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جامعة بجاية
Tasdawit n Bgayet
Université de Béjaïa

Faculty of Economic Sciences, Commercial and Management Sciences

Department of Economic Sciences

DISSERTATION

For the award of a Master's Degree in

Economic Sciences

Option: QUANTITATIVE ECONOMICS

THEME

THE IMPACT OF PUBLIC EXPENDITURE ON ECONOMIC GROWTH IN UGANDA FOR THE PERIOD OF 1990 – 2021

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Presentation Date: 20/06/2023

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Academic Year :

2022/2023

Dedications

This dissertation is dedicated to everyone who ever showed me kindness and believed in me, especially my Mother Amunyo Tesira and all my siblings especially to my brother Asonya Stephen Collins who had a very unique contribution towards my studies. It is also dedicated to those who have walked with me along this journey in both the highs and the lows. Finally, it is dedicated to those who are yet to discover the power of their own potential. May this dissertation be a small reminder of the strength within.

ACKNOWLEDGEMENT

First and foremost, I thank the Almighty God for the gift of life and unending blessings He has bestowed upon me and for enabling me to successfully complete this research, am forever grateful.

I am deeply indebted to my supervisor Prof. Khelifa Mazouz for his immeasurable commitment of providing professional guidance, stimulating suggestions and useful advice that facilitated the completion of the research report.

Furthermore, I would like to thank my family for their endless love and support throughout my journey and for believing in me and for providing me with the tools to achieve success most especially my mother Amunyo Tesira and my siblings; Mr. Asonya Stephen Collins, Mr. Akol Daniel Ross, Mr. Obeke Nathan and Miss. Apio Esther Barbrah who encouraged me to pursue my master's degree.

I would also like to thank my teachers and mentors for guiding me and for always pushing me to be the best version of myself. Your help and guidance have been invaluable in helping me to complete this project. Your knowledge, expertise and support have been invaluable in ensuring the success of this project.

I would like to thank my colleagues and course mates for their understanding and companionship during my journey am forever grateful and indebted to you; Ainseri Abdenour, Fassa Binafou, Abdoulaye Innousa Mahamadou, Bocar Youssouf, Ouaret Loula, Nizeye Brian, Nakandha Patricia Grace, Joomu Kenneth, Outa Paul, Ochieng Derrick, Sangaré Damini and Kaguggube Robert. Your support and encouragement will always be remembered.

Finally, Special thanks to me for doing all this hard work, I would like to thank me for believing in me, I would like to thank me for not giving up on me, I would like to thank me for trying to do more right than wrong, I would like to thank me for never quitting, I would like to thank me for being me at all times and I would like to thank me for being there for me in all situations.

I am truly grateful for everyone who has supported me in my endeavours and I will continue to strive for excellence.

ABSTRACT

This study investigates the impact of public expenditure on economic growth in Uganda using time series data for the period 1990-2021. The study employs the Autoregressive Distributed Lag (ARDL) model. We are particularly interested to the extent at which the government expenditure affects economic growth. We use the Augmented Dickey Fuller (ADF) unit root test and the co-integration analysis. We also employ the Autoregressive Distributed Lag model (ARDL) with error correction term to further examine the short- and long-run relationships. The ARDL bounds test shows the presence of long-run cointegration relationship between the variables. The key findings of the study are that public expenditure on gross capital formation, labour force and military expenditure have a negative and significant impact on economic growth in the long run while public expenditure on exports of goods and services and on imports of goods and services have a positive and significant impact on economic growth in the long run. Further in the short-run, only military expenditure can explain economic growth in Uganda and it has a positive and significant impact on economic growth. The study recommends that the government should focus on meaningful projects that have a direct bearing on the citizens' welfare. The government should also increase the spending patterns through careful reallocation of resources towards productive activities that would enhance human development in the country.

Key Words: Economic Growth, Autoregressive Distributed Lags (ARDL), Public Expenditure and Uganda.

