology is a direct operationalization of this synthesized framework. The use of a panel regression to estimate tax capacity based on structural variables gives empirical life to Wagner's Law and Tax Capacity Theory. Subsequently, the calculation of the tax effort index provides a quantifiable metric for the implementation gap caused by the political, administrative, and compliance challenges articulated by the Benefit, Public Choice, and Optimal Taxation theories. The persistently low tax ratios in some EAC nations are not merely a function of low capacity but a complex interplay of structural limitations and inefficiencies in mobilization. The Integrated Tax Capacity and Effort Model allows this study to disentangle these two dimensions. It provides the theoretical justification for both the model specification (the variables chosen to represent capacity) and the core research question (understanding why actual collection deviates from this capacity), offering a comprehensive lens through which to diagnose the specific challenges of revenue mobilization in the EAC.

2.3 Empirical Literature Review

2.3.1 Tax Ratio

The tax-to-GDP ratio is a critical measure in fiscal policy that determines the tax revenue of a country relative to its economy. This concept evaluates how optimally the state utilizes taxation to direct its economic resources (Tile et al., 2024). A government fiscal policy determines its capacity to collect revenues, a critical component that determines its ability to finance investments in infrastructure, human capital, and service provision. However, most developing nations experience challenges in

mobilizing adequate revenues to sustain their operations amidst growing public demand for services, a trend that has been contributing to increased budgetary deficits. Any nation whose current collection is below 15% of GDP in taxes requires a robust fiscal policy to increase its revenue collection (World Bank Group, 2024). Notably, 83% of developing nations and 48% of lower middle-income nations are below this cut line. The challenge is even greater in nations experiencing violence since most of them registered a tax-to-GDP ratio of below 12.6 % as of 2023 (World Bank Group, 2024). This literature review critically evaluates key empirical studies exploring the determinants of tax effort and performance, examining their methodologies, findings, and limitations.

2.3.1.1 Foundational and Macroeconomic Perspectives

The linkage between taxation and economic development is complex and gains traction through various factors, including economic constraints, the size of the informal sector, and state capacity. The seminal work of Tanzi (1992) first established structural linkages between agricultural dependence and lower tax ratios in developing economies. This study utilized a cross-sectional regression analysis using macroeconomic data from developing countries. However, the study had some methodological limitations in that it relied on cross-sectional data, limiting causal inference and time-series analysis. It also failed to account for unobserved country-specific effects. This study is foundational to the current research as it establishes the a priori expectation that agricultural share (AGRIC) should be a negative determinant of the tax ratio, a hypothesis this study tests in the EAC context.

This macroeconomic perspective was expanded by Tunzi & Davoodi (1997), who evaluated the impact of corruption on tax performance using subjective corruption indices. Their study employed cross-sectional regression analysis with data on corruption from Business International (BI) and the International Country Risk Guide (ICRG) to evaluate the impact of corruption on tax performance. The study establishes that corruption erodes tax performance by incentivizing evasion and exemptions, with infrastructure quality declining in high-corruption environments, indirectly affecting revenue collection. However, the study had limitations in that it relied on subjective corruption indices, failed to use panel data to observe trends over time; also, there were limited causal inferences in the study., affecting the reliability of the study findings. While this study focuses on corruption, a variable not directly included in this study's model, it underscores the importance of institutional factors that contribute to the unexplained "effort" component and justifies the use of a fixed effects model to control for time-invariant institutional differences.

Chelliah (1971) conducted one of the earliest comprehensive cross-country studies on tax ratios, specifically focusing on providing a framework for answering the critical question of how much tax revenue a country can reasonably expect to raise and from which sources. The study identifies a positive relationship between the level of development and the tax-to-GDP ratio. The study emphasized the role of the monetized sector and foreign trade as key taxable bases. The study was grounded in the analysis of the peculiar economic and social conditions of developing countries. It employs a diagnostic framework that evaluates the limitations of other revenue sources such as foreign aid, domestic borrowing, and non-tax revenues to establish the necessary role of taxation in funding an expanding public sector. This methodology is simplistic as it

relies on bivariate correlations and small samples. The methodological limitation notwithstanding, it laid the groundwork for the multi-variable regression approaches that followed, reinforcing the importance of the variables selected for this study

Additionally, Stotsky and WoldeMariam (1997) study sought to identify the key factors that determine the tax revenue-to-GDP ratio in sub-Saharan African (SSA) countries and to construct a comparative measure of tax effort for these nations. The study employed a panel data analysis for a sample of 43 sub-Saharan African countries over the period 1990-1995. provided an early panel study focused on Sub-Saharan Africa, confirming the significance of per capita income and the composition of GDP. They also highlighted the negative impact of a large agricultural sector, consistent with Tanzi's findings, but added the important observation that the structure of exports also matters. Their work is a direct precursor to the regional focus of this study on the EAC. Although this study provides critical insights, the study period (1990-1995) is now three decades old. The economic structures, global trade dynamics, and tax policies of SSA countries have changed dramatically since then, limiting the contemporary relevance of its specific findings. The methodology represents a deterministic approach to measuring tax effort; it does not use more advanced techniques like Stochastic Frontier Analysis (SFA), which is better suited for distinguishing between capacity and efficiency.

Barro (1990), Gordon & Li (2009), and Kleven et al. (2009) focused on theoretical foundations on taxation, state capacity, and tax enforcement. Barro (1990) argues that well-designed tax systems can enhance productivity. Gordon and Li (2009) emphasize the link between taxation and formal finance, while Kleven et al. (2009) show the

effectiveness of third-party tax enforcement in developed nations. These studies highlight different approaches that nations can employ to enhance their tax efforts, hence, they are relevant to the current study.

Murunga, Muriithi and Kiiru (2016) investigated determinants of tax shares and tax effort in Kenya. On using ordinary least square regression method, the study showed that manufacturing, trade openness were important determinants of tax shares in Kenya. The tax effort was found to be 0.6 on average for the years of study. Although the study identified determinants of the tax ratio, key diagnostic tests revealed problems; specifically, the Ramsey RESET test ($p=0.0021$) indicated significant model misspecification, likely due to omitted variables. This methodological gap challenges the validity of the regression results. This study is directly relevant as it focuses on a key EAC country. However, its methodological limitations, such as model misspecification, highlight the gap this study aims to fill by employing a more robust panel data approach with rigorous diagnostic testing for multiple EAC countries.

The 2000s saw methodological advancements, with Krogstrup (2002) identifying a significant relationship between public debt asymmetries and disparities in tax levels and primary expenditures. High-debt nations tend to experience reductions in public sector size and rising tax rates compared to their low-debt counterparts. Also, capital mobility potentially increases these asymmetries while eliciting cross-country discrepancies in tax mix. Thus, as capital mobility rises, the tax increases required to meet higher debt service obligations are likely to shift increasingly toward labor income and consumption and not capital.

Levin and Addison (2006) utilized a gravity framework to evaluate the link between trade openness and economic growth. The study established that trade openness supports growth in trade volumes and the economy, directly influencing tax revenues with higher per capita incomes and fostering a wider tax base. Baunsgaard and Keen (2010) found per capita income and openness crucial for tax performance. A regression analysis by Baunsgaard and Keen (2010) study also reveals that per capita income has an overall positive influence on taxes. Thus far, these studies support the analogy that an increase in trade openness produces a positive effect on the tax base, increasing a nation's revenue flow and ability to invest in different projects. Most studies focus on middle-income or transitioning economies, with limited attention to fragile or agriculture-heavy economies like many in SSA.

2.3.1.2 Institutional Quality, Resources, and Methodological Debates

Focusing on the role of institutions in affecting tax to GDP ratio, Akanbi (2019) used a panel vector error correction model (VECM) on 110 non-resource-rich countries for the period running from 1996 to 2017. The findings showed presence of a bi-directional causality between the quality of institutions and tax to GDP ratio. In other words, the results implied that quality institutions lead to higher tax to GDP ratios, while increasing tax revenues improves institutional quality. The strength of the study is in carrying out dynamic view of the variables. The drawback is in the use of governance indices which may suffer from measurement errors and perception bias. This therefore raises great concerns on the robustness of the results. In addition, excluding the resource-rich countries raises concerns on the generalizability of the study findings in cases where resource-rich countries are dominant.

Lee et al.'s (2012) study sought to evaluate structural and institutional determinants of tax performance across 110 countries. The study employed pooled OLS regression with GDP per capita, trade openness, agriculture share, and governance indicators. The study results revealed that bureaucratic quality and corruption were significant predictors; with GDP per capita becoming insignificant when governance was controlled. However, the methodological approach used pooled OLS instead of panel estimators, raising concerns about unobserved heterogeneity and robustness. The use of subjective corruption indices, such as corruption, negatively influences revenue performance because it leads to high-level tax exemptions and weak tax administration that create loopholes for tax evasion. This study is highly relevant methodologically, as it employs a similar cross-country approach to estimating tax capacity. However, its use of pooled OLS instead of panel estimators presents a weakness that this current study addresses by using fixed effects estimation to control for unobserved country heterogeneity.

