

DETERMINANTS OF TAX-TO-GDP GROWTH IN UGANDA: 2008 - 2023

BY

KATWESIGE DERICK INNOCENT

20/U/GAEE/13399/PE

**A DISSERTATION SUBMITTED TO THE DIRECTORATE OF RESEARCH AND
GRADUATE TRAINING IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF DEGREE OF
MASTER OF ARTS IN ECONOMICS OF
KYAMBOGO UNIVERSITY**

MARCH, 2024

DECLARATION

I, **KATWESIGE DERICK INNOCENT** hereby declare that this dissertation titled ***“DETERMINANTS OF TAX-TO-GDP GROWTH IN UGANDA: 2008 - 2023”*** is my original work and has never been presented for a degree in any other University.

SIGNATURE _____ DATE _____

KATWESIGE DERICK INNOCENT

REG NO: 20/U/GAEE/13399/PE

APPROVAL

We as University supervisors confirm that the dissertation titled ***“DETERMINANTS OF TAX-TO-GDP GROWTH IN UGANDA: 2008 - 2023”*** has been done by the candidate under our supervision.

SIGNATURE _____ DATE _____

PROFESSOR FRANCIS NATHAN OKURUT (PhD)

Department of Economics, Faculty of Social Sciences Kyambogo University

SIGNATURE _____ DATE _____

DR. OMEKE MICHAEL (PhD),

Department of Economics, Faculty of Social Sciences, Kyambogo University.

For and on behalf of Kyambogo University.

DEDICATION

First and foremost, I dedicate this work to the Almighty God, my Family, my lecturers, Cohort II M.A. Economics Kyambogo University and friends for their overwhelming support, advice and encouragement that you gave me during this research project.

ACKNOWLEDGEMENT

Special thanks and sincere appreciations go to my supervisors (Professor Francis Nathan Okurut and Dr. Omeke Michael) for their professional endless technical support, contribution and guidance that enabled me work hard at this dissertation. Many thanks to the head of Department Dr. Tindimwebwa Kenneth, Dr. Dickson Turyareeba, Lecturers and all the staff of the Department of Economics and Statistics of Kyambogo University for the support rendered.

My sincere appreciation to my entire family members especially the Katwesige Family (my wife Namatovu Teo and my children Anomugisha Mackline Shasha and Ainomujuni Mary Triana) who have always stood with me in my education path.

Above all, I thank the Almighty God for the protection and sustenance of my life and enabling me to successfully come to the end of this research and complete this report. Finally, to my classmates for the support rendered to me during our time of study especially in times of discussions.

TABLE OF CONTENTS

DECLARATION.....	i
APPROVAL	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
LIST OF TABLES	ix
LIST OF FIGURES	x
ABBREVIATIONS.....	xi
ABSTRACT.....	xii
CHAPTER ONE	1
INTRODUCTION.....	1
1.0 Introduction	1
1.1 Background to the Study	1
1.2 Research Problem.....	4
1.3 Conceptual Framework	6
1.4 Objective of the Study.....	6
1.4.1 Overall Objective	6
1.4.2 Specific Objectives	6
1.5 Research Hypotheses.....	7
1.6 Scope of the Study.....	7
1.6.1 Geographical Scope	7
1.7 Significance of the Study	7
1.8 Definition of Terminologies.....	7
1.8.1 Tax-To-GDP	7
1.8.2 Sector Composition.....	8

CHAPTER TWO	9
LITERATURE REVIEW	9
2.0 Introduction	9
2.1 Overview Uganda’s Tax System	9
2.2 Theoretical Review	10
2.2.1 Laffer Curve	10
2.2.2 The Cobb Douglas Theory	14
2.2.3 Marshall Lerner Theory	15
2.3 Empirical Review	16
2.3.1 Link Between Agriculture, Industry, Services and Tax-To-GDP Growth	16
2.3.2 Trade Openness and Growth of Tax-To-GDP.	17
2.3.3 Exchange Rates, Inflation and Growth of Tax-To-GDP.	19
CHAPTER THREE	21
METHODOLOGY	21
3.1 Introduction	21
3.2 Research Design and Approach	21
3.3 Model Specification	21
3.3.1 Auto Regressive Distributive Lag (ARDL)	21
3.4 Data Sources and Description of Study Variables	23
3.5 Data Analysis	24
3.6 Diagnostic Tests	25
3.6.1 Normality Test	25
3.6.2 Unit Root Tests	25
3.6.3 Cointegration Tests	25
3.7.4 Post Estimation Tests	25

3.8 Ethical Considerations.....	26
CHAPTER FOUR.....	27
RESEARCH FINDINGS.....	27
4.0 Introduction	27
4.1 Data Presentation and Analysis.....	27
4.1.1 Univariate Analysis.....	27
4.1.2 Bivariate Analysis.....	29
4.1.3 Unit root tests.....	30
4.2 ARDL Bounds Cointegration Test.....	32
4.3 ARDL ECM Model.....	32
4.4 Diagnostic Tests	34
4.4.1 Serial Correlation Test Results	34
4.4.2 Normality Test	34
4.4.3 Model Stability.....	36
4.5 Discussion of Results	36
4.5.1 Long Run Coefficients.....	36
4.6 Short Run Coefficients.....	39
CHAPTER FIVE	40
SUMMARY, CONCLUSION AND RECOMMENDATIONS	40
5.0 Introduction	40
5.1 Summary of Findings	40
5.2 Conclusions	41
5.3 Recommendations	41
5.4 Limitations	42
5.5 Areas for further Study.....	42

REFERENCES	43
APPENDICES	52
Appendix I: Top 20 Models: Akaike Information Criteria (AIC).....	52
Appendix II: Cumulative Sum and Cumulative Sum of Squares Figures.....	53

LIST OF TABLES

Table 4. 1: Descriptive Statistics	27
Table 4. 2: Correlation Matrix	29
Table 4. 3: Unit Root Test Results: Phillips Perron Technique	31
Table 4. 4: ARDL Bounds Test	32
Table 4. 5 ARDL ECM Regression	33
Table 4. 6 Test Results for Model Accuracy and Reliability.....	34

LIST OF FIGURES

Fig 1. 1: Trend in Tax-To-GDP Growth for Uganda FY 1991/92 - FY 2021/22	4
Fig 1. 2: Conceptual Framework for the Determinants of Tax-To-GDP.....	6
Fig 4. 1: Normality Test Results	34
Fig A. 1: Top 20 Models; Akaike Information Criteria (AIC)	52
Fig A. 2: Cumulative Sum	53
Fig A. 3: Cumulative Sum of Squares	53

ABBREVIATIONS

ARDL	:	Auto Regressive Distributive Lag
ATAF	:	African Tax Administration Forum
ATO	:	African Tax Outlook
AUC	:	African Union Commission
BOU	:	Bank of Uganda
DRMS	:	Domestic Revenue Mobilization Strategy
ECOWAS	:	Economic Community of West African States
FDI	:	Foreign Direct Investment
FGLS	:	Feasible Generalized Least Squares
FY	:	Financial Year
GDP	:	Gross Domestic Product
GMM	:	Generalized Methods of Moments
ICT	:	Information and Communications Technology
IMF	:	International Monetary Fund
MoFPED	:	Ministry of Finance, Planning and Economic Development
OECD	:	Organization for Economic Co-operation and Development
SSA	:	Sub-Saharan Africa
UBOS	:	Uganda Bureau of Statistics
UNHS	:	Uganda National Household Survey
URA	:	Uganda Revenue Authority
VAT	:	Value Added Tax
VIF	:	Variance Inflation Factor
WDI	:	World Development Indicators

ABSTRACT

Uganda is among the countries that implemented tax policy and administration reforms with the aim of increasing performance of revenue. Much as these tax reforms yielded some success and improved the tax revenue performance, early tax revenue performances have not been maintained. It is acknowledged that tax revenue is one of the resources needed to finance expenditure in several economies, Uganda inclusive, fail to mobilize sufficient revenue, necessitating borrowing. The study empirically examined the factors that determine the growth of Tax-To-GDP in Uganda, utilizing quarterly data spanning from 2008/2009 to 2022/2023. Data for the study was obtained from MoFPED, URA, UBOS and BoU. The study objectives were to; determine the impact of agriculture, industry and services on growth of Tax-To-GDP in Uganda; examine the impact of trade openness on growth of Tax-To-GDP in Uganda and examine the impact of exchange rate and inflation on growth of Tax-To-GDP in Uganda. The study was based on the Laffer Curve Theory, the Cobb Douglas Theory and the Marshall Lerner Theory. An ARDL-ECM model augmented by the bounds test were estimated. The findings demonstrated that Agriculture, Industry and Services negatively and significantly affect the growth of Tax-To-GDP in the long-term while Trade Openness and Exchange Rate positively and significantly affected Tax-To-GDP growth. The study recommends linking agriculture to value addition through agro-processing and trade in manufactured products which will result in high income. From the findings, services sector indicated that it had a negative and significant coefficient of -1.998022. Therefore, the study recommends the need to direct policy towards addressing the difficulty of taxing the sector with focus on strengthening tax administration capacity in Uganda, the need to enhance trade openness through further economic integration, more trade facilitation, removing trade barriers to ensure that there is increase in the volume of goods crossing borders.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

Most countries attempt to attain growth by increasing public expenditures with an assumption that income raises enough revenue to keep fiscal balance from deteriorating over a period of time. However, several economies, Uganda inclusive fail to mobilize sufficient revenue through taxation yet spending keeps on increasing, necessitating these economies to resort to borrowing. This results in growing deficits which puts fiscal sustainability at risk. The study sought to examine factors that affect growth of Tax-To-GDP in Uganda. Chapter One presents the study background, problem of the study, objectives of the study, study hypotheses and the study significance. Chapter Two presents introduces literature review, Chapter Three presents an outline of the methodology which was employed, Chapter Four outlines a summary of the research findings while Chapter Five provides a summary of findings, conclusions and policy recommendations drawn from the data analysed and model estimated.

1.1 Background to the Study

Tax revenue is one of the resources that every economy in the world, whether developed or developing, needs in order to accomplish its mandate (Andersson & Lazuka, 2019). Despite declines in world economic growth due to the Global Pandemic and Eurasian wars (Gourinchas, 2022), domestic revenue mobilization and performance has become key over time (Kitessa & Jewaria, 2018).

Taxation is greatly acknowledged as the most efficient way of raising revenue and affects economic growth, disparity in income, and affects levels of poverty. In many developing economies, taxation is used to support national development and economic independence (Kalogiannidis, 2021).

As the worldwide development projections show a slow growth, dropping from 6.0% in 2021 to 3.2% in 2022 and expected to drop further to 2.7% in 2023 (IMF, 2022), there is growing interest to domestically grow revenue. This has been attributed to the growing interests in funding expenditures, such as, development, including infrastructure, education, health, research and technology, strengthening security, and developing other capital activities over

time. There are worries about debt sustainability and dwindling donor support (World Bank, 2020). Revenue raised from taxes largely rely on the performance of taxes, administration of tax and fiscal policy changes that have been affected.

According to Mills (2017), emerging economies have over the years collected much lower proportions (between 10 to 20%) of gross domestic product (GDP) from tax revenue compared to economies of the OECD member countries who collect between 30 to 40 percent of their GDPs from tax revenues.

OECD (2022), indicates that Southeast Asia and the Pacific countries continue to have the lowest Tax-to-GDP, close to 10 percent, while Middle East, North Africa, Latin America, and Sub-Saharan Africa are among regions with slightly a higher Tax-to-GDP (approximately 18%). Although there exist large variations amongst regions, Middle East, North Africa, and Latin America register higher ratios compared to Sub-Saharan Africa.

Sweden has recorded the highest Tax-To-GDP of 50% in 2000 (OECD, 2020) across the world. According to World Bank (2022), a rate of 15% Tax-To-GDP or a higher rate is sufficient to spur economic growth. Similarly, Gasper, Jaramillo and Wingender (2016) in a study on low-income countries and emerging economies found that GDP per capita was 7.5% greater in economies with tax revenue greater than 15%. Tax-To-GDP plays an important role because it enables policy makers to see the rate at which taxes fund the economy.

OECD/ATAF/AUC (2022) reports that African nations have different levels of income, with Tax-To-GDP ratios converging towards OECD levels in upper and middle-income countries, while emerging nations still lag behind with many having rates fall below 15%, which is generally seen as the threshold, below which economies struggle to fund elementary functions and services.

Rahim and Asma (2019) assert that developing economies typically generate very little tax revenue due to a variety of issues, including a large proportion of the economy's GDP coming from agriculture and the significantly low income of its farmers, a small proportion of it coming from industry and services, a limited tax base, political instability, corruption, tax evasion, poor tax reforms, among other issues that can significantly lower tax revenues, and the sectoral composition of an economy. According to a Bank report (2023), In many developing nations,

agriculture is seen as a backbone since it makes up a major portion of their GDP (Rafael, 2023), it is challenging to tax especially if it is subsistence (Rahim & Asma, 2019).