Résumé

Cette étude examine l'impact des dépenses publiques sur la croissance économique en Ouganda en utilisant des données de séries chronologiques pour la période 1990-2021. L'étude utilise le modèle Autoregressive Distributed Lag (ARDL). Nous nous intéressons particulièrement à la mesure dans laquelle les dépenses publiques affectent la croissance économique estimée à l'aide de la formation brute de capital, de la population active totale, des dépenses militaires, des exportations de biens et services et des importations de biens et services. L'étude utilise le test de racine unitaire de Augmented Dickey Fuller (ADF) et l'analyse de cointégration. La relation à court terme et à long terme a également été examinée à l'aide du modèle de Autoregressive Distributed Lag (ARDL) avec terme de correction d'erreur. Le test des limites ARDL montre qu'il existe une relation de cointégration à long terme entre les variables. Les principales conclusions de l'étude sont que les dépenses publiques sur la formation brute de capital, la main-d'œuvre et les dépenses militaires ont un impact négatif et significatif sur la croissance économique à long terme, tandis que les dépenses publiques sur les exportations de biens et services et les importations de biens et services ont un impact positif et significatif sur la croissance économique. De plus, à court terme, seules les dépenses militaires peuvent expliquer la croissance économique en Ouganda et elles ont un impact positif et significatif sur la croissance économique. L'étude recommande que le gouvernement se concentre sur des projets significatifs qui ont une incidence directe sur le bien-être des citoyens. Le gouvernement devrait également augmenter les habitudes de dépenses grâce à une réaffectation prudente des ressources vers des activités productives qui amélioreraient le développement humain dans le pays.

Mots clés : croissance économique, Autoregressive Distributed Lag (ARDL), dépenses publiques et Ouganda

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LISTE OF ABBREVIATIONS

ADF:	Augmented Dickey Fuller
AIC:	Akaike information criterion.
ARDL:	Autoregressive Distributed Lag
CUSUM:	Cumulative sum of the recursive residuals
CUSUMQ:	Cumulative sum of squared recursive residuals
D-W:	Durbin- Watson
EAC:	East African Community
ECM:	Error-Correction Model
ECT:	Error correcting term
EXPO:	Exports of goods and services
FDI:	Foreign Direct Investment
FY:	Financial Year
GCF:	Gross Capital Formation
GDP:	Goss Domestic Product
GDPG:	Gross Domestic Product Growth
GFCF:	Gross Fixed Capital Formation
GNP:	Gross National Product
IMF:	International Monetary Fund
IMP:	Imports of goods and services
JB:	Jarque-Bera
K:	Capital factor of production
L:	Labour factor of production
LABF:	Labour Force
LCU:	Local Currency Unit
LM:	Lagrange Multiplier
LOG:	Logarithm
LOGEXPO:	Logarithm of Exports of goods and services
LOGGCF:	Logarithm of Gross Capital Formation
LOGGDPG:	Logarithm of Gross Domestic Product Growth
LOGIMP:	Logarithm of Imports of goods and services
LOGLABF:	Logarithm of Labour Force
LOGMILEX:	Logarithm of Military Expenditure
MILEX:	Military Expenditure

OLS:	Ordinary Least Square
P-P:	Phillips-Perron
R&D:	Research and development
RESET:	Regression Equation Specification Error Test
SBIC:	Schwarz Bayesian Information Criterion
SC:	Schwarz criterion
SIC:	Schwarz Information Criterion
T-stat:	T- statistic
US:	United States
USD:	United States Dollar
VIF:	Variance Inflation Factor
WDI:	World Development Indicator

Chapter One: Introduction

CHAPTER ONE
INTRODUCTION

This chapter introduces our work by first providing the background of the study, then the macro-economic evolution of Uganda, and the public expenditure patterns in Uganda; it also compares the public expenditure patterns in Uganda with those of the other East African countries; Subsequently, it outlines the statement of the problem and the purpose, significance as well as scope of the study.