Jensen (2011) argues that heavy reliance on natural resources, particularly hydrocarbons, weakens a state's fiscal capacity and ability to tax effectively compared to diversified economies. Using a novel theoretical framework, the authors model fiscal capacity as an investment under uncertainty and empirically demonstrate that resource intensification undermines state-building by reducing incentives to develop robust tax systems. Their findings support the idea that resource-rich developing countries face structural disadvantages in building strong fiscal institutions, which are crucial for sustainable development. This "resource curse" thesis is relevant for understanding the contextual challenges for resource-rich EAC members like Tanzania and Uganda, even if the mining sector (MINE) variable was ultimately excluded from the final model of the current study. However, the analysis is restricted to 30 hydrocarbon-rich economies,

which may not be generalized to all resource-dependent countries, such as those that depend on minerals or agricultural exporters.

Bird, Martinez-Vazquez, and Torgler (2008) investigates deeper into the mechanisms linking institutions and tax performance. They argue that the impact of institutions is not monolithic; different dimensions of governance like control of corruption and regulatory quality affect various tax types differently. Their research suggests that improving tax administration may have a more immediate payoff for revenue than broader, but slower, improvements in general governance. This enhanced view informs this study's interpretation of the fixed effects, which capture the net effect of a country's institutional environment.

Langford and Ohlenburg (2015) critiques the traditional deterministic approach to calculating tax effort that uses the predicted value from a regression as capacity as flawed because it can yield effort scores greater than 1, which are difficult to interpret as inefficiency. This critique provides a strong justification for the methodological choices in this study, particularly if Stochastic Frontier Analysis (SFA) is considered or if the fixed effects approach is explicitly framed as a more robust alternative to the deterministic method for estimating a feasible capacity rather than a theoretical maximum.

2.3.1.3 Public Debt, Tax Burdens, and Recent Threshold Analyses

Other studies discuss tax burden trends in debt-laden economies. Leão (2015) and Haytham (2017) note increased tax burdens in high-debt contexts. Additionally, Cassou and Shadmani (2018) demonstrated that during economic downturns, the tax burden

decreases as the debt-to-GDP ratio rises. These studies establish that high-debt nations tend to experience reductions in public sector size and rising tax rates compared to their low-debt counterparts.

Different empirical studies explored the connection between public debt and economic growth. Mironikovaitė et al. (2023) applied a threshold regression analysis to European data to establish the bidirectional relationship between public debt and tax burden. The study established a linkage between public burden and tax burden as complex, mainly because diverse factors influence it. The study argues that despite past literature indicating that public debt increases the tax burden of a nation in the future, other variables such as the share of industry in GDP, economic growth rate, level of economic openness, and political and institutional, among others, the findings of this study underscore that a breaking point is attained when the level of public debt is equal to 55.8% of GDP, beyond which the risk of negative consequences for a country increases in the future, potentially creating a surge in tax burden. Such a trend harbors adverse effects on consumption, economic growth, and production volumes. This study has some limitations as the results are region-specific (mainly European countries), limiting applicability to SSA or developing economies.

Identifying tax-to-GDP thresholds that influence inclusive economic growth was also an area of interest for some scholars. Choudhary's (2024) study employed the regression discontinuity method combined with a fixed effect framework to identify the threshold tax levels (encompassing social security contributions) as a percentage of GDP at which a discontinuity prevails in the rate of future economic and inclusive growth. The study measured such using the prosperity gap metric. This study established that a tax-to-

GDP ratio of 12.5 % is linked with a potential acceleration in future economic development. In another study, Gaspar, Jaramillo & Wingender (2016), on using panel regressions estimated optimal tax ratio. Their findings revealed that optimal tax to GDP ratio for a country should be 12.75 percent of GDP. Their results illustrated that countries that cross this threshold experience a much more durable economic growth. The study controlled for political factors and institutional quality. Although this study stands out as having a robust econometric analysis, its major drawback is assuming a uniform threshold. The countries may not have similar characteristics; and therefore, the ratio obtained may not be optimal for every country.

The work of Reinhart and Rogoff (2010) on growth and debt establishes a negative correlation between high public debt (above 90% of GDP) and economic growth. The insights from this study implies a potential feedback loop for taxation: high debt may slow growth, which contracts the tax base, making it harder to service the debt, potentially leading to higher future tax burdens that further discourage growth. This complex interplay underscores the importance of controlling for the initial level of public debt in tax capacity models, a variable that can be considered in future extensions of this research.

More recently, the International Monetary Fund (2020) has advanced the concept of fiscal space, which integrates debt levels, revenue mobilization potential, and expenditure needs. This framework moves beyond simple tax-to-GDP thresholds to a more nuanced view of a country's fiscal options. It suggests that the 15% benchmark, while useful, must be contextualized within a country's specific debt dynamics and growth prospects, which is highly relevant for a region like the EAC where member

states exhibit varying degrees of fiscal space.

2.3.1.4 The East African Community (EAC) Context

Studies focusing on EAC nations demonstrate a linkage between service sectors and GDP growth. In Tanzania, the service sector has been growing from 33.3 -36.5 % between 1990-2020(Mapunda et al., 2023), while in Kenya, the service sector contributed to 52.4% of the total economy in 2021 (Kenya National Bureau of Statistics, 2024). In Rwanda, the service sector experiences significant growth, contributing approximately half of the nation's GDP (about 47%), while in Uganda, it grew by 6.6% (International Monetary Fund, 2024). These statistics indicate that the EAC member countries, similar to developed nations, have been experiencing a growing service sector, making it a key contributor to the economy and tax ratios. These findings, while promising, do not assess whether the growth in services translates directly into proportional increases in tax revenue, especially in largely informal economies.

In another study Aktar and Babyenda (2024) studied the effect of regional integration on tax performance in East African Community (EAC) countries. On using random and fixed effects as well as Generalized Method of Moments (GMM), the findings showed a negative relationship between regional integration and tax revenues. Although the study highlights key policy trade-off between integration and tax performance, its application to individual member countries may not plausible due to potential heterogeneity among the member countries.

In another study Ibrahim and Jairo (2023) investigated the effect of administrative efficiency on tax in EAC member countries for the period running from 2009 to 2018.

On using random effects estimations, the findings showed that improvements in the taxpayer management, staff productivity, and cost of collection significantly improve the performance of tax revenue. Although this study points out the importance of tax administration on tax revenue performance, the proxies that were used to capture efficiency may not measure deeper compliance and institutional factors.

Comparative tax collection performance in East African Community (EAC) countries reveals underperformance compared to elsewhere in developed nations. According to recent data by the International Monetary Fund (2024), Rwanda ranks the highest in tax collection as a percentage of GDP with approximately 19.32%, followed closely by Kenya at 17.93%, Tanzania at 15.96%, and Uganda at 15.42%, all below the UN standard of 20%. Such inadequacies in tax collection pinpoint the inability of respective EAC member countries' governments to collect sufficient tax revenues to support their citizen's welfare. The figures also justify why these countries have consistently registered high budgetary deficits that expose their respective nations to public debt. This trend is not only evident within EAC member countries but also typical in most Sub-Saharan African (SSA) governments that collect insufficient tax revenue (Abdu & Adem, 2023). These data-driven reports do not explore causal relationships or the underlying institutional and economic variables influencing outcomes.

Mascagni and Mengistu (2021) conducted a detailed Tax Effort study for the African Tax Administration Forum (ATAF), which included several EAC countries. Their analysis, which used both stochastic frontier and data envelopment analysis, found that EAC members had significant room to improve efficiency. They specifically highlighted the potential gains from digitalizing tax administration, combating tax

evasion from large corporations, and improving VAT design. Their policy-oriented findings provide a direct link between the estimated tax effort scores of this study and concrete areas for reform in the region.

Furthermore, a World Bank (2022) country economic memorandum for the East African Community emphasized the critical role of regional harmonization in tax policy to reduce distortions and evasion. However, it also cautioned that harmonization must be carefully managed to avoid a race to the bottom in corporate tax rates. This directly relates to the findings of Aktar and Babyenda (2024) and underscores the complex policy environment in which EAC tax systems operate, where regional goals must be balanced against national revenue needs.

2.3.2 Tax Efforts

The empirical literature on tax performance comprises two main branches, encompassing the conventional regression techniques that identify the determinants of tax revenue, and another that employs Stochastic Frontier Analysis (SFA) to estimate tax effort by distinguishing between a country's tax capacity and its efficiency in achieving it.

The first branch traces its roots to the seminal work of Lotz and Morss (1967). This study sought to develop a method for measuring and comparing the tax effort of different countries to determine if there is scope for increasing taxation. It employs linear regression models to measure tax effort as the ratio of actual tax revenue to its Gross National Product (GNP) of a county. Countries are then ranked based on this ratio, with a higher ratio indicating a greater tax effort. The paper presents a ranking of

72 countries based on their tax-to-GNP ratios. It demonstrates that this simple ratio can be used as a preliminary, comparative indicator of a country's tax mobilization performance relative to its peers. The methodology used in this paper has limitations in the sense that it assumes GNP is the sole indicator of taxable capacity, ignoring other critical factors like the structure of the economy such as the share of agriculture vs. industry, trade openness, and institutional quality. This pioneering work establishes the basic concept of tax effort that this study employs. However, its simplistic methodology underscores the advancement represented by the use of a multi-variable panel regression to estimate capacity in the current study.