In contrast to the agriculture sector, it is simpler to tax the industry and service sectors (Karagoz, 2013). The bigger the industrial and services sectors, the more the tax revenue because record keeping is presumed to be better, which further increases tax revenue (Ayenew, 2016). As countries develop, Economic development causes domestic expenditure, production and imports grow, which in turn raises tax revenue (Basirat et al., 2014). On the contrary, many developing nations have an informal services sector. Due to informality, there is a significant rate of tax evasion and a low level of revenue generation in the services sector (Shahid, Shehryar & Allibhoy, 2016).

Like other nations across the world, African countries have undertaken tax reforms with a view of increasing revenues through taxes. These reforms have included; reducing taxes related to trade, lowering the high marginal tax rates, introducing taxes related to consumption and incomes for example value added tax (VAT), taxes related to production, such as excise duty and other taxes such as presumptive taxes). Other reforms have included improving tax administration and simplifying tax systems (Evnevich & Ivanova, 2020).

These reforms have resulted in the creation of revenue authorities to tackle the challenges of inadequate budgets, low staff remuneration and high corruption rates (Dom & Miller, 2018). Successful structural reforms in countries such as Seychelles, Namibia and Mozambique saw these economies have higher average ratios of Tax-To-GDP (Moore et al., 2018), with Seychelles achieving the highest Tax-To-GDP ratio of all African Tax Outlook (ATO) countries annually, since 2011 (OECD/ATAF/AUC, 2022).

Uganda is among the countries that implemented tax policy and administration reforms with the aim of increasing performance of revenue (Mawejje & Odhiambo, 2021). These reforms saw Uganda create an autonomous revenue authority (Uganda Revenue Authority) in 1991 and extensive reforms in the tax legislation in 1997 (Kwagala-Igaga, 2016). Much as the tax reforms yielded some success resulting into a growth in tax revenue from a ratio of 6.8% in FY 1991/1992 to 12.8% in financial year 2019/2020 (ATAF, 2022), early tax revenue performances have not been maintained, with Tax-To-GDP ratio stagnating at about 11-13% for the last 12 years (URA database, 2022; Eurostat, 2022).

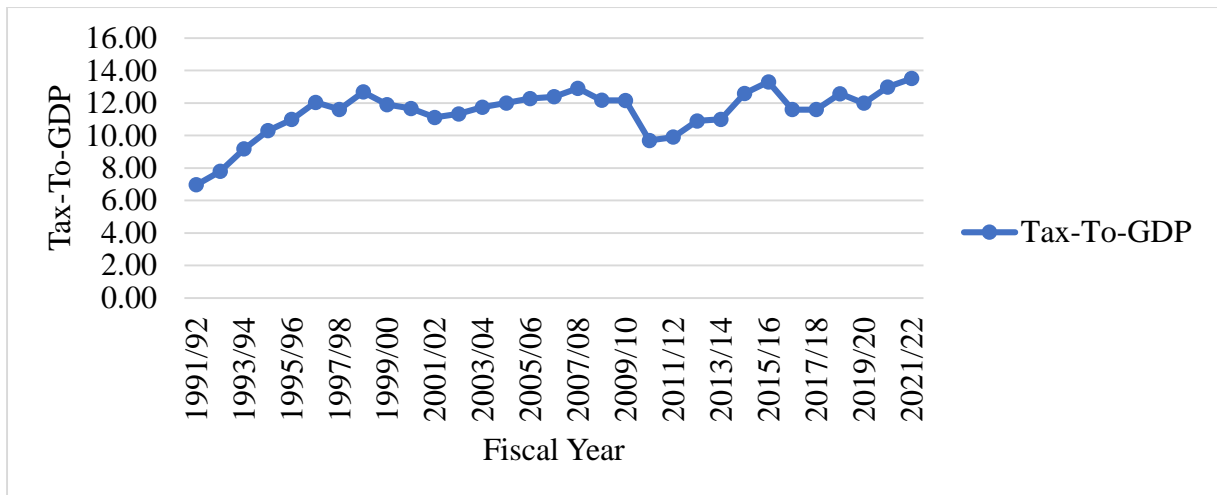


Fig 1. 1: Trend in Tax-To-GDP Growth for Uganda FY 1991/92 - FY 2021/22

Source: URA (2023)

Uganda among others continues to face structural challenges which may pose risks to domestic revenue mobilization. According to MoFPED (2022), the government has continuously resorted to additional domestic borrowing in order to finance expenditures, widening the debt burden and exerting pressure on Uganda’s budget due to the short-term maturity of the loans. Similarly, Uganda’s external debt-to-GDP ratio hit 36.1% in FY 2018/2019 growing from 26.2% in the FY 2014/2015 (MoFPED, 2022). Furthermore, according to Uganda’s budget 2023/2024, public debt stands at Shs. 80.8 trillion with external debt amounting to Shs 47.88 trillion and domestic debt amounting to Shs 33.0 trillion (MoFPED, 2023). Narrowing this debt-to-GDP ratio is very key to Uganda. However, this can only be achieved by increasing domestic tax revenue mobilization so as to fund government activities. With the existing stagnation in the mobilization of revenue from tax, it is important to take cognizance of the drivers that can boost the growth of Tax-To-GDP.

1.2 Research Problem

The Domestic Revenue Mobilization Strategy (DRMS) sets forth improving the collection of revenue from taxes for Uganda to lie between 16 and 18% Tax-To-GDP by end of FY 2024/2025 in order to spur growth as envisaged by National Development Plan II (MoFPED, 2022) and NDP III. The FY 2022/23 budget prioritizes the monetization of Uganda’s economy through commercialization of agriculture, industrialization and expanding services to increase Tax-To-GDP (MoFPED, 2022). Whereas the country has registered a significant

contributions of Agriculture, Services, Industry and Trade to GDP (UBOS, 2023) and given that Uganda has relatively high tax rates (Income Tax and Corporation Tax at a rate of 30%, value added tax (VAT) at a rate of 18% and import duty at a rate of 25%), Uganda's Tax-To-GDP ratio still remains low at 13.5% as per the budget background for the financial year 2023/2024 (MoFPED, 2023;) below the set targets of 16-18% Tax-To-GDP; the African average (16% Tax-To-GDP) (OECD/ATAF/AUC, 2022); the World Bank's satisfactory rate (15% Tax-To-GDP) (World Bank, 2022) and what the Sub-Saharan countries collect (17% of Tax-To-GDP) (OECD, 2020). These challenges are indeed visible as the BoU state of the economy report (2021) indicated that Uganda's debt-to-GDP stood at 50% in FY 2021/2022. An indication that the country does not mobilize sufficient tax revenue. Given that domestic revenue mobilization continues to be a challenge despite the relatively high tax rates and growth of the different sectors of the economy, there is need to pay keen attention to the drivers of Tax-To-GDP growth so as to be able to generate sufficient revenue for funding government activities.

1.3 Conceptual Framework

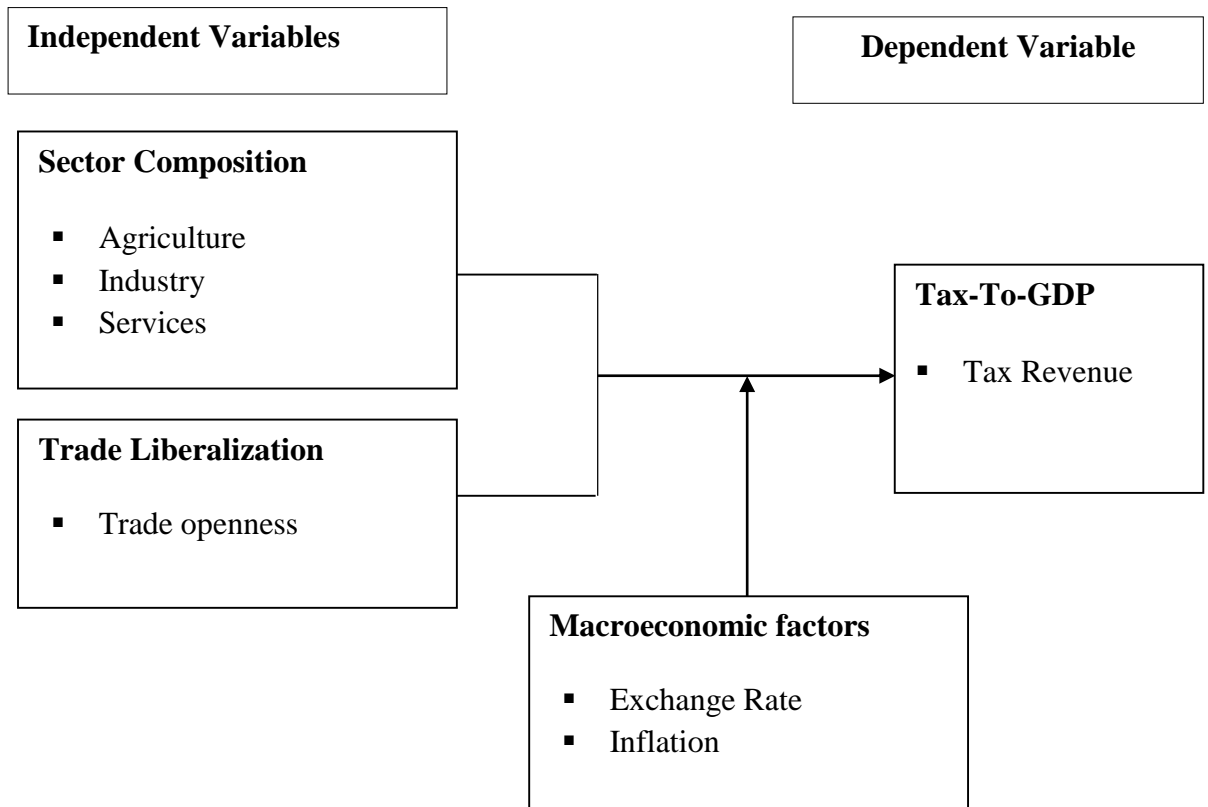


Fig 1. 2: Conceptual Framework for the Determinants of Tax-To-GDP

Source: Modified from Kitessa and Jewaria (2018)

1.4 Objective of the Study

1.4.1 Overall Objective

The overall objective of the study was to examine the determinants of Tax-To-GDP growth in Uganda.

1.4.2 Specific Objectives

The study was guided by the following specific objectives:

- (i) To determine the effect of Agriculture, Industry, Services on growth of Tax-To-GDP.
- (ii) To examine the effect of trade openness on growth of Tax-To-GDP.
- (iii) To examine the effect of exchange rate, inflation on growth of Tax-To-GDP.

1.5 Research Hypotheses

- (i) **H₀**: Agriculture, Industry, Services have no significant impact on growth of Tax-To-GDP.
- (ii) **H₀**: Trade Openness has no significant impact on growth of Tax-To-GDP.
- (iii) **H₀**: Exchange Rate, Inflation have no significant impact on growth of Tax-To-GDP.

1.6 Scope of the Study

1.6.1 Geographical Scope

The study intended to examine the determinants of Tax-To-GDP Growth in Uganda and was limited to reviewing literature on the factors that affect Tax-To-GDP.

1.7 Significance of the Study

The study sought to provide guidance on development initiatives geared towards improving the Ugandan tax system, provide basis for re-examining policies that provide leakage of revenues, provide basis for sectoral based initiatives to improve on tax revenue growth by providing a framework for estimating the associated tax revenues of the economy with the selected study variables, and contribute towards the existing literature on tax revenue in Uganda.

1.8 Definition of Terminologies

1.8.1 Tax-To-GDP

According to Nnadozie et al. (2017), Tax-To-GDP is the volume of taxes collected relative to a country's GDP. African Tax Outlook (2020) report, Tax-To-GDP is defined as a representation of a nation's total tax revenue collected compared to the size of the economy and it is a fundamental indicator of efficiency of an economy's tax system which may be affected by the size of the informal sector, sector related structures, international trade, levels of employment, adjustments in policies related to tax and administration. However, according to Uganda Revenue Authority annual data book 2021/2022, Tax-To-GDP is defined as a ratio of the total URA revenue from taxes collected compared to GDP. For purposes of this study, the definition by URA was adopted.

1.8.2 Sector Composition

According to Beqiraj, Fanti and Zamparelli (2019), sectoral composition includes the different sectors that contribute to the GDP of a country. These sectors include agricultural, industry and services as shares of GDP.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This Chapter provides an introduction to literature review by first discussing an overview of Uganda's tax system followed by the review of theories that the study builds on, and review of empirical literature on the determinants of Tax-To-GDP growth. The study builds on the Laffer Curve theory of optimal taxation, Cobb Douglas theory of production and the Marshall Lerner Theory of trade balance and exchange rate.