1.1. Background

The size of government expenditure and its impact on economic growth has been a matter of ongoing interest for a number of years. The most centrally debated question is whether or not public expenditure stimulates economic growth. Over the past five years, Uganda's GDP growth rate has been averaged 4.80% which is lower than its counterparts in the East African Community.

"Uganda's GDP growth rate for 2021 was 3.54%, a 0.59% increase from 2020. In 2020, Uganda's GDP growth rate was 2.95%, a 3.49% decline from 2019. In 2019, Uganda's GDP growth rate was 6.44%, a 0.13% increase from 2018. In 2018, Uganda's GDP growth rate was 6.30%, a 3.17% increase from 2017"[1].

Public expenditure is an important tool of economic policy used by the governments to promote sustainable growth. It is for the objective of enhancing economic growth through expansion of the budget in order to boost the expenditure by the private sector; in the long run, this will bring in economic growth through the multiplier effect. It englobes all goods and services that are produced in the country that is to say the whole country's entire economic output either sold domestically or overseas. Public expenditure is two-way aspect, while it could result into a higher GDP, the general economic development might be restricted by substitution effects. That is to say, when the public expenditure increases at the expense of higher taxes or borrowings then it affects the consumers' income and then lowering the consumption of the public.

Over the past decade, Ugandan public expenditure has seen a substantial increase for example government expenditure rose from 4.3 trillion Ugandan shillings in the FY 2007/2008 to 16.7 trillion Ugandan shillings in the FY 2016/2017, a 288% increase. The average annual growth rate of government expenditure was 15.8%. Noteworthy is the rise in

[1] https://www.macrotrends.net/countries/UGA/uganda/gdp-growth-rate Retrieved on 2023-03-31

both operating and capital expenses, with recurring expenditures rising 243% from 2.9 trillion Ugandan shillings to 9.96 trillion Ugandan shillings and capital expenditure increasing 379%, from 1.4 trillion Ugandan shillings to 6.7 trillion Ugandan shillings. In terms of annual growth rates, recurrent expenditure averaged 15.8% while capital expenditure is averaged at 16.7%. Government expenditure is projected to amount to 37.47 trillion Ugandan shillings (excluding debt refinancing) in the FY 2022/2023, an increase of 7% compared to that of the FY 2021/2022. Uganda's economic growth had been steadily increasing with an average of 7.6% from FY 2007/2008 to FY 2010/2011. However, this growth rate has since decreased to 4.4% from the period of FY 2011/2012 to 2016/2017. The outbreak of Covid-19 has further weakened Uganda's economic performance, decreasing the growth rate from 3.3% in the FY 2019/2020 to 3.1% in the FY 2020/2021.

1.2. Macro-Economic evolution of Uganda

Uganda is a country located in East Africa with a population of about 47.91 million people and a land area of about 200520 square kilometres. Its economy has been characterized by an evolution from subsistence agriculture to a more market-based economy. The macroeconomic evolution of Uganda can be broken down into three stages.

The first phase began in the 1960s and lasted until the mid-1980s. During this period, the government implemented an inward-looking import substitution policy, which saw the government actively intervene in the economy. This resulted into large fiscal deficits and an increase in debt. Despite this, some sectors, such as manufacturing and export-oriented agriculture, grew significantly. In the 1960s, Uganda was characterized by a period of rapid economic growth. During this time, the Ugandan economy grew by an average of 6.5 percent annually. This rapid growth was largely due to the country's favourable climate, as well as the government's investment in infrastructure and agricultural production. During this period, the government also promoted the development of manufacturing industry, leading to the emergence of a number of new private enterprises.

The late 1970s, saw the country's economic growth slow down significantly. This was due to several factors, including the effects of a severe drought, the collapse of the copper industry in neighbouring Zaire, and the rise of political instability in the country. In addition, the World Bank and International Monetary Fund (IMF) imposed a number of austerity measures on the country in an effort to reduce its debt burden. As a result, the country's economy experienced a period of stagnation, with growth rates dropping to below 1 percent. The mid-1980s, saw the economy start to recover. This recovery was led by a number of initiatives, including the

introduction of a liberalized foreign exchange market which allowed increased access to foreign exchange and the privatization of state-run enterprises.