The era also marked the pioneering panel study on tax performance in developing nations. Gupta (2007) study whose objective was to identify key determinants of tax effort across 105 developing countries, utilized panel data analysis over 24 years using random and fixed effects models to develop a Revenue Performance Index (RPI). The study established that Per capita GDP and trade openness were significant determinants of tax effort, with per capita income were the most influential variable. However, the Hausman test was not conducted in choosing between fixed and random effects, and omitted robustness checks for endogeneity. This study is a key reference for the methodology used in the current study, particularly in its identification of core determinants like GDP per capita and trade openness. The current study builds on this by applying and refining this approach specifically for the homogeneous policy environment of the EAC.

Dioda (2012) sought to examine the relationship between civil liberties, informal sector size, education, and tax revenue performance, estimating tax efforts. The study utilized

Cross-national regression analysis using comparative data on governance, informality, and fiscal indicators. The findings revealed that a 1-point improvement in civil liberties like freedom of expression and rule of law correlated with a 1.21% rise in tax revenue, attributed to increased trust in government and reduced corruption. Political rights were statistically insignificant. While larger informal sectors reduced tax ratios due to increased evasion and a narrower tax base. Secondary school enrollment had a weak positive effect (0.06% GDP increase per additional year), likely by improving compliance and formal employment. However, this study identified correlations rather than causal relationships, relied on inconsistent debt metrics and proxy variables, and omitted nuanced fiscal policy details. The impact of civil liberties may also be context-specific, varying across regions with different governance norms. This study highlights the role of non- economic, institutional factors like civil liberties. The current study's fixed effects approach controls for such time-invariant institutional factors, allowing for a clearer estimation of the time-varying economic determinants.

The existing literature demonstrates high-level consensus around a core set of variables that define tax capacity of a country. These include the level of economic development, consistently proxied by GDP per capita (Fox & Gurley, 2005; Gupta, 2007; Tanzi, 1987), and the sectoral composition of the economy, with a high dependence on agriculture typically associated with lower tax ratios due to informality (Jewell et al., 2005). Although complex, the degree of trade openness is another critical factor as it can generate customs revenue but may be eroded by trade liberalization (Agbeyegbe et al., 2006; Baunsgaard & Keen, 2010).

Agbeyegbe et al., (2006) study re-examined the mixed empirical evidence on the relationship between trade liberalization, exchange rates, and tax revenue in Sub-Saharan Africa, specifically testing whether trade liberalization can be implemented without harming overall revenue. The study uses a panel dataset of 22 Sub-Saharan African countries from 1980--1996. It employs Generalized Method of Moments (GMM) regressions, a technique suited for addressing endogeneity and dynamic effects, following a methodology similar to Adam et al. (2001). The study establishes that the impact of trade liberalization on tax revenue is sensitive to how it is measured. Overall, it is not strongly linked to changes in total tax revenue, though one measure showed a link to higher income tax revenue. The key conclusion is that trade liberalization, when accompanied by appropriate macroeconomic policies, can be achieved without negatively impacting total tax revenue. The study explicitly states that its findings are sensitive to the measure used to proxy trade liberalization. This means the core independent variable is poorly

defined. Using different proxies such as tariff rates, trade taxes as a share of revenue, a composite index of trade openness leads to different conclusions, undermining the robustness and reliability of the results.

Baunsgaard & Keen (2020) study sought to determine whether countries, particularly developing and emerging markets, have been able to replace lost trade tax revenues with domestic tax revenues following episodes of trade liberalization. The study aims to provide a clear answer to this question of fact to inform ongoing theoretical debates about tax policy. The study utilized a panel dataset, covering a large sample of 117 countries over a long-time horizon of 32 years. The analysis compares revenue trends

before and after trade liberalization events, examining the relationship between declines in trade tax revenue and increases in domestic tax revenue. The findings are stratified by income level in a country, revealing a clear hierarchy of success, with high-income countries clearly and fully recovering the lost revenue from trade taxes with domestic taxes. Middle-income countries showed strong replacement, essentially recovering lost revenue dollar-for-dollar in the long run, with some concurrent replacement as well. Low-income countries exhibited flimsier and more varied results. While revenue replacement has been higher than previously thought, it has been sufficiently incomplete in many cases to give cause for concern. This study methodology is marred with some limitations because of the heterogeneity in low-income countries, meaning the significant variation in the experiences of low-income countries suggests that the aggregate result masks important differences. The model used in this study also fails to fully capture the specific political, institutional, or economic factors that determine success or failure in the most vulnerable nations. These studies provide a pronounced understanding of the complex relationship between trade openness and tax revenue, informing this study's hypothesis and interpretation of the TRADEOP variable's insignificance.

Subsequent studies expanded this framework to include socio-institutional determinants such as education levels (Cyan et al., 2013), income distribution (Bird et al., 2014; Gupta, 2007), as well as the measures of institutional quality and informality (Grigorian & Davoodi, 2007). This past literature firmly established that factors such as governance, rule of law, and corruption are important in achieving high levels of tax collection (Bird et al., 2008; Le et al., 2012). Drummond and Wendell (2012) provide a comprehensive review of these determinants. This study analyzes the historical

experience of low-income Sub-Saharan African (SSA) countries in mobilizing tax revenue, with two specific aims. The first aim was to identify empirical norms for how much and how fast these countries have been able to increase their revenue-to-GDP ratios; while the second was to identify the key empirical determinants of revenue mobilization in the region. The study employs a descriptive and econometric analysis of historical data from low-income SSA countries over recent decades. This approach applies descriptive analysis to examine the frequency and distribution of changes in revenue ratios to establish realistic benchmarks for improvement. The approach also utilizes panel data techniques to identify the structural and economic factors that statistically determine tax revenue levels. The analysis provides clear, empirical benchmarks for revenue mobilization, indicating that short-to-medium term increases typically range from 0.5 to 2 percentage points of GDP while longer term increases ranges from 2 to 3.5 percentage points of GDP are achievable. The results indicate that nearly all SSA low-income countries achieved at least one short-term increase of over 2 percentage points in the last two decades. The panel estimates confirm that structural factors are crucial, specifically: GDP per capita, the share of agriculture in GDP, inflation, trade openness, and natural resource rents. However, the methodology has some limitations in that the model emphasizes structural determinants, which may underplay the critical role of political will, institutional quality, and administrative reforms in driving revenue gains.

Cyan et al.'s, (2013) study critically re-examined the concept and measurement of tax effort. The study aims to understand the economic logic behind different measurement approaches, compare the country rankings they produce, and propose a more relevant framework that links tax effort to a country's specific development needs, expenditure

goals, and potential welfare gains. The paper is primarily a conceptual and methodological analysis; hence, it does not present new empirical estimates but instead. The study utilizes the methodology to deconstruct and compare existing approaches to measuring tax effort; it proposes and argues for alternative measurements that offer more direct intuition while quantitatively comparing the country rankings generated by these different methodologies. The paper establishes that all tax effort indicators are based on comparing actual revenue to a measure of potential revenue. It identifies three key dimensions for tax policy derived from this comparison, including the need for revenue-raising reform, the timing and urgency of such reforms, and the achievable gains in national welfare. The study makes some novel contributions in that it is the first to systematically analyze how much the choice of estimation approach matters for the results. It is also the first study to argue for explicitly linking the adequacy of tax effort to specific government expenditure goals and the associated welfare benefits, rather than treating it as an abstract performance metric. However, the study harbors methodological limitations as it is a conceptual paper providing no single, new, empirically-estimated tax effort index, but rather a framework for creating one. The practical application of its proposed welfare-linked approach is likely complex. Also, the proposed method of linking tax effort to expenditure goals and welfare gains requires data and assumptions that are difficult to quantify, potentially limiting its immediate practicality compared to conventional methods. This conceptual paper validates this study's approach by critiquing earlier methods and emphasizing the need for a clear theoretical link between tax effort and policy goals, which this study provides through its specific recommendations.

Bird et al., (2014) study sought to analyze the core challenges in developing adequate tax systems in developing countries and to identify the most critical path to sustainable reform, moving beyond purely technical solutions to consider the political economy of tax reform. This paper is a conceptual and policy review, not an empirical study. It synthesizes lessons from historical experience and the author's expertise in public finance. The methodology is based on a qualitative analysis of the political economy of taxation, examining the interplay between policy, administration, and institutional governance. The paper identifies three principal, intertwined paths for tax reform including base-broadening, rate reduction, and administrative improvement. However, its central and most powerful conclusion is that technical fixes are insufficient, with the emphasis on the most essential ingredient for success being critical for improving the transparency and understanding of fiscal issues among all stakeholders. The paper argues that this process of institution-building and fostering informed public debate is not merely background support but is, in fact, the "real business" of serious and sustainable tax reform. The study has methodological glitches in that it lacks empirical data; hence, it provides no new quantitative evidence or statistical testing of its claims. Its arguments are based on observed patterns and logical deduction rather than data-driven analysis. The findings are presented as broadly applicable to developing countries, which is a highly diverse group. The paper may not fully account for the specific contextual challenges faced by different nations.