2.1 Overview Uganda's Tax System

The tax structure of Uganda is comparable to the international standards (Bachmann, Kayongo & Gebhardt, 2022). Uganda has enacted a wide range of tax reforms over the past two decades, stepping up efforts for tax revenue growth. These reforms resulted into the formation of URA in 1991, the implementation of the VAT in 1996, and improvements to the income tax system. The tax rate for income and corporate tax is 30%, VAT is 18%, and the import duties are 25% of the import value. Other tax heads administered by URA include PAYE, excise duty, withholding tax, gaming tax and other taxes on cross-border trade (URA, 2023; MoFPED, 2022).

With the formation of URA, there has been the establishment of the large and medium taxpayer offices, increased adoption of Information and Communications Technology (ICT) solutions to simplify tax administration, the elimination of specific VAT exemptions, and increases in specific excise tax rates are additional policy and administrative reforms over time. Uganda and its East African counterparts approved the Common External Tariff (CET) under the EAC Customs Agreement in 2005 (URA, 2023).

The Uganda Revenue Authority, which regulates tax administration, provides 24/7 online tax services through e-Tax, and regularly conducts tax education for taxpayers and the general public, and it is also responsible for expanding the taxpayer register. The Authority is in charge of regulating Uganda's contemporary tax system and all the local tax authorities, making payment of taxes easier (URA, 2023).

Despite Government's dedication to increase the Tax-To-GDP ratio to lie between 16-18% as envisaged in the National Development Plan II (NDPII) (MoFPED, 2022), domestic revenue mobilization has remained low (averaging 13.5%) given relatively the high tax rates and tax reforms in the tax system (MoFPED, 2023; URA, 2023).

2.2 Theoretical Review

This study builds on the Laffer Curve theory of optimal taxation which portrays a hypothesized connection between taxation rates and the subsequent amounts of tax collection for the government. The theory assumes that no tax revenue is generated at the extreme tax rates of 0% and 100% and therefore there is a tax rate between 0% and 100% that maximizes governmental tax revenue.

2.2.1 Laffer Curve

The Laffer Curve theory is similar to a theory of optimal taxation propounded by Mirrlees (1971), however, Laffer curve theory focuses on establishing the relationship between a rate of tax and the levels of revenue mobilization from taxes. Unlike the optimal tax theory which establishes a linear relationship, the Laffer Curve theory is quadratic in nature and has two opposite effects on income; a positive link between the rate of a tax and the volume of revenue generated from taxes; and a negative correlation between GDP and the rate of a tax (Laffer, 1981). According to the Laffer curve theory, there is always a threshold of taxation, below which the level of income is negatively affected by the tax rate.

Assume that an economy has a zero-tax rate, this would indicate that no tax revenue is raised since tax cannot be imposed where there are no profits. Assuming GDP is net income minus real taxes, then when Net profit is equal to zero, the total GDP will be equal to zero and the total revenue will be equivalent to zero.

Let;

B = Tax Base

Π = Gross Profit

N = Net profit

P = rate of profit

t = rate of tax

E = Excess Burden

e = rate of excess burden

R = Revenue from taxes

According to Laffer Curve, R is a function of average tax rate t , such that:

$$R = f(t) \dots \dots \dots (1)$$

Which is a non-linear relationship.

But,

$$B = f(\Pi - R - E) = n [\Pi - (R + E)] \dots \dots \dots (2)$$

Assume that the business activity and tax base (B) increase as much as the gross profits (Π) increase or decline as the tax burden increases, and decline as the excess burden (E) increases. But, “ E ” has a direct effect on total business activity resulting to a non-linear relationship, that is;

Tax revenue (R) = Gross profits (Π) * Tax rate (t).

$$R = \Pi * t \dots \dots \dots (3)$$

Dividing equation (2) by B ;

$$1 = f(p - (t + e)) \dots \dots \dots (4)$$

Where;

$$t = R/B$$

$$p = \Pi / B$$

$$e = E/B$$

However, according to Creedy (2017) and Ballard et al. (1985), the rate of deadweight losses tends to increase when the tax rate is squared and is linear with elasticities.

Therefore,

$$EB = \left(\frac{\rho_0}{2}\right)(q_0 p_0)t^2 \dots\dots\dots (5)$$

Where;

EB = rate of excess burden

ρ_0 = Hicksian point elasticity of demand

Assuming a horizontal supply curve, the point elasticities would be assumed to be constant and equal to the cross elasticity of demand and supply.

Let the quantity of goods in an economy be denoted by q_0 and the price of the goods denoted by p_0 .

Such that:

$q_0 * p_0$ = initial income. However, the tax rate is “t”

However, tax is imposed on taxable income which forms part of the tax base.

Let:

Total tax base = GDP - government tax revenue.

Therefore, t = government tax revenue divided by the tax base.

Given the inverse relationship between t and E , excess burden losses tend to increase as the tax rate is squared, that is;

$$e = at^2 \dots\dots\dots (6)$$

Assuming a linear relationship and that the elasticity ρ_0 in equation (5) is a point elasticity, $q_0 p_0$ is constant, then,

$e = EB$ = percentage of E to B

t = average tax rate percent.

Substituting equation (6) into (4),

$$1 = f(p - (t + \alpha t^2)) \dots\dots\dots (7)$$

Expanding equation (7);

$$f\alpha t^2 - ft + fp = 1; \text{ for } 0 \leq t \leq 1 \text{ (Laffer Curve theory).}$$

Therefore, Laffer Curve theory finds that too much tax negatively affects the mobilization of revenue from tax. A study by Barro (1990) on government spending found similar results and found economic growth is promoted through fiscal policy initiatives, however, beyond a certain level, these tend to generate negative externalities which tend to interrupt growth. Determining an optimal rate of tax that allows an optimal growth is key (Barro, 1990) as such, a tax rate which is not appropriate has negative effects on the economy.

This theory was adopted because it suggests that there is need to adopt an optimum tax rate which does not negatively affect GDP since production levels in the economy are directly associated with the ability to pay taxes, implying that, industrialization and other economic activities, levels of economic growth and development have a direct connection to the growth of revenue from taxes. Therefore, tax revenue growth will largely depend on the structural parameters of an economy.

2.2.2 The Cobb Douglas Theory

This study builds on the Cobb Douglas theory of production propounded by Charles Cobb and Paul Douglas in 1928, and a simple analytical frame work for revenue growth advanced by Mawejje and Munyambonera (2016). Mawejje and Munyambonera (2016) assert that firms are the key agents involved in the production of goods and services, such that, they invest capital K_i and employ labour L_i and the measure of firms' productivity from the factors of production is "A". Firms pay tax at a constant tax rate "t" levied on gross proceeds of the firms "Π". The firms' production function can then be specified as:

$$Q_i = AK_i^\alpha L_i^\beta; \dots\dots\dots (8)$$

Where:

$$\beta = 1 - \alpha$$

The production function assumes that $\alpha + \beta > 1$ (increasing returns to scale), the production function is differentiable such $f' > 0$ and $f'' < 0$ with a diminishing marginal rate of substitution.

Given that wage W_i is the return on labour and R_i is the return on capital invested by private firms, then:

$$c_i = W_i L_i + R_i K_i \dots\dots\dots (9)$$

Where;

$$c_i = \text{cost function}$$

The firms' proceeds maximizing function is then specified as:

$$\Pi_i = AK_i^\alpha L_i^\beta - W_i L_i - R_i K_i \dots\dots\dots (10)$$

Profit maximization implies that:

$$R_i = \alpha AK_i^{\alpha-1} L_i^{1-\alpha} \text{ while } w_i = (1 - \alpha) AK_i^{\alpha-1} L_i^{-\alpha}.$$

Firms can independently choose to be in Agriculture (AGRIC), Industry (INDUS) or Services (SERV). Then, overall output of the economy is denoted as:

$$Q = AGRIC^\sigma INDUS^\delta SERV^\varphi \dots\dots\dots (11)$$

Transforming equation (11) we obtain:

$$Q = \sigma \log AGRIC + \delta \log INDUS + \varphi \log SERV \dots\dots\dots (12)$$

Where:

σ , δ , and φ are shares of the three sectors of Agriculture, Industry and Services as percentages of the economy's output (GDP) respectively.

Assuming firms accurately declare profits Π and pay taxes on the profits at a tax rate t such that the total tax payable is τ .

Given that firms pay taxes on Π , then the Tax-To-GDP is:

$$\frac{t\Pi_i}{Q_i} = \frac{\tau}{Q_i} (AK_i^\alpha L_i^\beta - W_i L_i R_i K_i) \dots\dots\dots (13)$$

Taking the derivatives of Tax-To-GDP ratio with respect to π_i , we obtain a response of increased profitability to Tax-To-GDP. That is:

$$\frac{d}{d\Pi_i} \left(\frac{t\Pi_i}{Q_i} \right) = \frac{\tau}{Q_i} > 0 \dots\dots\dots (14)$$

Equation 14 indicates, as profits of the firms increase, the Tax-To-GDP ratio should increase, indicating a positive direct correlation between GDP or profits and the Tax-To- GDP.

2.2.3 Marshall Lerner Theory

This study builds on the Marshall Lerner Theory of trade balance and exchange rate developed by Alfred Marshall, 1842–1924 and Abba Ptachya Lerner 1903–1982 (Keynes, 1924). The theory is also referred to as the Marshall Lerner Condition and it states that when a currency depreciates while the demand for imports and exports are both relatively elastic, the volume of exports will increase and the volume of imports will decrease by a greater proportion than the change in prices, leading to an improvement in the trade balance (Bano, Raashid & Rasool, 2014). This theory suggests that an increase in exchange rate (depreciation) stimulates exports and constrains imports, resulting into an increase in aggregate demand since the demand for imports and exports tend to be inelastic. As exports and imports measured in monetary terms increase, tax revenue will increase since exporters and imports pay tax at a constant tax rate levied on both export and import volume.

2.3 Empirical Review

2.3.1 Link Between Agriculture, Industry, Services and Tax-To-GDP Growth

Broad literature has attempted to examine the factors that affect Tax-To-GDP growth across the universe. Tax-To-GDP has broadly been proxied by tax revenue growth. Scholars largely take sectoral composition as an important factor that determines tax revenue in an economy. Khan, Jamshed and Fatima (2020) defines sectoral composition to include agriculture, services and industry as shares of GDP. Similarly, Mawejje and Munyambonera (2016) describe sectoral composition of Uganda to include, services sector, industrial sector and agricultural sector.

Given conflicting opinions expressed by scholars, the relationship between sectoral composition and tax revenue growth is fascinating. Some scholars report positive, while others claim negative impacts of sectoral composition on tax revenue growth. In a study by Gobachew, Debela and Shibiru (2018) using multiple variables regression in Ethiopia, measured sectoral composition as industry sector and agricultural sector. Industrial and agricultural were measured as share of GDP, and the study revealed that the industrial sector had a positive and significant effect on Tax-To-GDP, while agriculture significantly but negatively affected revenue from taxes.

Mawejje and Munyambonera (2016) using time series data and employing an autoregressive distributive lag (ARDL) bounds testing method found that whereas agriculture and informal sectors dominate the Ugandan economy, these pose the biggest obstacles to the performance of tax revenue. Additionally, development expenditures, trade openness and industry positively and significantly impacted the growth of tax revenue. Their study found that services was nonsignificant in determining the growth of Tax-To-GDP.

Alabede (2018) using FGLS and panel-corrected standard errors methodologies on data for the in sub-Saharan Africa (SSA) region found that investment freedom positively and significantly affected tax revenue performance, whereas agriculture negatively and significantly affected tax revenue performance.

Using a multivariate panel data cointegration analysis to examine the key factors that determine tax revenue, Kitessa and Jewaria (2018) found a positive and significant impact of shares of

agriculture, industry and services on the mobilization of revenue across the East African region. Similarly, in Pakistani, Rahim and Asma (2019) employing panel estimation techniques of generalized methods of moments (GMM) studied the effect of sectoral growth on the mobilization of tax revenue in emerging nations found that agriculture, industry and services sectors had a magnificent influence on the mobilization of tax revenue. However, in comparison, the study found that in low-income countries, sectoral growth had an inverse impact on tax yields.

Given that the majority of the studies have examined sectoral composition as GDP shares for agriculture, industry, and services, this study adopts the same metrics. Whereas the industrial sector in Uganda is measured by mining and quarrying, manufacturing, electricity, water and construction, taxes on industry in Uganda are largely imposed on manufacturing, mining and quarrying. This study adopted the measurement of variables by the aforementioned scholars.

2.3.2 Trade Openness and Growth of Tax-To-GDP.

According to Banton and Kenton (2019), trade liberalization is process of reducing restrictions that hinder the free movement of goods and services across economies. Restrictions that economies use to hinder the free movement of goods and services take the form of tariff and nontariff barriers which affect free trade. By definition, trade liberalization can affect tax revenue performance.