The second phase was marked by a shift to a more market-oriented economy. In the 1980s, the economy was in a recession due to years of armed conflict and political instability. The government was heavily dependent on foreign aid and debt relief, leading to a high level of external debt and low economic growth. In the early 1990s, the economy began to improve as the conflict ended and the government implemented economic reforms, such as liberalizing trade and agricultural markets and investing in infrastructure. In the mid-1990s, the government implemented series of reforms such as liberalizing trade policies, reducing the size of the public sector and introducing privatization. These reforms resulted in increased foreign investment and economic growth. By the late 1990s, the economy began to experience rapid growth with GDP increasing by an average of 7.2% annually between 1998 and 2003. Inflation declined to around 8%, and poverty decreased as well. In the early 2000s, the economy continued to grow and became more diversified with the services sector accounting for a larger proportion of GDP. The government also increased investment in agriculture and infrastructure leading to further increase in GDP growth[2]. Despite the progress, the economy faced challenges in the early 2000s, such as a high level of external debt and increased military spending. This led to a period of economic stagnation and high unemployment in the late 2000s.

The third phase has seen the government adopt a more pro-business stance. In the early 2000s, Uganda had a low GDP per capita and high levels of poverty. Since then, the country has seen a large increase in economic growth and poverty alleviation. GDP per capita has grown steadily since the early 2000s from about $300 USD in 2000 to about $1,200 USD in 2020. This growth has been largely driven by increased investment and government spending, particularly in infrastructure and energy projects. The government has also implemented a number of reforms to increase foreign investment including free trade zones and reduced taxes.

Inflation has also been under control in recent years with the average rate hovering around 5%. This has allowed the currency to remain relatively stable, helping to encourage foreign investment. The population has also grown significantly since 2000 with the total population now estimated at around 47.91 million. This has been largely driven by improved healthcare and living standards as well as increased birth rates. Uganda has seen great improvements in

[2] Kakeeto J. & Kalyango J. (2016), "UGANDA: Mapping economic reforms and macroeconomic performance", 1986–2016, *African Development Review*, Vol. 28(1), pp. 69-86.

its macroeconomic situation since the 2000s. GDP per capita and inflation have been growing steadily while government reforms and increased investment have helped to spur economic growth. Additionally, increased healthcare and living standards have helped to improve the quality of life for many Ugandans. In the 2000s, the government implemented policies to attract foreign direct investment and encourage private sector growth. The government has also been focusing on improving the country's infrastructure and providing better access to finance. These reforms have resulted into improved economic growth and greater stability.

More recently, Uganda has taken steps to improve the investment climate including reforms to simplify the business registration process, reduce bureaucracy, and improve access to finance. These measures have contributed to increased foreign direct investment and higher growth rates which have averaged between 6-7% in recent years. Macroeconomic conditions in Uganda have improved significantly since 2010. The economy has grown steadily, with the gross domestic product (GDP) increasing from around US$19 billion in 2010 to US$48 billion in 2023. This is mainly attributed to strong growth in the services and construction sectors, which have grown at an average rate of around 8.5% every year. Inflation has been kept at manageable levels due to prudent macroeconomic policies and prudent management of foreign exchange reserves. The inflation rate has hovered around 3.5-4.5% since 2010.