Grigorian & Davoodi, (2007) study investigates the reasons behind Armenia's persistently low tax-to-GDP ratio that stood at around 14.5%, which remained stable despite the country experiencing strong economic growth. The paper aims to determine whether this low revenue is due to a narrow tax base or inefficiencies in collection. The

study employs a two-pronged empirical approach. A benchmarking analysis compared Armenia's tax-to-GDP ratio against a group of comparator countries; while a cross-country regression analysis was conducted to identify the main determinants of tax collection and to estimate Armenia's tax potential and effort relative to its peers. The study establishes the primary drivers of Armenia's low tax collection as weak institutions and a large shadow economy, coupled with a significant gap between Armenia's potential and actual tax revenue. The paper quantifies this tax gap to be as high as 6.5% of GDP, indicating that the problem is not a lack of taxable capacity but instead a failure to effectively mobilize existing resources. Given that this was a cross-country study, it could not fully capture Armenia's unique historical, political, and structural specifics that are not easily quantified in a regression model. Also, the analysis relies on proxies for complex concepts like institutional weakness and the "size of the shadow economy, which can be difficult to measure accurately.

Lee et al. (2012) study empirically estimate and analyzes the taxable capacity and tax effort of a wide range of countries. The goal is to provide a framework that can classify countries based on their revenue performance and offer broad guidance for tailoring tax reforms. The study is a cross-country panel data analysis, and uses a sample of 110 developed and developing countries over the period 1994-2009. The methodology involved estimating taxable capacity by running a regression to predict the tax-to-GDP ratio based on a country's specific and time-varying macroeconomic, demographic, and institutional characteristics. The primary output is a diagnostic framework that classifies countries into four categories, entailing low collection vs. low effort; high collections vs. .high effort; low collection vs. high effort; high collection, vs. low effort. This classification allows for targeted policy recommendations, as the necessary

reforms differ for each group, where a country with "Low Collection, High Effort" has a structural capacity problem, while a "Low Collection, Low Effort" country has a governance and administration problem. Despite the contribution of this study to existing literature on tax capacity and efficiency, the analysis relies on country-level data, potentially masking significant internal disparities such as informal sector dynamics, subnational tax issues, and the specific composition of the tax base.

However, this traditional approach is more focused on estimating the average level of tax collection within the context of a given set of economic conditions. The predicted value from such a regression is often interpreted as tax capacity, with tax effort calculated as the ratio of actual revenue to this prediction. Langford and Ohlenburg (2015) study quantified the tax capacity and measures the tax effort of non-resource-rich countries, determining the realistic amount of revenue they can raise given their economic and institutional constraints, and identifying the gap between their actual performance and potential. The study employs Stochastic Frontier Analysis (SFA) on a 27-year panel of 85 non-resource-rich economies. This advanced econometric technique is used to estimate a tax frontier representing the maximum possible tax-to-GDP ratio a country can achieve. The analysis utilizes the high-quality ICTD Government Revenue Dataset to ensure data comparability. The study established that industrial structure, education, and trade as key inputs that expand a country's tax capacity. A higher age dependency ratio also increases capacity, potentially by raising demand for public services and thus taxation, while high inflation reduces it. The study also establishes that institutional variables, encompassing political and administrative factors, significantly affect how close a country gets to its capacity. The estimated tax effort for 2009 showed a wide range, from a low of 38% (Guatemala) to a high of 90%

(Sweden), with a global mean of 62%. This indicates that, on average, countries collect little more than half of their potential revenue. Despite the study utilizing the SFA approach, this methodology relies on specific statistical assumptions; hence, the findings are specific to non-resource-rich economies and may not apply to resource-dependent countries. This study also pinpoints a core limitation associated with the conventional regression, arguing that this method provides little information on a country's ability to raise additional revenues, given that effort can exceed one; hence, making its interpretation as "inefficiency" less intuitive. The discussion of SFA and its methodological challenges provides a strong justification for this study's choice of a Fixed Effects panel model. The FE model effectively controls for time-invariant heterogeneity, which is a key criticism of early SFA models, thus providing a more robust estimate of tax capacity and effort for the EAC context. Such a limitation informed the development of the second branch of literature, which utilized Stochastic Frontier Analysis (SFA). Unlike traditional regression, the SFA approach is designed to estimate a “true" tax potential, the maximum feasible revenue given the economic structure and characteristics. This approach is advantageous in that tax effort, measured as the ratio of actual collection to this stochastic frontier, ranges between 0 and 1, directly representing the degree of efficiency in revenue mobilization and the potential room for improvement.

The first literature pioneering the SFA approach was authored by Jha et al. (1999) for Indian states. Jha et al. (1999) study measured the pure tax efficiency of fifteen major Indian states over the period 1980-81 to 1992-93, analyzing how this efficiency varies across states and over time. The study sought to investigate the impact of intergovernmental fiscal transfers on the states' incentive to collect their own taxes. The

study employs Stochastic Frontier Analysis to calculate and compare the tax efficiency of the states. It analyzes the relationship between central government grants and state-level tax collection efficiency. The paper discovers a moral hazard problem, where higher grants from the central government reduce the efficiency of tax collection by state governments, weakening their incentive to mobilize their own revenue, with developed states demonstrating more efficient tax collection than poorer states. However, this analysis covered the period 1980-1993, and the fiscal landscape of India, including tax policies and center-state relations; hence, the results may not be generalizable.

The SFA method has been widely applied globally, as seen in different studies. Alfirman (2003) study focused on local governments in Indonesian to determine if local governments are maximizing their revenue from existing taxes before considering new ones, by estimating their tax potential and efficiency. The study employed Stochastic Frontier Analysis (SFA), a regression technique designed to estimate the maximum potential revenue (the "frontier") given a region's economic characteristics and to measure how efficiently they collect against that potential. The study found that no local government in Indonesia is maximizing its tax potential. The study established that if local governments operated at full efficiency, they could generate substantial additional revenue in local taxes for every 10% increase of GDP and through property tax for every 0.20 % increase of GDP. The study concluded that the primary issue was not a lack of taxable capacity, but inefficiency in tax collection. The Indonesian study serves as a direct conceptual and methodological parallel, reinforcing the use of SFA in the current study and validating its approach.

A different study focusing on Mexican context by Castaneda & Pardinas (2012 analyzed the tax collection efficiency of Mexican state and municipal governments using a Stochastic Frontier Analysis (SFA) model to estimate their potential revenue compared to what they actually collect. The study established that states were generally exploiting their current tax bases appropriately, particularly the payroll tax, meaning they were operating close to their revenue potential. In contrast, municipalities had a low rate of tax collection compared to their potential. This was especially true for the property tax, which was their most important revenue source and is considered relatively simple to collect. This indicates significant inefficiency at the local level. This Mexican study is highly relevant to the current research on the EAC because it provides a clear, empirical example of using Stochastic Frontier Analysis (SFA) to diagnose sub-national tax efficiency, which is the core methodology preferred in the current study. The efficiency gap is also context-specific because it shows that inefficiency is not uniform. Like the Indonesian study, it finds major inefficiency at the local/municipal level, while state-level performance was better. This reinforces the need for the EAC study to analyze each member state individually to identify which are lagging in efficiency.

Ndiaye & Korsu (2014) study sought to investigate the determinants of non-natural resource tax revenue and estimate the collection efficiency of member countries of the Economic Community of West African States (ECOWAS). The study employed a Stochastic Frontier Analysis (SFA) model on annual data from 2001 to 2015 with the panel data estimated using the Maximum Likelihood procedure. The study established a positive effect of trade openness and financial deepening, with increase tax revenue, with urbanization having a negative effect potentially linked to informality. The study also found out that past tax levels strongly influence current tax levels, suggesting

structural persistence. Tax efficiency scores for most ECOWAS countries were highly efficient, scoring above 90% of their potential., with Nigeria a major outlier with a much lower efficiency of 67.7%. The study used a standard SFA model, similar to Battese and Coelli (1992), failing short of proper accounting for time-invariant, country-specific factors such as historical tax culture, colonial legacy, geographic constraints; these stable features could have been misclassified as high "efficiency. The study demonstrated the application of SFA in a regional African context, similar to the current study. However, its methodological shortcomings, particularly the potential misspecification of unobserved heterogeneity leading to implausibly high efficiency scores directly justify why the current study employs fixed effects (FE) panel model to overcome such methodological problems.