Several scholars have attempted to study the role of liberalization towards revenue generated from taxes, for example, Chaudhry and Munir (2010) employing econometric techniques studied factors that affect the low revenue generated from tax in Pakistan. They used time series data spanning from 1973 to 2009, taking economic policies, social indicators and external factors as determinants. In their study, trade liberalization was measured by trade openness and the findings indicated there was a significant and positive effect of trade openness on revenue from taxes. Whereas their findings further showed that political stability, external debt, and broad money had a detrimental impact on tax revenue, a narrow tax base, foreign aid and heavy reliance on agriculture significantly reduced tax revenue in Pakistan.

Asghar and Mehmood (2017) using auto regressive distributive lag (ARDL) studied the effects of openness in trade on revenue from tax in Pakistan. Their findings from the study showed an inverse association between openness in trade and revenues generated from taxes, implying

that trade openness is more likely to reduce revenues from taxes if it is followed with a reduction in tariffs.

In East Africa, Tanzania for example, Epaphra and Kaaya (2020) while employing an ARDL model found that openness in trade leads to an increase in revenues from taxes both temporarily and in the future. However, fully opening up of an economy poses an obstacle to growing revenue from taxes.

In public sector and tax studies, openness has long been considered a key determinant and has been used to study its impact on tax levels (Feger, 2014). Exports and imports in terms of GDP (trade-to-GDP) has been constructed as a tool of various measures, for example the level at which the economy has lowered barriers to trade, the extent to which economies open up and the volume of imports and exports between among economies, depending on the study objectives (Gnangnon, 2019).

A study by Gobachew, Debela and Shibiru (2018) on the factors that affect the generation of revenues from taxes in Ethiopia used multiple variables regression. Their study found that openness in trade had a statistically significant and positive influence on revenue from tax.

By employing the fixed effects model, Gaalya (2015) in his study in Uganda examined the factors that determine the performance of revenue from taxes. His study utilized panel data from six trade partners including Tanzania, Burundi, Kenya, Rwanda, DRC and Sudan, spanning from 1994 to 2012. Openness in trade as a proxy of liberalization of trade positively and significantly influenced performance of tax revenue.

Beside a handful of studies that have been conducted largely on the association between trade liberalization (openness in trade) and the growth in tax revenues, literature has had mixed findings; Epaphra and Kaaya (2020); Gaalya (2015); Chaudhry and Munir (2010); and Gobachew, Debela and Shibiru (2018) have all reported a positive impact of trade liberalization measured by trade openness on the growth of tax revenues, while Asghar and Mehmood (2017) report a negative effect. Furthermore, little studies (Gaalya, 2015) have attempted to establish the association between openness in trade and growth in tax revenues in Uganda, using panel data. Therefore, the study will establish the connection between openness in trade and growth in Tax-To-GDP in Uganda using time series data. Like the aforementioned scholars, trade liberalization was measured by trade openness.

2.3.3 Exchange Rates, Inflation and Growth of Tax-To-GDP.

Literature on factors that affect growth of an economy have become central issues among both theoretical and empirical scholars, but there is little consensus. Hakim and Bujang (2012) identify taxes as the main source of revenue towards the growth of a country. Whereas impacts in macroeconomic atmosphere on tax revenue is important for a country, the extent to which unemployment, inflation, exchange rates and aggregate output affect revenue from taxes is less explored in literatures (Ihvarulam, Sanusi & Oderinde, 2021)

In Pakistan, a study by Ali and Audi (2018) using auto regressive distributive lag model and Augmented Dickey-Fuller unit root tests examined the macroeconomic factors that affect the growth of revenue from taxes. Their study found that there was a positive and statistically significant association between unemployment, the supply of money and the growth of tax revenue, while inflation had considerably a substantial but negative association with revenue generated from taxes.

Saptono and Mahmud (2021) used fixed effects model studied the macroeconomic factors that affect tax revenue among six southeast Asian countries for a period spanning from 2008 to 2019. Their study found that inflation was nonsignificant in explaining the performance of revenues from taxes.

A study on the six ECOWAS countries using panel data, by Ihvarulam, Sanusi and Oderinde (2021) investigated the relationship between macroeconomic variables and revenue from tax. They employed fixed effects regression coupled with Wald's and Hausman tests and found a positive and statistically significant association between inflation and revenue from taxes. The study further showed that unemployment and revenue from taxes had a significant but negative relationship. However, their study did not find any relationship that was significant between exchange rates and the revenues from taxes in the ECOWAS region.

Tsaurai (2021) examined the factors that determine revenues from taxes among the middle- and upper-income countries employing several techniques (GMM, FE, pooled ordinary least squares, and RE). He found that exchange rates and openness in trade had a negative but significant effect on revenues from taxes. His study further found that financial development, FDI, GDP, urbanization, human capital development, and population growth had a significant and positive impact on revenue from taxes.

Based on several literatures, it is clear that there still exists some gap on how macroeconomic factors affect tax revenue growth especially in Uganda, even among the existing literature in other parts of the world, scholars report mixed findings. For example, Ihuarulam, Sanusi and Oderinde (2021) found that inflation positively affects tax revenue, meaning that as inflation grows, then revenues from taxes grow, whereas Ali and Audi (2018) found that inflation had a negative but significant relationship with Tax-To-GDP. Saptono and Mahmud (2021) found that inflation was insignificant and did not have an impact on tax revenue performance. Whereas a handful of studies have attempted to establish the link between macroeconomic factors and Tax-To-GDP growth around the world and in Uganda, macroeconomic factors such as inflation, unemployment, exchange rates pose a big threat on tax revenue growth (Bachmann, Kayongo & Gebhardt, 2022) in developing countries including Uganda because they tend to affect the realization of tax from employment income, international trade and the overall production of good and services. Due to limited availability of data on unemployment in Uganda, this study shall adopt inflation and Exchange rates as measures of macroeconomic factors.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This Chapter is an outline of the methodology which was employed in this study. The chapter provides justifications which underpin the choice of methodology, area of study, study designs and approaches, data types, sources of data, definitions and description of the study variables, model specifications and choice of model adopted are presented. Additionally, the chapter provides the different diagnostic and post estimation tests conducted, data analysis techniques and the discussion of the different ethical issues concerning the study.

3.2 Research Design and Approach

The study adopted a longitudinal research design since data were collected over time by MoFPED, URA, UBOS, BoU and World Bank. A quantitative research approach was followed since the study used quantitative data.

3.3 Model Specification

3.3.1 Auto Regressive Distributive Lag (ARDL)

Empirical Literature has indicated that studies on determinants of Tax-To-GDP across the world have adopted mixed methodologies, for example; Epaphra and Kaaya (2020); Ali and Audi (2018); Asghar and Mehmood (2017); Mawejje and Munyambonera (2016) adopted the Auto Regressive Distributive Lag (ARDL) methodology. Tsaurai (2021), Pakistani, Rahim and Asma (2019) employed a mixture of methodologies, such as, the generalized methods of moments (GMM), fixed effects, pooled ordinary least squares and random effects in their analysis, while scholars such as Alabede (2018), Kitessa and Jewaria (2018), Gaalya (2015), Ihuarulam, Sanusi and Oderinde (2021) used panel estimation techniques in their studies, which is a good estimation technique when using panel data.

Given that the study used time series data with mixed orders of integration ($I(0)$ and $I(1)$), an Auto Regressive Distributive Lag (ARDL) model was adopted to estimate both the short term

and long term effects of the predictor variables on the outcome variable. Furthermore, Pesaran, Shin and Smith (1996) suggested the use of ARDL while determining the long-term association among non-stationary series, as well as estimating an ECM to ascertain the long-term relations. Analysis by Kwesi Ofori, Obeng and Armah (2018) regressed tax revenue on factors that are proxies of an economy's tax performance. By referring to the functional form from the aforementioned, the general form of an ARDL model can be written is expressed as follows;

$$Y_t = \alpha + \sum_{i=1}^p \beta_i Y_{t-i} + \sum_{j=0}^q \gamma_j X_{t-j} + \varepsilon_t \dots\dots\dots 15$$

Where,

Y_t = Dependent variable

X_t = Independent variable

α = intercept

β_i and γ_j = Short-run and long-run coefficients respectively

p and q = Lag lengths of the dependent and independent variables, respectively

ε_t = Error term

But TRGDP = $f(\text{AGRIC, INDUS, SERV, TRADE, EXRATE, INF})$. By following the study by Ali and Audi (2018); Asghar and Mehmood (2017) to find the degree of responsiveness caused by the predictor variables on the dependent variable, equation (15) then becomes;

$$TRGDP_t = \alpha + \sum_{i=1}^p \beta_i TRGDP_{t-i} + \sum_{j=0}^q \gamma_j AGRIC_{t-j} + \sum_{k=0}^r \delta_k INDUS_{t-k} + \sum_{l=0}^s \epsilon_l SERV_{t-l} + \sum_{m=0}^n \xi_m TRADE_{t-m} + \sum_{n=0}^{\vartheta} \eta_n EXRATE_{t-n} + \sum_{\rho=0}^v \theta_{\rho} INF_{t-\rho} + \varepsilon_t \dots\dots 16$$

Where,

TR = Tax Revenue

GDP = Gross Domestic Product

$AGRIC_t$ = Agriculture contribution to GDP (percentage share of GDP)

$INDUS_t$ = Industry contribution to GDP (percentage share of GDP)

$SERV_t$ = Services contribution to GDP (percentage share of GDP)

$TRADE_t$ = Trade openness contribution to GDP (percentage share of GDP)

$EXRATE_t$ = Exchange rates

INF_t = Inflation

$\beta_i, \gamma_j, \delta_k, \epsilon_l, \xi_m, \eta_n$ and θ_{ρ} = coefficients representing the short-run effects of the lagged variables;

p, p, r, s, n, ϑ and v = lag lengths for each variable

ε_t = Stochastic disturbance term

t = time

3.4 Data Sources and Description of Study Variables

The study examined that the determinants of Tax-To-GDP growth in Uganda. The study utilized data spanning from Quarter 1 FY 2008/2009 to Quarter 1 FY 2022/2023. The study period was guided by the availability of data on all study variables within the specified time range. The sample size of the time range is also big enough to facilitate the analysis of time series data.

Time series was captured on a quarterly basis, spanning from quarter 1 FY 2008/2009 to Quarter 1 FY 2022/2023, giving a total of 56 data points. According to Jebb et al. (2015), time series data should have enough observations to capture the phenomena of interest. Early scholars such as Meidinger (1980) recommend that 50 observations would be much more sufficient for accurate model estimation. Data on Tax-To-GDP was obtained from the MoFPED and URA, data of Agriculture, Industry and Services was obtained from UBOS, data on trade openness, exchange rates and inflation was obtained from BoU, and these data were supplemented with data from the WDI.

Study variables were adopted based on the theoretical and empirical background on the factors affecting Tax-To-GDP growth. The dependent variable was Tax-To-GDP which was measured as revenue generated from taxes as a ratio of GDP whereas the explanatory variables included agriculture, industry, services, trade openness, exchange rates and inflation. Agriculture, industry and services are to be captured as percentages of gross domestic product, trade openness was captured as the total volume of exports and import as a share of GDP. The intuition of including these variables in the model is that agriculture, industry, services, trade openness, exchange rates and inflation all believed to have an impact on GDP. Since the dependent variable is a share of GDP, GDP was not be included into the model in order to avoid endogeneity problems.

Table 2. 1: Variable Definition

S/n	Variable	Abbreviation	Definition	Source	Anticipated sign
1	Tax-To-GDP	TRGDP	Tax revenue (percentage of GDP)	MoFPED, URA	DV
2	Agriculture share	AGRIC	Agriculture, forestry, and fishing, value added (percentage of GDP)	UBOS	-
3	Industry share	INDUS	Industry share (construction inclusive), value added percentage of GDP), excluding Mining & quarrying % share to GDP	UBOS	+
4	Services share	SERV	Services, value added (% of GDP)	UBOS	+
5	Trade openness	TRADE	Summation of all exports & imports (% of GDP)	BOU	+
6	Exchange rates	EXRATE	Exchange rates (quoted against the US Dollar (\$))	BOU	+
7	Inflation	INF	Inflation, GDP deflator (annual %)	BOU	+/-

3.5 Data Analysis

The EViews software Version 13 was used to analyse data because the software is capable of offering a specialised estimator for running ARDL models with in-built lag length selection methods, offers a summary of results for both the short run and long run coefficients as well as the critical values of the bounds test and other diagnostic test methods. Data were analysed at three levels, that is, descriptive analysis, correlation analysis and regression analysis. Descriptive analysis was used to provide basic information about the distribution of data variables. Furthermore, correlation analysis was carried out to highlight the association among the study variables. Correlation analysis was used to give insights on the direction and strength of the relationship while regression analysis was conducted to highlight the impact of the

explanatory variables on the dependent variable. Regression analysis involved estimation of an appropriate model that best fits the available data.