The Ugandan shilling has been relatively stable against the US dollar, Euro and pound sterling since 2010. As a result, Uganda has been able to attract foreign direct investment (FDI) which has helped the country diversify its economy. FDI inflows have increased from US$622 million in 2010 to US$2.2 billion in 2023. In addition, Uganda has made progress in expanding access to basic services, such as energy, water, and sanitation. This has resulted in higher living standards, as measured by improved indicators of health, education, and poverty. Overall, Uganda's macroeconomic performance has been positive in recent years and the government is committed to continuing with the reforms that have contributed to this success. The Ugandan government has also implemented a number of structural reforms to improve the business climate and promote economic growth. These reforms have included improving tax systems and regulations, strengthening the financial sector and improving infrastructure. As a result, Uganda has been able to improve its doing business ranking from 166 in 2010 to 131 in 2023.

1.3. Public expenditure patterns in Uganda

Public expenditure patterns in Uganda are characterized by a high reliance on external aid, especially foreign aid. This is especially true in the education sector, where foreign aid makes up a significant portion of the total budget. In 2018/2019, external aid accounted for nearly 40% of total education expenditure. However, this level of external aid has been declining over the past decade with the government of Uganda increasing domestic spending to make up the difference. In 2018/2019, domestic spending on education accounted for over 50% of total education expenditure compared to around 36% in 2009/2010. The government of Uganda has also been focusing its efforts on reducing the inequalities in the education system especially in terms of access to education among the rural and urban areas[3]. To this end, the government has increased its spending on basic education, especially primary and secondary education. In 2018/2019, basic education accounted for over 60% of total education expenditure, up from around 44% in 2009/2010. The government has also increased its spending on tertiary education, which accounted for around 16% of total education expenditure in 2018/2019, up from around 11% in 2009/2010. This has helped to increase access to higher education among the poorest and most vulnerable members of society.

Overall, the government of Uganda has been focusing its efforts on reducing inequalities in the education system by increasing its domestic spending and redistributing it in a more equitable manner. Public expenditure patterns in Uganda are shaped by the government's policy agenda, which focuses on reducing poverty and increasing economic growth. Uganda's public expenditure is heavily skewed towards social sectors, such as health and education, with the public sector accounting for around 45 percent of total health expenditure and nearly 25 percent of total education expenditure. In addition, the government invests heavily in infrastructure and energy, with the public sector accounting for almost 70 percent of total infrastructure expenditure. Examples of public expenditure in Uganda include the construction of roads, bridges, and other transportation infrastructure, as well as investments in renewable energy sources such as solar, wind, and geothermal. The government also allocates funds for agricultural development and water projects, such as irrigation and dam construction. Lastly, the government spends on defence, public safety, and other government services.

[3] Lambert P. (2019), “Public Expenditure Patterns in Uganda: From Foreign Aid to Domestic Spending”, *Global Policy*, Vol. 10(3), pp. 364-376.

1.4. Public expenditure patterns in Uganda vs. other East African countries

Uganda has the highest public expenditure among the countries of the East African Community (EAC). This is due to its relatively high population size and economic growth. In 2017, Uganda's public expenditure accounted for around a quarter of the EAC's total public expenditure. Comparatively, Tanzania had the second highest expenditure at 18.2% followed by Kenya at 16.4%. Rwanda and Burundi had the lowest public expenditure accounting for only around 11% each. Within the EAC, Uganda has the largest share of public expenditure devoted to health at 21.7%. This is followed by Kenya at 19.3%, Tanzania at 18.7%, Rwanda at 12.9%, and Burundi at 10.1%. Uganda's share of public expenditure devoted to education is also relatively large at 21%, followed by Tanzania at 17.8%, Kenya at 16.2%, Rwanda at 11.8%, and Burundi at 8.7%[4]. In 2017, Uganda's share of total EAC public expenditure devoted to infrastructure and capital investments was 11.6%, while Tanzania and Kenya had a share of 8.3% and 8.2% respectively. Rwanda and Burundi had the lowest share of total public expenditure devoted to infrastructure and capital investments, at only around 6 percent.

In Uganda, the largest public expenditure items are public sector wages and salaries, goods and services, and external financing. These categories make up over 50 percent of total public spending. In other East African countries, these categories also make up the majority of public spending. A comparison of public expenditure patterns among East African countries will show some similarities and differences.