The FE model explicitly controls for the time-invariant country-specific factors that the ECOWAS SFA model conflated with efficiency. Antonio & Postali (2015) investigated whether Brazilian municipalities that receive oil royalties reduced their own local tax collection efforts, a phenomenon known as the "resource curse" or "fiscal laziness" at the local government. The study employed a Stochastic Frontier Analysis (SFA) model, framing tax collection as a "production" process. Municipal personnel and capital expenditures like spending on the tax administration were the inputs while municipal tax collection wee the output, with oil royalties, which were included in the model to see if they directly impacted efficiency. A panel of Brazilian municipalities from 2002 to 2011 was used. Independent variables were lagged to address endogeneity, mitigating reverse causality concerning the problem where higher tax collection could have led to higher personnel spending. The study found that oil royalties have a statistically significant negative impact on municipal tax efficiency. However, modeling tax

collection as a function of personnel and capital spending is an oversimplified approach and reduces a complex socio-economic and political process to a simple mechanical one. It omits crucial determinants of tax capacity and effort, such as economic structure, institutional and political factors. This study is relevant to the current study because it provides a clear, empirical case study of the "resource curse" playing out at the sub-national level, similar to the context of individual EAC member states. It shows that windfall revenues like aid, mineral wealth, or even large central government transfers can disincentivize local revenue mobilization. Although the study methodology serves as an advanced example of SFA application, it also highlights its pitfalls, particularly regarding omitted variable bias and the challenge of causal identification. The use of a Fixed Effects model in the current study is a direct attempt to control for the kind of unobserved municipal heterogeneity that could confound the results in the Brazilian study. Also, EAC assumes a homogeneous policy environment, helping control for the very structural and policy variables that the Brazilian study may have omitted, strengthening the ability to isolate the true effect of administrative efficiency. Pessino and Fenochietto (2013) also employed SFA on a large panel of developed and developing countries, moving beyond cross-sectional analysis.

Although the SFA approach has some advantages, its application has been met with some criticism due to its methodological challenges and inconsistencies. A primary issue is the misspecification of handling unobserved country-specific heterogeneity, such as the historical tax culture, geography, and stable institutional features. Early panel SFA models, like the basic formulation of Battese and Coelli (1992), assumed a deterministic trend for inefficiency, conflating these time-invariant fixed effects with persistent inefficiency. This conflation produces a downward bias in inefficiency

estimates, which leads to overestimation of tax effort due to the mistaking of inherent national characteristics for efficient performance.

Later studies, such as those using the True Random Effects (TRE) model (Greene, 2005a; applied by McNabb et al., 2021) attempted to address this by incorporating all time-invariant effects as heterogeneity. However, this approach swings to the opposite extreme, often overestimating inefficiency as it underestimates tax effort by classifying government-controllable but persistent institutional factors, such as long-standing governance quality, as unchangeable heterogeneity. The impact of these choices is dramatic, with McNabb et al. (2021) showing that the average tax effort estimate can swing from 0.41 under an ordinary random effects model to 0.84 under the TRE specification.

A further critical limitation of traditional and SFA studies is the omission of key policy variables, most notably tax rates as Pessino and Fenochietto (2013) established that models that omit statutory rates can yield puzzling results, such as surprisingly low tax effort estimates for advanced economies with low VAT rates like in Singapore and Korea; and implausibly high estimates for developing nations with high rates like the case of Belarus and Bolivia. This indicates that a significant portion of what is labelled "effort" or "capacity" may reflect differences in policy choices on tax rates, leading to inaccurate assessments and flawed policy recommendations.

2.3.2.1 The Contribution of the Current Study within the EAC Context

The existing literature on tax effort remains limited within the East African Community (EAC) context, with most studies focusing on individual countries or relying on

traditional deterministic models. This study addresses a contextual gap by providing a unified panel data analysis of tax determinants and effort across five EAC nations, whereas most previous studies focus on individual countries or other global regions. The study also contributes to the methodological literature by applying a robust empirical strategy that avoids the misspecification of earlier models. The choice and the application of the Fixed Effects (FE) panel model is deliberate and effectively controls for all time-invariant, country-specific heterogeneity such as historical legacies and geographic constraints. This allows us to isolate the time-varying components of tax performance, providing a clearer, less biased measure of taxable capacity based solely on observable economic determinants. This approach ensures that the subsequent calculation of tax effort is not confounded by fixed national characteristics, offering a more accurate measure of controllable efficiency.

The study benefits from a quasi-natural experiment, given the EAC's progress in tax policy harmonization that creates a more homogeneous policy environment. The EAC member states have made significant strides in harmonizing their tax policies, including aligned VAT standards and a common external tariff. This regional integration creates a more homogeneous policy environment than global samples, meaning that differences in statutory rates are less likely to drive the variations in tax effort observed between Kenya, Tanzania, Rwanda, Uganda, and Burundi. This unique context allows for a more confident attribution of disparities in tax effort to differences in administrative efficiency and compliance rather than divergent policy choices. Therefore, this study provides a novel and refined analysis of tax effort in the EAC, offering policymakers evidence-based insights that are crucial for designing targeted reforms to enhance domestic revenue mobilization. [This study provides a novel and refined analysis of tax

effort in the EAC using a pragmatic fixed effects-based approach to approximate the decomposition of inefficiency as proposed by Kumbhakar et al. (2014).

2.3.3 Overview of the Literature and Identification of Gaps

The empirical literature provides a well-established understanding of the core determinants of tax performance, identifying a strong consensus around several key variables. A nation's level of economic development, consistently proxied by GDP per capita, is foundational, as wealthier economies typically possess a broader and more formal taxable base. The sectoral composition of the economy is equally critical, with a large agricultural sector widely associated with lower revenue mobilization due to informality, while a robust manufacturing sector is linked to higher collections. The evidence on trade openness, however, is mixed; it can expand the tax base through international trade but may also erode traditional revenue sources, with its net effect being highly contingent on a country's specific context and policy choices. Beyond these structural factors, second-generation studies have convincingly incorporated institutional and governance variables such as corruption control, bureaucratic quality, and political stability to explain variations that purely economic models cannot.

Despite these valuable insights, a critical appraisal reveals three significant gaps that this study is designed to address. First, there exists a regional-analytical gap, characterized by a scarcity of comprehensive, multi-country studies that analyze the determinants of tax ratios and tax effort specifically for the East African Community (EAC) as an integrated bloc. The existing literature is predominantly focused on individual countries or other world regions, failing to capture the unique, shared dynamics of the EAC's common market and harmonization efforts.

A methodological gap is also evident. Many existing studies, rely on methodologies such as cross-sectional analysis or pooled OLS that do not adequately control for unobserved, time-invariant country-level heterogeneity, such as historical tax culture or geographic constraints. This oversight potentially biases result and limits the robustness of the findings, a problem often compounded by inconsistent diagnostic testing. A Contextual-theoretical gap also emerges; while theories of tax capacity and effort are well-established, their rigorous empirical application within the EAC's unique context remains limited, particularly due to ongoing regional integration, a large informal sector, and evolving tax administrations.

This study is structured to directly address these interconnected gaps. It employs a robust fixed effects panel data model for five EAC nations from 2013 to 2023, effectively controlling for unobserved country-specific characteristics to provide unbiased estimates of the economic determinants. The methodology of the study will involve an application and testing of a model derived from Tax Capacity theory, the research provides a novel comparative analysis of tax effort across member states. Furthermore, it enhances methodological rigor by systematically conducting and reporting key diagnostic tests, including for unit roots, multicollinearity, and model specification. This integrated approach allows for the generation of more reliable, causally pronounced, and regionally specific insights, thereby making a distinct contribution to the literature on public finance in developing economies and providing actionable guidance for EAC policymakers.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology employed to analyze the determinants of tax performance and estimate tax effort in the selected East African Community (EAC) countries. The methodology section focuses on data collection, and how different tests were conducted to establish causal relationships between variables. It details the research design, data sources, theoretical framework, model specification, and the empirical strategies used for estimation. The chapter also explains the diagnostic tests conducted to ensure the robustness and validity of the results. This section guides the process of establishing the relationship between the dependent and independent variables, facilitating informed findings. This structured approach ensures that the findings are reliable and can effectively address the research objectives.

3.2 Research Design

This study employs a causal research design to examine the determinants of tax ratios across five East African Community (EAC) member states: Kenya, Tanzania, Rwanda, Uganda, and Burundi, over the period 2013 to 2023. The design is non-experimental, analyzing pre-existing relationships between variables without manipulation, which is the standard approach for macroeconomic inquiry (Kathpalia & Nagaraj, 2021). This design is considered the most appropriate in the context of this study as it aligns with its objective of describing patterns in tax performance across the countries of interest while also assessing causal relationships between economic variables. Inferential statistical techniques like panel regression models were also employed to establish the direction and strength of these relationships.

The analysis utilizes a balanced panel dataset constructed from secondary sources. Data for the dependent variable (Tax Revenue to GDP ratio) and independent variables were sourced from the World Development Indicators (WDI) and International Financial Statistics (IFS) databases. These data sources are considered most useful because the WDI and IFS offer standardized and internationally comparable data across countries and over time. This choice is justified by the imperative for standardized, internationally comparable data that ensures consistency in measurement and definition across the five nations, making cross-country analysis reliable.

The selection of a five-country panel over 11 years represents a deliberate trade-off between breadth and depth. While a longer time series or inclusion of all EAC members would be desirable, this sample frame was chosen to maximize data consistency and reliability, which are often compromised in fragile and post-conflict states, thereby ensuring the robustness of the econometric analysis.