3.6 Diagnostic Tests

3.6.1 Normality Test

The Jarque-Bera statistic propounded by Jarque and Bera (1987) was used to test for normality because of its reliability while dealing with large data samples and superiority in matching both the skewness and kurtosis in order to determine whether data follows a normal distribution. The test is capable of dealing with data that takes different forms for example time series, errors in a regression model or data in a vector form.

3.6.2 Unit Root Tests

This study used the Philips-Perron (PP) technique propounded by Phillips and Perron (1988) because of its ability to adjust series for serial correlation and heteroskedasticity without the need to specify the time lag.

3.6.3 Cointegration Tests

3.6.3.1 ARDL Cointegration Tests

Cointegration test was carried out to determine whether there was a correlation between among the series under study in the long run. The study adopted the ARDL bounds cointegration test by Pesaran, Shin and Smith (2001) because it is more appropriate when dealing with series that have mixed orders of integration such $I(1)$ and $I(0)$. Furthermore, the ARDL bound cointegration test was used because the study was dealing with small or finite sample sized data (56 series). The method was used because it helped to establish whether there exists both the long run and short run relationships among variables among the series.

3.7.4 Post Estimation Tests

3.7.4.1 Serial Correlation

The Breusch-Godfrey (BG) test propounded by Breusch (1978) and Godfrey (1978) was adopted while testing for auto correlation because of its ability to detect autocorrelation up to

any pre-designated order (p) and the ability to support a broader class of regressors.

3.7.4.2 Heteroscedasticity

In order to test whether the data follows a constant variance, the Breusch-Pagan test by Breusch and Pagan (1979) was used to test for heteroscedasticity. Unlike the White's test by White (1980), the Breusch-Pagan test is not an asymptotic test.

3.7.4.3 Model Specification and Stability Tests

According to Ramsey (1969), Ramsey RESET Test is used to test whether non-linear combinations of the explanatory variables help to explain the independent variable. According to test, the null hypotheses is that the model has no omitted variables. The Ramsey RESET Test was adopted to test for model specification. Furthermore, the cumulative sum and cumulative sum of squares tests by Brown, Durbin and Evans (1975) were used to test for model stability.

3.8 Ethical Considerations

According to Walker (2007), scholars, encounter ethical dilemmas when carrying out research. As such researchers must address all the ethical issues. In line with Kyambogo University Graduate Research guidelines, the researcher ensured that the dissertation was subjected to the plagiarism test to ensure that the dissertation is of good quality and original having obtained a similarity index below 20%. Furthermore, data were collected and analysed upon clearance and approval of the research proposal by the Graduate school. Data obtained from the different sources were used for purpose of the study. No data were shared by any third parties unless for purposes of validation of the study findings by the supervisors.

CHAPTER FOUR

RESEARCH FINDINGS

4.0 Introduction

This chapter outlines a summary of results for the study. The results are presented in form of descriptive statistics, correlation matrix and estimated results of the regression model. The chapter further presents results of the different post estimation and diagnostic tests conducted to ensure that good results were obtained for purposes of the study. The study aimed at examining the determinants of Tax-To-GDP growth in Uganda. Data were analyzed using EViews13 software.

4.1 Data Presentation and Analysis

4.1.1 Univariate Analysis

Table 4. 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
TRGDP	56	11.041	2.567	5.966	15.655
AGRIC	56	26.069	7.326	12.226	52.805
INDUS	56	25.175	5.684	7.762	40.383
SERV	56	42.083	8.341	-3.765	68.276
EXRATE	56	3034.77	658.507	1670.045	3879.54
INF	56	6.67	5.404	1.855	24.084
TRADE	56	49.074	40.532	18.49	169.02

Source: Own Computation

The results in table 4.1 highlight a summary of descriptive statistics (Mean, Standard deviation, Minimum and Maximum) for all study variables. It depicts means of both the predicted and predictor variables. The mean Tax-To-GDP as a percentage of GDP for the study period was 11.04% with a standard deviation of 2.567, indicating moderate variability around the mean. The mean of Agriculture as a percentage of GDP was 26.07%, Industry as a percentage of GDP was 25.18%, and the mean of Services as a percentage of GDP was 42.08% for the Period with standard deviations of 7.326, 5.684 and 8.341 respectively. Exchange Rate was on average 3034.770 shillings, Inflation was on average 6.67%, while on average, Trade Openness (as a

percentage share of GDP) was 49.07% with a standard deviation of 40.532. The means fall within the lowest and highest values which indicates that they are a good measure of central tendency. The standard deviation demonstrates minimum variability of the data points from their mean over the study period for Tax-To-GDP and Inflation, while Exchange Rates and Trade Openness reported relatively a higher Variation.

4.1.2 Bivariate Analysis

Table 4. 2: Correlation Matrix

VARIABLE		TRGDP	AGRIC	INDUS	SERV	EXRATE	INF	TRADE
TRGDP	Pearson Correlation	1						
	Sig. (2-tailed)							
	N	56						
AGRIC	Pearson Correlation	-0.172	1					
	Sig. (2-tailed)	0.204						
	N	56	56					
INDUS	Pearson Correlation	0.509**	-0.301*	1				
	Sig. (2-tailed)	0.000	0.024					
	N	56	56	56				
SERV	Pearson Correlation	-0.327*	-0.678**	-0.485**	1			
	Sig. (2-tailed)	0.014	0.000	0.000				
	N	56	56	56	56			
EXRATE	Pearson Correlation	0.615**	-0.511**	0.412**	0.104	1		
	Sig. (2-tailed)	0.000	0.000	0.002	0.445			
	N	56	56	56	56	56		
INF	Pearson Correlation	-0.294*	0.338*	-0.291*	-0.077	-0.551**	1	
	Sig. (2-tailed)	0.028	0.011	0.030	0.571	0.000		
	N	56	56	56	56	56	56	
TRADE	Pearson Correlation	-0.328*	0.550**	-0.702**	0.035	-0.543**	0.374**	1
	Sig. (2-tailed)	0.014	0.000	0.000	0.799	0.000	0.005	
	N	56	56	56	56	56	56	56

Notes: 1. **. Correlation is significant at the 0.01 level (2-tailed);
 *. Correlation is significant at the 0.05 level (2-tailed).
 2. Analysis at 5% (0.05)

Source: Own Computation

Table 4.2 presents results for the correlation analysis. The results indicate a negative association between Agriculture and Tax-To-GDP growth (-0.172365), Agriculture and Industry (-0.300711), and Agriculture and Services (-0.677635).

There was a relatively strong positive association between Industry and Tax-To-GDP Growth for Uganda (0.509045), a negative relationship between Industry and Services (-0.484849), a positive relationship between Industry and Exchange Rates (0.411665), a negative coefficient between Industry and Inflation (-0.291110), and a relatively high strong negative relationship between Industry and Trade Openness (-0.701709).

Furthermore, the findings show a negative association between Services and Tax-To-GDP Growth (-0.327056), a positive connection between Services and Exchange Rate (0.104055), a negative association between Services and Inflation (-0.077315), and a positive relationship between Services and Trade Openness (0.034804).

Exchange Rate was found to have a relatively high strong positive association with Tax-To-GDP Growth (0.615465), while Inflation was found to have a negative association with Tax-To-GDP (-0.294282) and Trade Openness was found to have a negative affiliation with Tax-To-GDP Growth in Uganda. Output in table 4.3 above indicate a relatively low degree of association among variables, that is, the coefficients of association are moderately low (below 0.8), which reduces the risk of having a multicollinearity problem.

4.1.3 Unit root tests

4.1.1.1 Phillips-Peron Test

The study adopted the Phillips-Perron (PP) methods and the tests were conducted at different levels (that is; in levels, first difference and second difference). The results are presented in table the 4.3 below.

Table 4. 3: Unit Root Test Results: Phillips Perron Technique

VARIABLE NAME	LEVELS		FIRST DIFFERENCE		CONCLUSION
	PP t-stat	Prob	PP t-stat	Prob	
	TRGDP	-4.524169	0.0006***	-36.01343	
AGRIC	-4.766933	0.0003***	-11.44586	0.0000***	I(0)
INDUS	-4.807807	0.0002***	-9.724789	0.0000***	I(0)
SERV	-6.023798	0.0000***	-12.23884	0.0000***	I(0)
EXRATE	-1.911768	0.3247	-6.729327	0.0000***	I(1)
INF	-2.470079	0.1282	-3.788359	0.0053***	I(1)
TRADE	-3.203304	0.0251**	-6.995779	0.0000***	I(0)

Note: *** $p < .01$, ** $p < .05$, * $p < .1$. Analysis at 5%

Source: Own Computation

Results in table 4.3 above reveal that Exchange Rate (EXRATE) and Inflation (INF) are not stationary in levels but become stationary at first difference at 5% suggesting that they are integrated with order one [I(1)]. The variables Tax-To-GDP (TRGDP), Agriculture (AGRIC), Industry (INDUS), Services (SERV) and Trade Openness (TRADE) were stationary in levels [I(0)] at 5%. These results imply that the study should adopt the ARDL model to estimate both the long run and short run effects of the predictor variables on dependent variable due to the fact that the variables are integrated with mixed orders on integration (the variables are of I(0) and I(1) orders). Therefore, the ARDL Model was estimated and results presented in table 4.5.

4.2 ARDL Bounds Cointegration Test

Table 4. 4: ARDL Bounds Test

Null hypothesis: No levels relationship

Test Statistic		Value				
F-statistic		23.901324				
Bounds Critical Values						
		10%		5%		1%
Sample Size	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
50	2.259	3.264	2.670	3.781	3.593	4.981
55	2.226	3.241	2.617	3.743	3.543	4.839
Asymptotic	2.080	3.000	2.390	3.380	3.060	4.150

* I(0) and I(1) are respectively the stationary and non-stationary bounds.

Source: Author's Own Computation (2023)

The ARDL Bounds Test results in the table 4.5 above indicate that there is a long run relationship between the predicted and explanatory variables since the value of the F-statistic (23.901324) is greater than the critical values of the upper Bound Level I(1) at 5%. The study rejects the null hypothesis and conclude that there exists a long-run relationship between the dependent variable (Tax-To-GDP growth) and its explanatory variables and therefore, an ARDL ECM was estimated and the results presented in table 4.5.

4.3 ARDL ECM Model

The study adopted an ARDL approach due to the presence of I(0) or I(1) orders of integration to test for the existence of the long run and short run relationships. The lag order of the variables in the model was selected by the Akaike info criterion (AIC) selection criteria and obtained the ARDL (1, 1, 2, 2, 3, 3) specification. The AIC criterion was used because of its superiority to estimate the quality of each model in relation to the other models and it minimizes the mean square error of the predictions. The results of the estimated model are presented in table 4.5 below.

Table 4. 5 ARDL ECM Regression

Variable	Coefficient	Std. Error	t-Stat	Prob.	Sig.
COINTEQ*	-1.524049	0.108630	-14.02977	0.0000	
Long Run					
TRGDP(-1)*	-1.524049	0.137095	-11.11676	0.0000	****
AGRIC(-1)	-2.131748	0.284355	-7.496770	0.0000	****
INDUS(-1)	-1.800538	0.265209	-6.789138	0.0000	****
SERV(-1)	-1.998022	0.251864	-7.932948	0.0000	****
EXRATE(-1)	0.001540	0.000642	2.399918	0.0220	***
INF(-1)	0.050747	0.053637	0.946134	0.3508	
TRADE	0.032324	0.011742	2.752954	0.0094	****
C	195.5013	25.16648	7.768319	0.0000	****
Short Run					
D(AGRIC)	-1.093211	0.301105	-3.630662	0.0009	****
D(INDUS)	-0.958715	0.364181	-2.632525	0.0127	***
D(INDUS(-1))	-0.198690	0.092782	-2.141479	0.0395	***
D(SERV)	-1.032904	0.297474	-3.472255	0.0014	****
D(SERV(-1))	-0.087259	0.042117	-2.071839	0.0459	***
D(EXRATE)	1.65E-05	0.001400	0.011759	0.9907	
D(EXRATE(-1))	-0.002232	0.001208	-1.847945	0.0733	
D(EXRATE(-2))	-0.002658	0.001203	-2.210489	0.0339	***
D(INF)	0.154474	0.103900	1.486763	0.1463	
D(INF(-1))	0.179910	0.112550	1.598489	0.1192	
D(INF(-2))	-0.309668	0.107030	-2.893273	0.0066	****
R-squared	0.919035		F-statistic	21.44093	
Adjusted R-squared	0.876172		Prob(F-statistic)	0.000000	

Notes: 1. * p-values are incompatible with t-bounds distribution.