For example, in the region, Uganda dedicates the highest share of its total public expenditure to general public services, such as the military, public administration, and public order and safety. This is followed by Rwanda, Kenya and Tanzania. However, Uganda spends the least amount of its public expenditure on economic affairs, such as infrastructure, transport, and energy, relative to other East African countries. In contrast, Rwanda has the highest share of public spending on economic affairs. This is followed by Kenya, Tanzania and Uganda. Rwanda also spends the most on social protection, such as health and education, followed by Kenya, Tanzania, and Uganda.

Overall, East African countries tend to prioritize social spending such as health and education, and economic spending such as infrastructure, transport, and energy. Moreover, Uganda has the highest share of public expenditure dedicated to general public services such as the military, public administration, and public order and safety relative to the other countries in the region. In Kenya, public sector wages and salaries make up 22.5 percent of

[4] African Statistical yearbook (2017); *Economic Commission for Africa, African Development Bank Group, African Union Commission.*

total public expenditure while goods and services and external financing make up 11.8 percent and 18.9 percent respectively. In Uganda, public sector wages and salaries make up 24.2 percent of total public expenditure while goods and services and external financing make up 18.7 percent and 11.4 percent respectively. As for other expenditure items, Uganda spends more on health and education than other East African countries. Education expenditure makes up 8.8 percent of total public expenditure in Uganda, while health expenditure makes up 5.8 percent. In comparison, Kenya spends 6.1 percent on education and 2.4 percent on health.

1.5. Statement of the problem and questions of research

The research aims to explore the effect of public expenditure on economic activity, the relationship between public expenditure and economic performance and the potential policy implications for Uganda's economic growth. In general, increase in government expenditure has been associated with increase in economic growth. This is due to the fact that government expenditure provides a stimulus to the economy and helps to create jobs and economic activity. Additionally, government expenditure can be used to invest in infrastructure, which can have a long-term positive effect on economic growth. Although public expenditure has increased in Uganda over the years, the GDP growth has declined and is volatile averaging around 4.8%, which is far below other countries in the East African Community like Tanzania, Kenya, Rwanda, Burundi. For example, in the period between the fiscal years 2002/2003 and 2010/2011, the average growth rate of the government expenditure was 15.9% while the average GDP growth rate was 7.7%, for the period between 2011/2012 and 2016/2017, the average growth rate of government expenditure was 11.9% while the GDP growth rate was 4.4%. This literally means that the growth in the government expenditure does not implicate an increase in the GDP growth rate. This therefore calls for a need to study and analyse the impact of government expenditure on Economic growth in Uganda.

This research will therefore answer the following question;

1. What is the short- and long-run impact of public expenditure on economic growth in Uganda?

1.6. Purpose of the study

1.6.1. Objectives of the study

- To analyse and assess the impact of government expenditure on economic growth in Uganda.

1.6.2. Study Hypothesis

- Government expenditure on Imports of goods and services and Exports of goods and services has a positive impact on economic growth in Uganda.
- Government expenditure on gross capital formation, labour force and military expenditure has a negative impact on economic growth in Uganda.

1.7. Significance and Contribution of the Study

The study is crucial because it seeks to examine the relationship between government expenditure and economic growth in Uganda which is a developing country given its rising public expenditure over years. The direct relationship between public expenditure and economic growth is unclear, making it more necessary to conduct more comprehensive empirical research. Moreover, it is important to evaluate the impact of the composition of budgetary expenditure on economic growth, since different combinations of expenditure may affect the economy in different ways. The study will aid the government in determining which policies and components of expenditure should be increased to optimize economic growth in Uganda. It is important to understand the relationship between public expenditure and economic growth in order to better advice on public policy decisions. This knowledge can help inform policy makers on how best to use public funds to stimulate economic growth and reduce inequality in Uganda. A better understanding of the impact of public expenditure on economic growth can also help identify the best ways to increase economic opportunities, reduce poverty and improve the quality of life of the people of Uganda.