3.3 Theoretical Framework

The study is grounded in the Integrated Fiscal Capacity and Tax Effort framework, which synthesizes Tax Capacity Theory (Bahl, 1971; Lotz & Morss, 1967) and the Tax Effort Framework (Gupta, 2007; Le et al., 2012). This framework posits that a country's observed tax revenue is a function of its inherent tax capacity and its tax effort. This model allows for the estimation of a country’s potential tax revenue based on its structural economic determinants and subsequently calculates its tax effort as the ratio of actual revenue collected to this estimated capacity. The model first asserts that a nation's potential tax revenue is determined by its structural economic characteristics. Key determinants include the level of economic development (GDP per capita), the

sectoral composition of the economy (share of agriculture, manufacturing, etc.), and its integration into the global economy (trade openness). The second framework provides the methodology for calculating tax effort as the ratio of actual tax revenue to the estimated tax capacity. A score below 1 indicates inefficiencies attributable to factors like weak tax administration, low compliance, or policy gaps.

This approach is particularly apt for the EAC, as it disentangles whether low tax ratios are due to a constrained economic base (low capacity) or institutional and administrative inefficiencies (low effort). This theoretical model directly informs the study's dual objectives. First, it guides the selection of independent variables (GDPPC, MANU, AGRIC, TRADEOP, etc.) as proxies for the structural determinants of tax capacity. Second, it provides the conceptual basis for calculating the tax effort index, which is the second specific objective. The model helps distinguish between constraints arising from a narrow economic base (a capacity problem) and those stemming from poor mobilization (an effort problem).

There are several key assumptions of the theoretical model. First, the model assumes that a tax capacity of a country can be reasonably approximated by its observable macroeconomic and structural characteristics. Secondly, it assumes that the deviations of actual revenue from this capacity reflect differences in institutional efficiency and policy effectiveness, collectively termed as effort. The model also assumes that the relationship between the structural determinants and tax revenue is stable enough to be modeled empirically over the study period.

3.3 Model Specification

To empirically implement the theoretical framework, an econometric model is specified. The model is derived from established empirical studies on tax capacity (Gupta, 2007; Le et al., 2012) and takes the form of a panel regression where the natural logarithm of the tax ratio is a function of its structural determinants.

The econometric framework is derived from the production function.

$$(\mathrm{TRGDP})_{it} = \beta_0 + \beta_1(\mathrm{lnGDPPC})_{it} + \beta_2(\mathrm{MANU})_{it} + \beta_3\,(\mathrm{TRADEOP})_{it} + \beta_6(\mathrm{M2})_{it} + \beta_7(\mathrm{INF})_{it} + \beta_8(\mathrm{EXCRATE})_{it} + \beta_9(\mathrm{AGR})_{it} + \beta_{10}(\mathrm{INF})_{it} + \sigma_i + \mu_{it} \ldots.1$$

The study has considered six main individual independent variables to explain the tax performance of countries over the period 2013-2023, all in natural logarithms so as to narrow the variance in the data and enable a comparison of elasticities (or impact) of the different independent variables on tax revenue a proportion of GDP. The independent variables include the per capita income of countries (GDPPC) as a measure of the capacity of individuals to pay tax; the share of trade in GDP (TRADEOP) as a measure of the capacity of a country to tax trade; the manufacturing (MANU), agriculture (AGRIC) as a measure of the capacity to tax profits, the degree of monetization of an economy measured by broad money (M2), exchange rate (EXCRATE) to control for external sector effects in the tax ratio and inflation (INF) to control for the effect of rising prices on nominal revenue. The parameters β_1 to β_8 are coefficients representing the effects of the variables, σ represents the fixed effects for each country while μ is the error term.

The theoretical framework acknowledges statutory tax rates as a key policy variable. However, this variable was excluded from the empirical model for two primary reasons. First, as established in the literature review, the EAC member states have made significant progress in tax policy harmonization, leading to aligned VAT standards and a common external tariff. This creates a relatively homogeneous policy environment, minimizing the cross-country variation in major tax rates that would be necessary to identify its effect. Second, compiling a consistent, granular, and time-varying dataset on the effective statutory rates for all major tax categories (Corporate Income Tax, VAT, etc.) across all five countries for the entire period proved unfeasible. Thus far, the chosen model focuses on the structural economic determinants of tax capacity, with the understanding that the fixed effects estimator effectively controls for time-invariant country-specific factors, including historically stable policy stances.

The model is linear in parameters, with the error term $\mu(it)$ assuming a conditional mean of zero, meaning the model is correctly specified and there is no omitted variable bias for the time-varying factors. The country-specific effects (σi) are correlated with the explanatory variables.

Tax effort that quantifies how effectively a country mobilizes its estimated tax capacity (Dioda, 2012). It is computed for each country-year observation as the ratio of the actual tax ratio to the predicted tax capacity.

The model specification is derived from our prior analysis of tax ratio determinants in the EAC which established a robust set of macroeconomic and structural drivers. The core econometric model is specified as follows:

$$Y_{it} = \alpha_0 + \alpha_1 X_{it} + V_{it} - u_{it} \quad \text{.....2}$$

where Yit represents the natural logarithm of tax revenue to GDP ratio of country i at time t; Xit is the vector of variables that determine tax collection of country i at time t; uit represents the extent to which a country fails to reach its potential tax revenue given the underlying conditions. It captures the level of inefficiency. It is assumed that Vit and uit are uncorrelated across observations. The inefficiency term represents a one-sided error for all countries, illustrating the difference between their actual tax performance and the theoretical frontier. The literature has developed various approaches for identifying this inefficiency component. We apply the stochastic frontier model of Kumbhakar et al. (2014) that disentangles the one-sided inefficiency term into time-varying inefficiency (uit), persistent inefficiency ηi, and country heterogeneity β_0:

$$Y_{it} = \alpha_0 + \beta_i + \alpha_1 X_{it} + V_{it} + \eta_i - u_{it} \quad \text{.....3}$$

The analysis aims at measuring tax effort as the ratio between actual and the corresponding stochastic frontier tax revenue predicted from Equation (3):

Our estimation strategy is built around the reduced form representation of the SF model

discussed in the previous section:

$$\text{TRGDP}_{it} = \beta_0 + \beta_1 \text{lnGDPPC}_{it} + \beta_2 \text{MANU}_{it} + \beta_3 \text{TRADEOP}_{it} + \beta_4 \text{AGRIC}_{it} + \beta_5 \text{M2}_{it} + \beta_6 \text{INF}_{it} + \sigma_i + \mu_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

Where TRGDP is the Tax Revenue to GDP ratio, GDPPC is GDP per capita, a measure of economic development and the ability to pay taxes, MANU is the natural log of

the manufacturing share of GDP, representing an easily taxable, formal sector, TRADEOP is the natural log of trade openness (exports + imports as a % of GDP), a source of customs duties, AGRIC is the natural log of the agricultural share of GDP, a typically hard-to-tax, informal sector, M2 is the natural log of broad money supply, a proxy for financial deepening and monetization, INF is the inflation rate, which can erode the real value of tax collections, EXCRATE is the exchange rate, controlling for external sector effects, σi is the standard random error term, U (it) is a non-negative error term representing technical inefficiency.

We utilize a balanced panel dataset from 2013–2023 for five EAC member states: Kenya, Tanzania, Rwanda, Uganda, and Burundi. Data for all variables are sourced from the World Development Indicators (WDI) and International Financial Statistics (IFS) databases. These sources were selected to ensure standardized, internationally comparable data, which is a critical requirement for robust cross-country analysis.

This study adopted a pragmatic fixed effects-based approach to approximate the decomposition of inefficiency as proposed by Kumbhakar et al. (2014). Specifically, the country-specific fixed effects are interpreted as the proxies for persistent inefficiency and the within-period residuals treated as time-varying inefficiency. Though this approach does not completely implement the Generalized True Random Effects model, it adopts the conceptual framework that is proposed by Kumbhakar et al. (2014) to differentiate between persistent and time-varying inefficiency components.

The variables are stationary, and no perfect multicollinearity exists among the regressors.

Table 2: Variable Description, Measurement, and Expected Signs

Variable	Abbreviation	Description, Measurement	Measurement	Expected Sign
Tax Ratio to GDP	TRGDP	Tax as a percentage of GDP	Ratio	-
Estimated Tax Ratio to GDP	TRGDPit	Predicted value of tax ratio from the model	Ratio	- (Model output)
GDP Per Capita	GDPPC	Gross Domestic Product per capita	Dollar	+
Tax Effort	Tax E	The ratio of actual Tax Ratio to GDP to predicted Tax Ratio to GDP	Ratio	-
Agriculture value	AGRIC	Value of the agricultural productivity	Percentage	-
Manufacturing Output	MANU	Value of manufacturing production	Percentage	+
Trade Openness	TRADEOP	Sum of exports and imports as a % of GDP	Percentage	+
Broad Money Supply	M2	Broad money (M2) as a proxy for financial deepening	Dollar	+
Inflation	INF	Consumer Price Index (CPI) or annual inflation rate	Percentage	_
Exchange Rate	EXCRATE	Official exchange rate (local currency per USD)	Index or LC/USD	±(Context-specific)

3.4 Estimation Technique and Diagnostic Tests

The study used a panel data estimation technique because of its several advantages that is it has for example a greater degree of freedom and less multicollinearity leading to more efficient estimates (Hsiao, 2003) and gives greater flexibility in modelling differences in behaviour across the firms under study which enables us to control for unobserved heterogeneity. The panel data analysis method has two main approaches,

namely; the Fixed Effects Model (FEM) which assumes omitted effects unique to cross-sectional units are constant over time and the Random Effects Model (REM) which assumes the overlooked effects are random over time.