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

2. Analysis at 5% (0.05)

Source: Own Computation

4.4 Diagnostic Tests

4.4.1 Serial Correlation Test Results

Table 4. 6 Test Results for Model Accuracy and Reliability

Diagnostic Test	Chi-Square	F-Stat	P-Value
Breusch-Godfrey Serial Correlation LM Test	2.8123	0.89657	0.2451
Heteroskedasticity Test: Breusch-Pagan-Godfrey	24.2545	1.59379	0.1469
Ramsey RESET Test	-	0.02477	0.8759

Note: Test at 5%

Source: Own Computation

The presence of autocorrelation was examined using the Breusch-Godfrey LM test. Based on the autocorrelation results presented in table 4.6, the Probability of the Chi-Square of 0.2451 indicates that there was no autocorrelation. The presence of heteroskedasticity was examined using the Breusch-Pagan-Godfrey test. Since Probability of Chi-Square of 0.1469 was insignificant at 5%, then the study was unable to reject the null hypothesis and come to the conclusion that the residuals followed a constant variance. The Ramsey RESET Test was used to examine whether the model was correctly specified. Since the probability of the t-statistic of 0.8759 was insignificant at 5%, the results of the Ramsey RESET Test show that the model was correctly described. These results therefore indicate that the model fits the data well.

4.4.2 Normality Test

The Jargue-Bera Test was used to examine whether the residuals follow a normal distribution. The findings are presented in figure 1.3 below.

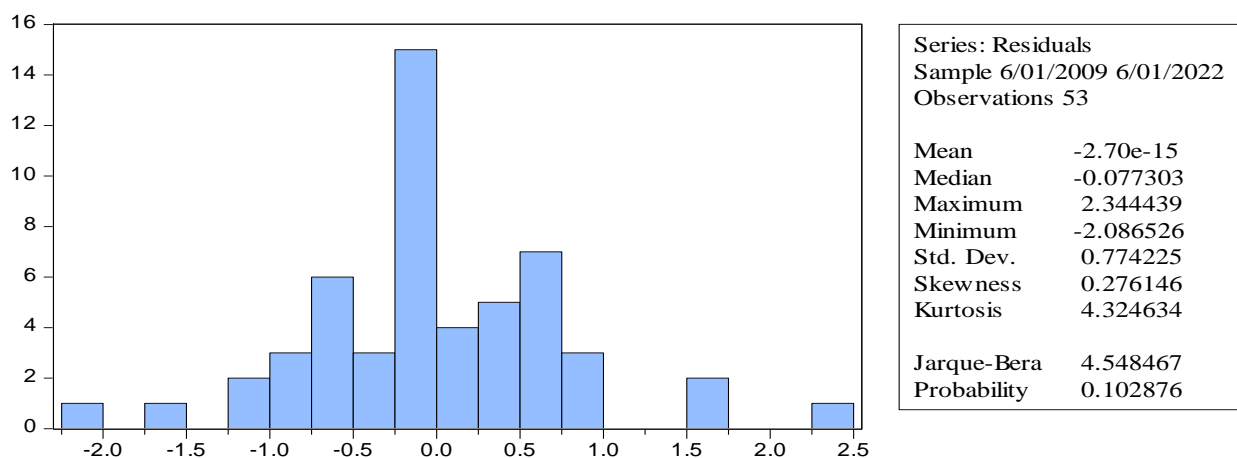


Fig 4. 1: Normality Test Results

Source: Own Computation

To check for normality, the Jarque-Bera test was applied on the residuals. The results show a probability of 0.102876, which is higher than 0.05. These results suggest a good model because they show that the error terms follow a normal distribution.

4.4.3 Model Stability

The cumulative sum and cumulative sum of squares tests were used to test for model stability and figures presented in Appendix II. The estimation in both tests did not move outside the 5% critical bands indicating that the parameters are stable.

4.5 Discussion of Results

The results in table 4.5 above indicate that the variation in the independent variables account for around 87.6% of the variation in the dependent variable (Tax-To-GDP), as indicated by the coefficient of determination (Adjusted R-Squared) of 0.876. The combined significance level for the explanatory variables is 5%, and the F-Statistic (P-Value) is 21.441 (0.0000). The calculated coefficient of the error correction term, COINTEQ*, is -1.524049, the t-statistic is -14.02977, and the probability is 0.0000. These findings suggest that within the following period, approximately 152% of the movements from disequilibrium in the preceding period are corrected. The t-statistic (-14.02977), which is very large, indicates that the coefficient is highly significant. These findings show that the model fits the data well.

4.5.1 Long Run Coefficients

4.5.1.1 The effect of Agriculture, Industry, Services on growth of Tax-To-GDP

The estimated model results indicates that Agriculture has a long-term detrimental effect on Tax-To-GDP growth. The coefficient for Agriculture is negative (-2.131748) and statistically significant at 5%, suggesting that a 1% increase in Agriculture to GDP results to approximately 2.132% decline in Tax-To-GDP growth. These results conquer with findings by Gobachew, Debela and Shibiru (2018); Mawejje and Munyambonera (2016); Mawejje and Munyambonera (2016) who found a negative effect of agriculture on tax revenue growth. The negative coefficient could be greatly attributed to the large non commercialized agriculture, low levels of technology adoption and rain fed agriculture affecting the productivity of the sector. Low productivity implies that low income is generated which results to low tax revenue generation. Furthermore, the subsistence sector which employs more than half (51.9%) of Uganda's

working population as per the UNHS 2019/2020 report imply that these employees earn seasonal wages which are below the threshold which hinders expansion of the tax base and revenue mobilization.

The regression model reveals that the share of Industry to GDP has a negative effect on the growth of Ugandan taxes to GDP in the long run. The coefficient (Probability) of Industry as a share of GDP is -1.800538 (0.0000) which is statistically significant at 5%. These findings are not consistent with findings by Kitessa and Jewaria (2018), and Gobachew, Debela and Shibiru (2018) who found that industrial sector positively and significantly affected tax revenue. Uganda's industrial sector is predominantly associated with both forward and backward linkages through the support for agro-processing but also linked to the services sector. The poor performance of the agricultural and services sectors can indeed affect the productivity of the industrial sector. Unlike industrialized economies, Uganda's industrial sector is dominated by primary and semi production other than processing (Secondary production). Low value addition implies low revenue generated. Furthermore, Uganda's industrial sector continues to be a major beneficiary of tax exemptions (Kasirye, 2015) and the negative coefficient of -1.800538 could reflect the effect of these exemptions as reflected in the 2021/2022 Uganda tax expenditure report which show that between FY 2016/17 and FY 2021/2022, Uganda lost 10.50436 trillion in the form of exemptions, credits and deferrals and other allowances.

Whereas the services sector presents a significant source of revenue as per its contribution to national income in the economy (largest contributor to GDP), it was found to negatively impact Tax-To-GDP growth. The regression model finds that the coefficient of Services is negative (-1.998022) and statistically significant (Prob= 0.0000) at 5%. These results suggest that a 1% increase in the share of services in GDP decreases tax-to-GDP growth by about 2% in the long-term. This result is inconsistent with that of Maweje and Munyambonera (2016) who found a positive effect. The results are partly attributed to large informal business in the services sector. According to the DRMS 2019/2020 -2023/2024, the services sector continues to be a major structural constrain of revenue growth because the sector is comprised of informality accounting for close to half of economic activity in Uganda. Many Ugandans, especially in the service sector, conduct all or part of their businesses in the informal sector, hidden from the tax system. Furthermore, the MoFPED Uganda Informal Business Assessment Report 2023, indicates that the informal sector has grown to more than 72%. The large informal businesses

have an adverse effect on tax revenue growth since it is costly to administer taxes in an informal setting (Verberne & Arendsen, 2019).

4.5.1.2 The effect of trade openness on growth of Tax-To-GDP

Trade Openness was found to have a positive effect on Tax-To-GDP growth. According to statistics, a 1% increase in trade openness increases the results into grows Tax-To-GDP by about 0.032%. These results correspond with that of Epaphra and Kaaya (2020); Gobachew, Debela and Shibiru (2018); Gaalya (2015); Chaudhry and Munir (2010) who found that trade opening has positive and significant effects on taxability. These statistics imply that an increase in the volume of Imports and exports leads to increases import duties assuming that the demand for both exports and imports is inelastic keeping other factors constant. The results may be attributed to Uganda's efforts to liberalize trade through the reduction of quantitative restrictions, automating the import certification process, the lifting of import ban on some goods, improvements in customs procedures and the continued efforts to reduce infrastructural bottlenecks among other efforts have enabled the importation of goods and services into the country thus increasing tax revenue (WTO, 2023).

4.5.1.3 The effect of Exchange Rate, Inflation on growth of Tax-To-GDP

Exchange rate was found to have a positive effect on Tax-To-GDP growth with a coefficient of 0.001540 and P-value of 0.0220. Statistics reveal that higher exchange rates lead to higher tax revenues in the long-term. The positive coefficient implies that depreciation of the local currency makes exports cheaper in the foreign market, which leads to an increase in export demand thus leading to an increase in export volume and export tax revenue, while other factors remain constant. Similarly, devaluation causes an increase in import prices, taxing the monetary value of imported goods, thus leading to increased tax revenues from imports, thus satisfying the Marshall-Lerner Condition.

The results above reveal that in Uganda, inflation causes growth of Tax-To-GDP in the long-term with a coefficient of 0.050747. This result suggests that a 1% increase in inflation increases tax revenue by 0.05% in the long run. The positive coefficient on inflation may be attributed to the fact that inflation has remained relatively stable (single digit) overtime. BoU adopted inflation targeting policy since 2011 as a monetary policy instrument to influence output through economic agents and the real wage.

This has resulted into control of core inflation (BoU, 2021). Furthermore, stable prices imply that economic agents can make decisions based on the fact that the nominal and real values of goods and services are relatively the same over a period of time. Inflation can be a shock to economic agents. A rise in inflation causes lower real wages, which leads to higher demand for labor (assuming higher returns to scale), which in turn leads to higher output. Increased output, in turn, leads to an increase in revenue.

4.6 Short Run Coefficients

The short-term agricultural coefficient is -1.093211. This shows that a 1% increase in agriculture's share of GDP in a given quarter reduces Tax-To-GDP by 1.09% in the same quarter.

The model indicates that the short run coefficient of Industry is -0.958715, implying that an increase in the industry share to GDP by 1% negatively affects Tax-To-GDP growth by 0.96%. The results further indicate that a change in industry as share to GDP for the previous quarter has a 0.199% negative effect on Tax-To-GDP growth in the present quarter.

The short-term services' coefficient is -1.032904. This shows that an increase in services' share of GDP in a quarter reduces Tax-To-GDP by 1.03% in the same quarter. Furthermore, the results suggest that a 1% change in services as a share to GDP for the previous quarter has a 0.087% negative effect on Tax-To-GDP growth in the present quarter.

The model indicates that the short-term coefficients of exchange rate and Inflation have an insignificant effect on Tax-To-GDP growth in Uganda since their probabilities are 0.9907 and 0.1463 respectively and are insignificant at 5%. However, a change the exchange rate in the two previous quarters, has a 0.003% negative effect on Tax-To-GDP growth in the present quarter while a change by 1% in inflation in the two previous quarters negatively affects Tax-To-GDP growth by 0.310%.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This Chapter provides a summary of findings, conclusions and policy recommendations drawn from the data analysed and model estimated in chapter four. Limitations were identified and recommendations for further research presented. The study examined the determinants of Tax-To-GDP growth in Uganda. This chapter also presents research limitations and areas for further research.

5.1 Summary of Findings

The study examined the factors that determine the growth of Tax-To-GDP in Uganda, utilizing quarterly data spanning from 2008/2009 to 2022/2023. The predicted variable was Tax-To-GDP while the predictors were Agriculture's share of GDP (AGRIC), share of Industry to GDP (INDUS), share of Services to GDP (SERV), share of Trade Openness to GDP (TRADE), Exchange Rates (EXRATE) and Inflation (INF).

Descriptive statistics conducted included the Mean, Median, Standard deviation, Skewness, Kurtosis and Jarque-Bera), correlations and the ARDL model were estimated in this study. A Phillips-Perron stationary test was conducted to establish the order of integration for all the study variables. The output indicate that two variables (Exchange Rates and Inflation) were not stationary at I(0) but become stationary at I(1) at 5% while majority of the variables (Tax-To-GDP, Agriculture, Industry, Services and Trade Openness) are stationary at the I(0) level, suggesting that an ARDL model should be estimated to find the long-term and short-term effects of the explanatory variables on the dependent variable.

The findings demonstrate that in the long run, Agriculture, Industry and Services were found to negatively and significantly affect the growth of Tax-To-GDP with coefficients of -2.1317, -1.8005 and -1.9980 respectively. Trade Openness and Exchange Rate positively and significantly affect Tax-To-GDP growth with a coefficient of 0.0323 and 0.0015 respectively while Inflation exhibited an insignificant effect on Tax-To-GDP growth in Uganda.

The post estimation testing revealed that the model was well specified with the Ramsey RESET test exhibiting an insignificant t-statistic (0.8759) at 5%. For the residual diagnostic tests (Breush- Godfrey LM test, Breush-Pagan test and the Jarque –Bera normality test) statistics showed that the model had no serial correlation, the error term followed a constant variance, and the residuals followed a normal distribution. Both the cumulative sum test and the cumulative sum of squares test estimates do not move outside the 5% band of interest, indicating that the parameters are stable.

5.2 Conclusions

This study has examined the determinants of Tax-To-GDP growth in Uganda. Extensive literature review was carried out. The standard regression techniques were employed to examine the impact of the predictor variables on the outcome variable.

Whereas Uganda has recorded significant growth in Tax-To-GDP over the years, this study demonstrates that there continues to exist mismatch between the overall Tax-To-GDP growth and the different sectoral contributions to GDP. Agriculture, Industry and Services continue largely to hinder the growth of Tax-To-GDP. Therefore, there is need to improve the performance of these sectors so that benefits can be realized in terms of revenue mobilization. The study found that Trade Openness positively significantly affected Tax-To-GDP growth in Uganda. Furthermore, empirical results suggest that Exchange Rate positively affects Tax-To-GDP growth in Uganda.

5.3 Recommendations

Uganda has seen an improvement in Tax-To-GDP growth over the years, however, this has been low and surely the current Tax-To-GDP ratio (13.5%) as per the budget background 2023/24 is below the set targets (16-18%) in the DRMS.

Empirical findings of the study indicate that agriculture has a negative and significant effect on Tax-To-GDP growth. Government should consider linking agriculture to value addition through agro-processing and trade in manufactured products which will result in high income. Higher incomes will cause taxes to growth thus cause a growth of Tax-To-GDP. Additionally, this will contribute to the growth of the industrial sector, leading to a shift from less productive jobs in agriculture to more productive jobs in industry. A shift to more productive jobs will

lead to a wider tax base, as wages will, output and consumption rise and taxes are easier to collect.

Empirical evidence suggests that services sector has a negative and significant effect on Tax-To-GDP growth. The negative coefficient can be explained by the majority of the players operating informally making it difficult for tax administration. Therefore, the policy recommendation is that there is need to direct policy towards addressing the difficulty of taxing the sector with focus on strengthening tax administration capacity in Uganda.

Trade Openness has a positively and significant effect on Tax-To-GDP growth. The policy recommendation is to enhance trade openness. This can be achieved through further economic integration, more trade facilitation, removing trade barriers to ensure that there is increase in the volume of goods crossing borders.

5.4 Limitations

The study encountered a number of limitations. These included the following; limited data. The study intended to use annual data however, data were scanty for most of the years so as to be able to carry out an annual time series analysis. The study therefore, adopted to use quarterly data for analysis with the available data. Furthermore, there was limited time to undertake the study, however, the researcher worked extra hours to ensure that the set timeline is met.

5.5 Areas for further Study

The study sought to examine the determinants of Tax-To-GDP growth in Uganda. Further research can be conducted in the same area with particular focus of the role of ICT adoption on revenue mobilization while considering an annual analysis.

REFERENCES

- African Tax Administration Forum. (2022). The 2022 African Tax Outlook (ATO) report. Retrieved from: <https://events.ataftax.org/index.php?page=documents&folder=115>
- African Union Commission. (2022). Strengthening regional value chains in the African Continental Free Trade Area.
- Alabede, J. O. (2018). Economic freedom and tax revenue performance in sub-Saharan Africa. *Journal of Financial Reporting and Accounting*.
- Ali, A., & Audi, M. (2018). Macroeconomic environment and taxes revenues in Pakistan: an application of ARDL approach. *Bulletin of Business and Economics (BBE)*, 7(1), 30-39.
- Andersson, J., & Lazuka, V. (2019). Long-term drivers of taxation in francophone West Africa 1893–2010. *World Development*, 114, 294-313.
- Asghar, F., & Mehmood, B. (2017). Effects of trade liberalization on tax revenue in Pakistan. *Pakistan Economic and Social Review*, 55(1), 187-212.
- Ayenew, W. (2016). Determinants of tax revenue in Ethiopia (Johansen co-integration approach). *International Journal of Business, Economics and Management*, 3(6), 69-84.
- Bachmann, C., Kayongo, P. S., & Gebhardt, J. (2022). Uganda's Tax System: Key Challenges and Prospects for Improvement. *Intertax*, 50(5), 1.
- Ballard, C. L., Fullerton, D., Shoven, J. B., & Whalley, J. (1985). General Equilibrium Analysis of Tax Policies. In *A General Equilibrium Model for Tax Policy Evaluation* (pp. 6-24). University of Chicago Press.
- Bank of Uganda (2021). Accessed on 10th June 2023: <https://www.bou.or.ug/bou/faq/Related-faq/monetary-policy/index.html#:~:text=Effective%20July%202011%2C%20the%20Bank,diversification%20of%20the%20financial%20system.>

- Bano, S. S., Raashid, M., & Rasool, S. A. (2014). Estimation of Marshall Lerner Condition in the economy of Pakistan. *Stud*, 3(4).
- Banton, C., & Kenton, W. (2019). Trade Liberalization. *Investopedia*. diakses dari.
- Barro, R. J. (1990). Government spending in a simple model of endogeneous growth. *Journal of political economy*, 98(5, Part 2), S103-S125.
- Basirat, M., Aboodi, F., & Ahangari, A. (2014). Analyzing the effect of economic variables on total tax revenues in Iran. *Asian Economic and Financial Review*, 4(6), 755.
- Beqiraj, E., Fanti, L., & Zamparelli, L. (2019). Sectoral composition of output and the wage share: The role of the service sector. *Structural Change and Economic Dynamics*, 51, 1-10.
- BoU (2021). State-of -the economy report. Accessed (December 2022): <https://www.bou.or.ug/bou/bouwebsite/bouwebsitecontent/publications/QuartelyStateofEconomy/publications/Quarterly-Economic-Reports/2021/Jun/State-of-Economy-Report-June-2021.pdf>
- Breusch, T. S. (1978). Some aspects of statistical inference for econometrics. The Australian National University (Australia).
- Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. *Econometrica: Journal of the econometric society*, 1287-1294.
- Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, 37(2), 149-163.
- Caspari, V. (2016). Abba Ptachya Lerner (1903–1982). In *Handbook on the History of Economic Analysis Volume I*. Edward Elgar Publishing.
- Chaudhry, I. S., & Munir, F. (2010). Determinants of Low Tax Revenue in Pakistan. *Pakistan Journal of Social Sciences (PJSS)*, 30(2).

- Chaudhry, I. S., & Munir, F. (2010). Determinants of Low Tax Revenue in Pakistan. *Pakistan Journal of Social Sciences (PJSS)*, 30(2).
- Cobb, C. W., & Douglas, P. H. (1928). A theory of production.
- Creedy, J. (2017). The Optimal Threshold for GST on Imported Goods. *Australian Economic Review*, 50(2), 169-180.
- Dom, R., & Miller, M. (2018). Reforming tax systems in the developing world. Retrieved, 16, 2019.
- Engle, R F. and Granger, C. W. J. (1987). Co-integration and Error Correction: Representation, Estimation and Testing', *Econometrica*, Vol. 55, pp. 251-76.
- Epaphra, M., & Kaaya, L. E. (2020). Tax Revenue Effect of Sectoral Growth and Public Expenditure in Tanzania: An application of Autoregressive Distributed Lag Model. *Journal of Quantitative Finance and Economics*, 2, 2.
- Eurostat (2022). "Tax revenue statistics." Accessed December 6, 2022: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Tax_revenue_statistics&oldid=460966
- Evnevich, M. A., & Ivanova, D. V. (2020). Research on tax administration reforms in the Russian practice. *Digest Finance*, 25(2 (254)), 157-169.
- Feger, T. D. (2014). An analysis of the tax revenue components in sub-Saharan Africa. *The Journal of Developing Areas*, 363-379.
- Gaalya, M. S. (2015). Trade liberalization and tax revenue performance in Uganda. *Modern Economy*, 6(02), 228.
- Gaspar, V., Jaramillo, L., & Wingender, M. P. (2016). Tax capacity and growth: Is there a tipping point?. International Monetary Fund.
- Gnangnon, S. K. (2019). Tax Reform and Trade Openness in Developing Countries. *Journal of Economic Integration*, 34(3), 498-519.

- Gobachew, N., Debela, K. L., & Shibiru, W. (2018). Determinants of tax revenue in Ethiopia. *Economics*, 6(6), 58.
- Godfrey, L. G. (1978). Testing for multiplicative heteroskedasticity. *Journal of econometrics*, 8(2), 227-236.
- Gourinchas, P. O. (2022). Global economic growth slows amid gloomy and more uncertain outlook. *Blogpost, International Monetary Fund*, 26.
- Hakim, T. A., & Bujang, I. (2012). The impact and consequences of tax revenues' components on economic indicators: Evidence from panel groups data. *International Trade from Economic and Policy Perspective*, 63, 82-95.
- I Ihuarulam, G., Sanusi, G. P., & Oderinde, L. O. (2021). Macroeconomic Determinants of Tax Revenue in Economic Community of West African States. *The European Journal of Applied Economics*, 18(2), 62-75.
- International Monetary Fund. 2022. World Economic Outlook: Countering the Cost-of-Living Crisis. Washington, DC. October.
- Jaramillo, L., Wingender, M. P., & Gaspar, V. (2016). *Political Institutions, State Building, and Tax Capacity: Crossing the Tipping Point* (No. 2016/233). International Monetary Fund.
- Jaramillo, L., Wingender, M. P., & Gaspar, V. (2016). *Political Institutions, State Building, and Tax Capacity: Crossing the Tipping Point* (No. 2016/233). International Monetary Fund.
- Jarque, C. M., & Bera, A. K. (1987). A test for normality of observations and regression residuals. *International Statistical Review/Revue Internationale de Statistique*, 163-172.
- Jebb, A. T., Tay, L., Wang, W., & Huang, Q. (2015). Time series analysis for psychological research: examining and forecasting change. *Frontiers in psychology*, 6, 727.

- Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica: journal of the Econometric Society*, 1551-1580.
- Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with applications to the demand for money. *Oxford Bulletin of Economics and statistics*, 52(2), 169-210.
- Kalogiannidis, S. (2021). Role of Revenue Mobilisation in the Growth and Development of Economy: A Case Analysis of Greece. *Research in World Economy*, 12(2), 63-76.
- Karagöz, K. (2013). Determinants of tax revenue: does sectorial composition matter?. *Journal of Finance, Accounting & Management*, 4(2).
- Kasirye, I. (2015). Taxation for investment in the Uganda Agricultural Sector.
- Kayongo, P. S., & Bachmann, C. (2022). Uganda's Tax System: Key Challenges and Prospects for Improvement. *Intertax*, 50(5).
- Keynes, J. M. (1924). Alfred Marshall, 1842–1924. *The Economic Journal*, 34(135), 311-372.
- Khan, W., Jamshed, M., & Fatima, S. (2020). Contribution of agriculture in economic growth: A case study of West Bengal (India). *Journal of Public Affairs*, 20(2), e2031.
- Kitessa, D. T., & Jewaria, T. (2018). Determinants of tax revenue in East African countries: An application of multivariate panel data cointegration analysis. *Journal of Economics and International Finance*, 10(11), 134-155.
- Kitessa, D. T., & Jewaria, T. (2018). Determinants of tax revenue in East African countries: An application of multivariate panel data cointegration analysis. *Journal of Economics and International Finance*, 10(11), 134-155.
- Kwagala-Igaga, D. (2016). Tax Reform in Uganda: a case study of the reform of direct taxation of business profits in the formal and informal sector. Cambridge Scholars Publishing.
- Kwesi Ofori, I., Obeng, C. K., & Armah, M. K. (2018). Exchange rate volatility and tax revenue: Evidence from Ghana. *Cogent Economics & Finance*, 6(1), 1537822.

- Laffer, A. B. (1981). Supply-side economics. *Financial Analysts Journal*, 37(5), 29-43.
- Mawejje, J., & Francis Munyambonera, E. (2016). Tax revenue effects of sectoral growth and public expenditure in Uganda. *South African Journal of Economics*, 84(4), 538-554.
- Mawejje, J., & Odhiambo, N. M. (2021). Uganda's fiscal policy reforms: What have we learned?. *Public Budgeting & Finance*, 41(2), 89-107.
- Meidinger, E. E. (1980). *Applied time series analysis for the social sciences*. Sage Publications.
- Mills, L. (2017). Barriers to increasing tax revenue in developing countries.
- Ministry of Finance, Planning and Economic Development (2022). FY 2022-23 Budget Speech. Retrieved from: <https://budget.finance.go.ug/sites/default/files/National%20Budget%20docs/FY%202022-23%20Budget%20Speech.pdf>
- Ministry of Finance, Planning and Economic Development (2022): Accessed on 10th December 2022: https://www.finance.go.ug/sites/default/files/Publications/NEW%20DOMESTIC%20REVENUE%20MOBILISATION%20STRATEGY_FEB%202020_0.pdf
- Ministry of Finance, Planning and Economic Development (2023). The National Budget Framework Paper FY 2023/24 – FY 2027/28. Retrieved from: <https://budget.finance.go.ug/library/671>
- Ministry of Finance, Planning and Economic Development (2023). Accessed on 10th June 2023: <https://www.finance.go.ug/publication/assessment-informal-business-uganda>
- Mirrlees, J. A. (1971). An exploration in the theory of optimum income taxation. *The review of economic studies*, 38(2), 175-208.
- Moore, M. (2020). What is wrong with African tax administration?
- Moore, M., Prichard, W., & Fjeldstad, O. H. (2018). *Taxing Africa: coercion, reform and development* (p. 288). Bloomsbury Academic.