3.5 Diagnostic Tests

The following diagnostic tests were performed.

3.5.1 The Hausman Specification Test

The Hausman test was conducted so as to inform the choice between the fixed and random effects. The test examines correlation of the different errors with the explanatory variables (Hausman, 1978; Greene, 2008). The specified model was thus estimated using statistical program (R software) and the study objective were investigated through regular tests. The null hypothesis of the tests is that random effects is the appropriate model. The alternate hypothesis is that the fixed effects is appropriate.

3.5.2 Stationary Series Test for Panels

This was necessitated by the understanding that panel data contains both time series components and cross-sectional component. The time series component motivated testing for stationary series. The claim under consideration was that the panels were stationary, and this was verified using the Levin lin Chu test. Non-stationary series necessitated application of the difference operation.

3.5.3 Multicollinearity Test

Multicollinearity occurs when the explanatory variables are related. Presence of multicollinearity may lead to imprecise estimates. In addition, presence of multicollinearity can lead to low t ratios thus leading to wrong conclusion. The study

tested for multicollinearity through correlation matrix or Variance Inflation Factor (VIF test)

3.6 Data Type and Source

This study uses annual secondary data from the World Bank Development Indicators whereby the specific information that was collected from the selected East African countries for the period running from 2013 to 2023.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

This chapter presents the empirical findings of the study, systematically addressing the two research objectives: (1) to determine the key macroeconomic determinants of the tax ratio, and (2) to estimate and compare the tax effort across the five EAC member states. The analysis begins with descriptive statistics, followed by diagnostic tests to validate the model. The core of the chapter presents and interprets the regression results for the determinants of the tax ratio and the calculated tax effort scores. The chapter concludes by explicitly linking these findings back to the research objectives and the existing literature.

4.2. Descriptive Statistics

Table 3: Descriptive Table

Variable	Mean	Min	Max	SD
TRGDP (%)	13.2	9.5	16.4	1.73
lnGDPPC	1.01	0.26	2.27	0.54
MANU (% GDP)	9.98	7.00	18.00	2.50
TRADEOP (% GDP)	41	27	65	8.67
AGRIC (% GDP)	25.2	18.3	38.4	3.71
MINE (% GDP)	7.4	1.2	19.1	5.06
M2 (% GDP)	28.21	18.0	45.0	6.50
INF (%)	5.77	0.5	15.8	3.01
EXCRATE	16.75	0.86	23.83	7.70

Note: All values represent cross-country averages for five East African nations. GDPPC is expressed in thousands of current US dollars, sectoral contributions are percentage shares of GDP, M2 represents broad money as a percentage of GDP, INF is the annual inflation rate expressed as percentage, and EXCRATE is expressed as local currency units per US dollar.

Table 5 summarizes the key variables for the period 2013–2023. The average tax-to-GDP ratio (TRGDP) was 13.2%, ranging from 9.5% to 16.4%, indicating room for improvement against international benchmarks. The average GDP per capita (GDPPC) stood at $1,010, with wide variation from $260 to $2,270, reflecting significant income disparities.

The structure of the EAC economies is depicted by sectoral contributions: agriculture (AGRIC) averaged 25.2%, underscoring its continued importance, while the manufacturing (MANU) share was 9.98%. Trade openness (TRADEOP) averaged 41.05%, indicating substantial external sector integration. The macroeconomic variables, like broad money supply (M2) averaged 28.21% of GDP, indicating the level of financial depth in the region. Inflation (INF) averaged a moderate 5.77%. The exchange rate (EXCRATE), with a mean of 16.75 local currency units per USD and a high standard deviation (7.70), exhibited significant volatility over the period.

4.3 Diagnostic Tests

To ensure the robustness and validity of the regression results, a series of diagnostic tests were conducted

4.3.1 Levin–Lin–Chu (LLC) Panel Unit Root Test

Table 4: Unit Root Test

Variable	Coefficient estimate	Std. Error	t-statistic	P-value	LLC Adjusted t
TRGDP	-0.396**	0.154	-2.572	0.042	-3.45**
GDPPC	-0.521*	0.218	-2.389	0.048	-3.21**
MANU	-0.610***	0.182	-3.352	0.008	-4.02***
TRADEOP	-0.455*	0.241	-1.888	0.082	-2.98*
AGRIC	-0.502**	0.196	-2.561	0.043	-3.40**
M2	-0.488**	0.205	-2.380	0.049	-3.18**
INF	-0.741***	0.167	-4.277	0.001	-4.56***
EXCRATE	-0.422*	0.229	-1.843	0.092	-2.87*

The LLC test results (Table 6) indicate that the null hypothesis of a unit root can be rejected for all variables at least at the 10% significance level. This confirms that all series are stationary, satisfying a key assumption for panel regression and avoiding spurious results.

4.3.2 Hausman Specification Test

***Table 5*: Hausman Specification Test**

Test Summary	Chi-Square Statistic	Degrees of Freedom	p-value
Hausman Test (H_0: RE is consistent)	21.83	7	0.002

The Hausman test was conducted to choose between the Fixed Effects (FE) and Random Effects (RE) models. The statistically significant result ($\chi^2 = 21.83$, $p = 0.002$) leads to the rejection of the null hypothesis, confirming that the Fixed Effects model is the consistent and appropriate estimator for this analysis.

4.3.3: Multicollinearity Diagnosis

Table 6: Variance Inflation Factor (VIF) Results for Multicollinearity

Variable	Variance Inflation Factor (VIF)
GDPPC	3.63
MANU	1.98
TRADEOP	1.80
AGRIC	2.71
M2	2.02
INF	1.37

VIF tests were conducted to diagnose multicollinearity. As shown in Table 8, all VIF values are well below the critical threshold of 10, with a mean VIF of 2.35. This confirms that multicollinearity is not a substantive issue, and the coefficient estimates are stable and reliable for interpretation.

4.4 Determinants of Tax Ratios (Objective 1)

This section presents the results addressing the first research objective: to determine the effect of selected macroeconomic variables on the tax ratio.

Table 7: Fixed Effects Estimation

Variable	Estimate	Std. Error	t-value	Pr(>|t|)
GDPPC	3.8812	1.1692	3.32	0.0018
MANU	0.1565	0.0550	2.85	0.0068
TRADEOP	-0.0001	0.0139	-0.01	0.9918
AGRIC	0.0487	0.0647	0.75	0.4559
M2	0.2459	0.3003	0.82	0.4173
INF	-0.0064	0.0376	-0.17	0.8658
EXCRATE	0.0803	0.0793	1.01	0.3170

The regression results in Table 9 show that the model is jointly significant (F-statistic = 6.96, $p < 0.001$) and explains a substantial portion of the within-country variation in the tax ratio (R-squared = 0.570). The adjusted R-squared of 0.447 is considered acceptable for cross-country panel data studies in social sciences, where unobserved heterogeneity is common. The model identifies two statistically significant determinants:

GDP Per Capita (GDPPC has a coefficient of 3.881 is highly significant ($p = 0.002$). This indicates that a 1 percent increase in GDP per capita is associated with an approximately 0.0388% increase in the Tax-to-GDP ratio, holding other factors constant. This strong positive effect validates Wagner's Law and the capacity argument, suggesting that economic development expands the formal taxable base. Manufacturing Output (MANU) gives a coefficient of 0.157 is significant ($p = 0.007$). This indicates that a 1 unit increase in the manufacturing sector's share of GDP is associated with a 0.16 unit increase in the Tax-to-GDP ratio. This supports the structural economic

transformation thesis, as the manufacturing sector is typically more formal and easier to tax.

The following variables were found to have no statistically significant effect on the tax ratio within the EAC during the study period ($p > 0.10$): Trade Openness (TRADEOP), Agricultural Share (AGRIC), Financial Depth (M2), Inflation (INF), and Exchange Rate (EXCRATE). The lack of significance for these variables is itself an important finding, suggesting that short-term fluctuations in these factors do not systematically impact revenue performance, which is instead driven more by structural economic factors.

4.5 Tax Effort Analysis (Objective 2)

This section addresses the second research objective: to estimate and compare the tax effort of the selected EAC nations.

The predicted tax capacity used in the tax effort calculation was derived by applying the estimated coefficients from the Fixed Effects regression (Table 7) to the actual values of the independent variables for each country-year, including the country-specific fixed effects. This prediction was then converted from logarithmic terms back to a linear scale using the exponential function, as outlined in the methodology (Chapter 3, Section 3.5).

Table 8: Tax Effort Estimates by Country (2013-2023)

Country	Tax Effort
Rwanda	0.91
Kenya	0.90
Uganda	0.87
Burundi	0.88
Tanzania	0.77

The tax effort analysis reveals that all EAC member states exhibit tax effort scores below 1.0, indicating that none are fully realizing their predicted tax capacity based on their economic structures (Table 8). However, there is a clear hierarchy of revenue mobilization efficiency. Rwanda (0.91), Kenya (0.90), and Uganda (0.87) form a group of moderate underperformers. They collect between 87% and 91% of their potential revenue. This suggests relatively stronger tax administration and compliance systems, though there is still significant room for improvement. Burundi (0.88) shows a similar level of effort to Uganda, collecting 88% of its potential. Tanzania (0.77) is a significant underperformer, collecting only 77% of its predicted tax capacity. This score highlights substantial potential for revenue mobilization through improvements in tax administration, compliance, or policy.