- Mugabi, D. (2022). *Factors affecting revenue performance in Uganda: evidence from Uganda Revenue Authority* (Doctoral dissertation, Makerere University).
- Nnadozie, E., Munthali, T., Nantchouang, R., & Diawara, B. (2017). Domestic resource mobilization in Africa: state, capacity imperatives and policy actions. *Africa Journal of Management*, 3(2), 184-212.
- OECD. (2020). *Revenue Statistics in Asian and Pacific Economies 2020*. OECD.
- OECD/ATAF/AUC (2022), *Revenue Statistics in Africa 2022*, OECD Publishing, Paris, <https://doi.org/10.1787/ea66fbde-en-fr>.
- Oguttu, A. W. (2021). Tax reforms for Africa to achieve the UN sustainable development goals in the post-COVID-19 economic fallout.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (1996). *Testing for the 'Existence of a Long-run Relationship'* (No. 9622). Faculty of Economics, University of Cambridge.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, 16(3), 289-326.
- Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *biometrika*, 75(2), 335-346.
- Rafael, B. M. (2023). The importance of agricultural development projects: a focus on sustenance and employment creation in Kenya, Malawi, Namibia, Rwanda, and Uganda. *Journal of Agricultural Chemistry and Environment*, 12(2), 152-170.
- RAHIM, F. U., & Asma, M. (2019). HETEROGENEOUS EFFECTS OF SECTORAL GROWTH ON TAX YIELDS IN DEVELOPING ECONOMIES. *Pakistan Economic and Social Review*, 57(2), 199.
- Ramsey, J. B. (1969). Tests for specification errors in classical linear least-squares regression analysis. *Journal of the Royal Statistical Society: Series B (Methodological)*, 31(2), 350-371.

- Saptono, P. B., & Mahmud, G. (2021). Macroeconomic Determinants of Tax Revenue and Tax Effort in Southeast Asian Countries. *JDE (Journal of Developing Economies)*, 6(2), 253-275.
- Sebudde, R. K., Kajubi, M. M., Stucka, T., Mawejje, J., & Walker, R. A. (2017). Uganda economic update: Financing growth and development: options for raising more domestic revenues.
- Shahid, M. S., Shehryar, H., & Allibhoy, M. A. (2016). Levels of informality and characteristics of micro-entrepreneurs in Pakistan. In *Routledge Handbook of Entrepreneurship in Developing Economies* (pp. 394-411). Routledge.
- Tsaurai, K. (2021). Determinants of tax revenue in upper middle-income group of countries. *The Journal of Accounting and Management*, 11(2).
- Uganda Bureau of Statistics (2023). *Quarterly Gross Domestic Product, 1st Quarter 2023/2024*. Retrieved from: <https://www.ubos.org/wp-content/uploads/publications/QGDP-Press-Release-Q1-2023-24.pdf>
- Uganda Revenue Authority (2023). Accessed on 2nd July 2023: <https://www.ura.go.ug/>
- Verberne, J., & Arendsen, R. (2019). Taxation and The Informal Business Sector in Uganda: An Exploratory Socio-Legal Study.
- Verberne, J., & Arendsen, R. (2019). Taxation and The Informal Business Sector in Uganda: An Exploratory Socio-Legal Study.
- Walker, W. (2007). Ethical considerations in phenomenological research. *Nurse researcher*, 14(3).
- White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica: journal of the Econometric Society*, 817-838.
- World Bank (2018). Accessed on 2nd July 2023: <https://www.worldbank.org/en/country/uganda/publication/increasing-tax-flow-key-to-financing-ugandas-growth-development>

World Bank (2018). Financing growth and development. *Uganda Economic Update, 11th Edition*. Accessed (February 2023): <https://documents1.worldbank.org/curated/en/425631526323380885/pdf/126184-WP-PUBLIC-FinalReportUgandaEconomicUpdate.pdf>

World Bank (2022). "Getting to 15 percent: addressing the largest tax gaps." Accessed December 6, 2022: <https://blogs.worldbank.org/governance/getting-15-percent-addressing-largest-tax-gaps>

World Bank. (2020). *Uganda Economic Update, December 2020: Investing in Uganda's Youth*. World Bank.

World Trade Organization (2023): https://www.wto.org/english/tratop_e/tpr_e/tp012_e.htm

APPENDICES

Appendix I: Top 20 Models: Akaike Information Criteria (AIC)

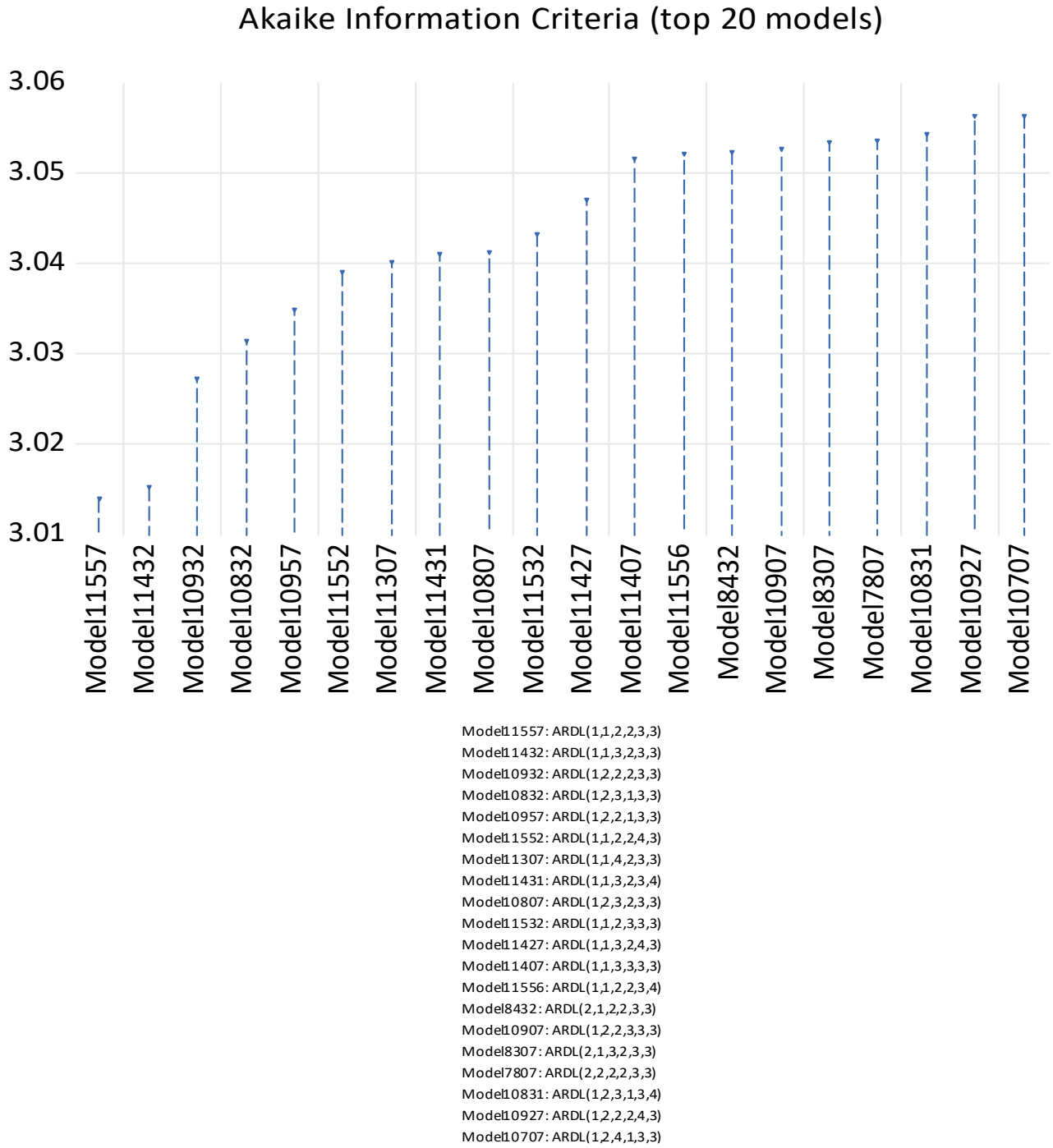


Fig A. 1: Top 20 Models; Akaike Information Criteria (AIC)

Source: *Own computation*

Appendix II: Cumulative Sum and Cumulative Sum of Squares Figures

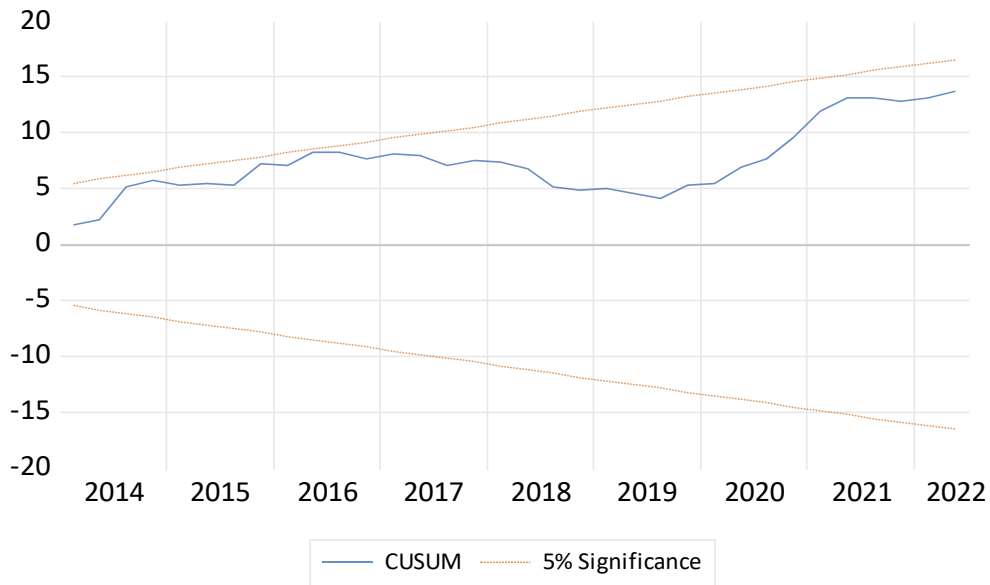


Fig A. 2: Cumulative Sum

Source: *Own Computation*

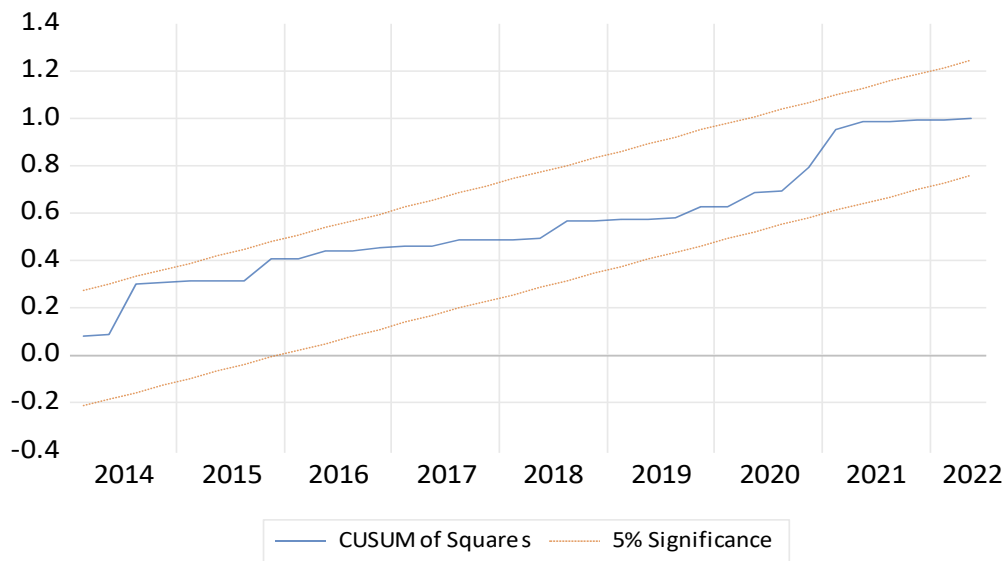


Fig A. 3: Cumulative Sum of Squares

Source: *Own Computation*