The clustering of four out of five countries between 0.87 and 0.91 suggests common regional challenges in maximizing revenue collection, while Tanzania's notably lower score points to more acute, country-specific inefficiencies. These findings directly show how the second objective was met, providing a clear fiscal efficiency metric across the EAC and identifying specific countries where improvements in tax effort could yield the greatest revenue gains.

4.6 Discussion and Synthesis of Findings

This section synthesizes the empirical results, linking them back to the study's objectives and the existing literature reviewed in Chapter Two. The finding that GDP per capita and the manufacturing share are the primary drivers of tax ratios is consistent with the theoretical foundations of Tax Capacity Theory (Bahl, 1971) and empirical work by scholars like Gupta (2007). The large, significant coefficient for GDPPC underscores that economic development is a core determinant of revenue mobilization in the EAC.

Conversely, the non-significance of variables like agriculture and trade openness presents a notable divergence from seminal cross-sectional studies like Tanzi (1992). This discrepancy can be attributed to this study's use of a fixed effects model, which controls for time-invariant country-specific factors and isolates within-country effects over time. It suggests that for EAC nations, year-to-year changes in agricultural share or trade volumes are less consequential for revenue than the underlying, slower-moving structural composition of the economy.

Also, the tax effort scores provide empirical evidence for the theoretical concept of mobilization efficiency and reveal a critical regional challenge. The finding that all EAC member states have tax effort scores below 1.0 aligns with the broader context of developing nations struggling with revenue mobilization. The clustering of four countries, that is, Rwanda, Kenya, Uganda, and Burundi, with scores between 0.87 and 0.91 suggests common, region-wide institutional or administrative constraints that prevent them from fully realizing their tax potential. Tanzania shows a significantly lower score (0.77), highlighting more acute country-specific inefficiencies. This

spectrum of performance aligns with the Tax Effort Framework (Le et al., 2012) and supports arguments by Piancastelli & Thirlwall (2020) that effort varies significantly due to differences in institutional quality and administrative effectiveness, which are captured in the model's residual efficiency component.

In conclusion, this chapter has successfully addressed the two research objectives. It has identified the key structural determinants of the tax ratio and provided a clear, comparative measure of tax effort. The results paint a clear picture: while the EAC's revenue potential is determined by its economic structure, a universal effort gap exists across the region, with the size of this gap varying from country to country.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND POLICY IMPLICATIONS

5.1 Introduction

This chapter provides a concise synthesis of the key findings of the current study while interpreting their significance in light of the research objectives. The chapter also offers evidence-based policy recommendations derived directly from the empirical results. It begins by summarizing key results related to the determinants of tax revenue and tax effort in Kenya, Tanzania, Uganda, Rwanda, and Burundi between 2013 and 2023. The chapter then draws conclusions that explicitly link the findings back to the initial knowledge gap and outlines targeted, actionable strategies for improving revenue mobilization. The insights are intended to guide policymakers, tax administrators, and researchers in designing effective, context-sensitive tax reforms.

5.2 Summary of Findings

The results showed that the model is jointly significant (F-statistic = 6.96, $p < 0.001$). In addition, the results showed an R-squared of 0.57. This implied that the tax handles considered in the study explain 57 percent of variation of the tax ratio.

GDP Per capita had a coefficient of 3.881 and a p of 0.002. This indicated that a 1 percent increase in GDP per capita is associated with an approximately 0.0388 percent increase in the Tax-to-GDP ratio. The low p value implied that the coefficient is significant at 5 percent level of significane. This strong positive effect validates Wagner's Law and the capacity argument, suggesting that economic development expands the formal taxable base. The Manufacturing share in GDP had coefficient of 0.157 with a p value of 0.007. The results indicated that a 1 unit increase in the

manufacturing sector's share of GDP is associated with a 0.16 unit increase in the tax-to-GDP ratio. This supports the structural economic transformation thesis, as the manufacturing sector is typically more formal and easier to tax.

The coefficients of trade openness, agricultural share, broad money, Inflation, and exchange rate were insignificant. The lack of significance for these variables is itself an important finding, suggesting that short-term fluctuations in these factors do not systematically impact revenue performance, which is instead driven more by structural economic factors.

All EAC countries exhibited tax effort scores below 1.0, indicating a universal effort gap. Rwanda (0.91) and Kenya (0.90) showed the highest efficiency, followed by Uganda (0.87) and Burundi (0.88). Tanzania (0.77) demonstrated the most significant untapped revenue potential.

The non-significance of other variables, including trade openness, agricultural share, and macroeconomic indicators, suggests that short-term fluctuations in these factors are less consequential for revenue performance than the underlying structural economic composition within EAC countries.

5.3 Conclusions

This study successfully addressed the identified knowledge gap; the lack of a unified empirical analysis of tax determinants and effort across the EAC. The conclusions are as follows. In response to the first objective, the study concludes that the tax capacity of EAC nations is fundamentally determined by their level of economic development (GDP per capita) and their industrial structure (manufacturing share). This finding

confirms the core tenets of Tax Capacity Theory within the regional context and suggests that long-term strategies to raise income levels and promote industrialization are paramount for expanding the revenue base.

In response to the second objective, the study concludes that there is a systematic efficiency gap in revenue mobilization across the entire EAC. The variation in tax effort scores indicates that this gap is more pronounced in some countries as is the case with Tanzania than others, as is the case with Rwanda, Kenya, highlighting that administrative and compliance inefficiencies are a critical, region-wide constraint on achieving full tax potential. Collectively, the findings demonstrate that while a country's economic structure defines its revenue potential, its administrative effectiveness determines how much of that potential is realized.

5.4 Recommendations

The following recommendations are made based directly on the study's empirical findings.

5.4.1 Prioritize Structural Economic Policies

Given that GDP per capita and manufacturing are the primary drivers of tax capacity, policymakers should intensify industrialization efforts. This can take shape through implementing policies specifically designed to stimulate the manufacturing sector, as it provides a stable and easily taxable revenue base. This includes investing in infrastructure, enhancing access to credit for industrial firms, and developing skilled labor. They should also foster broad-based economic growth by **p**ursuing inclusive economic policies that raise GDP per capita, recognizing that this is the most powerful

lever for expanding the overall tax base through increased formalization and higher consumption.

5.4.2 Administrative Reforms to Bridge the Tax Effort Gap

To address the universal finding of tax effort below capacity, the following administrative reforms are recommended

In high-effort countries such as Rwanda and Kenya, policy-makers should focus on maintaining and marginally improving efficiency through advanced data analytics and further digitalization to tackle complex evasion and improve audit targeting. In moderate and low-effort countries like Uganda, Burundi, and Tanzania, they should prioritize foundational reforms. Tanzania, in particular, requires significant investment in core tax administration through the implementation of large-scale digitalization such as e-invoicing and digital filing towards strengthening compliance programs, and building taxpayer trust through improved services. The goal should be to adopt and adapt the digital tools and administrative practices that have proven successful in Rwanda and Kenya.

5.5 Limitations and Areas for Future Research

This study faced several limitations that should be acknowledged. Data constraints included limited temporal coverage (2013–2023) and reliance on secondary data, which had inconsistencies. The primary methodological limitation in this study was the omission of qualitative institutional variables such as, tax morale. While the fixed effects model controlled for time-invariant institutional factors, it could not capture the impact of time-varying institutional changes on tax effort.

Thus, there is need for future research should to incorporate qualitative factors to assess their direct impact on tax effort in the EAC. Future research also should employ dynamic panel models to better account for potential endogeneity and the persistence of tax policies over time. Future research should also conduct subnational or sector-specific studies to uncover the granular drivers of performance that national-level data may obscure.

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APPENDICES

Appendix I: Research Authorization Letter from Institution

MACHAKOS UNIVERSITY
OFFICE OF THE DEAN GRADUATE SCHOOL

Telephone:254-(0)735247939, (0)723805929
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P.O Box 136-90100
Machakos
KENYA

REF. MksU/ASA/GS/3/3

23rd July, 2025

The Director,
National Commission for Science, Technology and Innovation
P.O Box 30623,
NAIROBI

Dear Sir

RE: PATRICK MWANZA NZULA (K56/1922/2022)

The above named is a Masters student in the second year of study and has cleared course work. The University has cleared him to conduct a research entitled: **"Determinants of Tax Performance in Selected East African Community Countries."**

Kindly assist him with a Research Permit in order to undertake the research.

Thank you.

DEAN OF GRADUATE SCHOOL P.O. BOX 136 - 90100, MACHAKOS
23 JUL 2025
MACHAKOS UNIVERSITY

PROF. KIMITI RICHARD PETER, PhD
DEAN GRADUATE SCHOOL

KRP/lg

Appendix II: NACOSTI Letter

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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Date of Issue: **30/July/2025**

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