In this context, this study is aimed at analysing the relationship between government expenditure and economic growth.

1.8. Scope of the study

The study will analyse the influence of government expenditure on economic development. It will utilize secondary time series data from World Bank on Uganda over a 32-year period, from 1990-2021.

1.9. Structure of the study

This study consists of 5 chapters; the first chapter is the introductory chapter consisting of the background, macro-economic evolution of Uganda, public expenditure patterns in Uganda, comparison between public expenditure patterns in Uganda with other East African countries, statement of the problem and the research questions, the purpose of the study, the

significance and the contribution of the study, the scope of the study. The second chapter reviews the existing theoretical and empirical evidence regarding the connection between public expenditure and economic growth. The third chapter outlines the theoretical model and data analysis methodology adopted. The fourth chapter looks at the data analysis, followed by a discussion and interpretation of the results of the study. Finally, the fifth chapter summarizes the study, presents the conclusions, proposes policy recommendations and suggests areas for further research.

Chapter Two: Literature Review

CHAPTER TWO
LITERATURE REVIEW

2. Introduction

This chapter reviews the literature that has been done on economic growth and public expenditure. The first section reviews theoretical literature which looks at the definition of economic growth, different types of economic growth, determinants of economic growth, measurement of economic growth, the economic growth cycle, the theories of economic growth and then the definition of public expenditure, the functions of public expenditure, the different classes of public expenditure, theories of public expenditure and the relationship between public expenditure and economic growth in Uganda while the second section reviews empirical literature on economic growth and public expenditure.

2.1. Economic Growth

Economic growth is the increase in a country's production of goods and services which typically happens over a period of time. It is measured by various measures such as gross domestic product (GDP) per capita which is the total output of the economy divided by the number of people in the country. The economic growth rate is the percentage increase in the real GDP of an economy from one year to the next. It is an important indicator for the overall health of the economy as economic growth is necessary for job creation and increase in living standards. Governments can influence economic growth by creating an environment that encourages investment as well as through fiscal and monetary policies that stimulate aggregate demand. Factors that contribute to economic growth include technological advancement, improved education, increase in investment and consumers' expenditure, and the presence of natural resources.

2.1.1. Types of Economic Growth

Economic growth can be classified into two main categories: extensive and intensive.

Extensive economic growth involves increasing the quantity of available resources such as land, capital and increasing the labour force. This type of economic growth is associated with increase in productivity and output as more resources are utilized.

This type of growth is usually accompanied by increased economic activity such as higher rates of investment and consumption, more efficient production and distribution of goods and services and the development of new technology. An example of extensive economic growth occurred in the United States of America after World War II. This was due to the massive

amount of government spending on infrastructure, education, research and development, and the implementation of new technologies. This led to an increase in the number of businesses, a higher rate of employment, and an overall increase in the country's GDP. Another example of extensive economic growth can be seen in China. Since the 1980s, China has experienced tremendous economic growth due to the implementation of reforms and open market policies. This has led to a large increase in foreign investment and trade as well as higher levels of manufacturing and productivity. This has allowed China to become one of the world's leading economies.

Intensive economic growth on the other hand involves increasing the quality and efficiency of the resources already available. This type of economic growth is achieved through innovation, technological advances, and improved management of resources. It is associated with increased productivity and output with the same amount of resources. It focuses on increasing the productivity of existing resources rather than creating new resources. This model of growth is often used to sustain economic development and to maintain a country's economic health. Examples of intensive economic growth would include increasing a country's agricultural productivity, improving the educational system of a country, and adopting new technologies to improve the efficiency of production. Investing in research and development can be another example of intensive economic growth. In this case, resources are invested in the development of new products, processes, and services that can improve the overall productivity of an economy.

2.1.2. Determinants of Economic growth

The factors of production are taken as major determinants in the economic growth of any country and they are explained as follows;

- **Capital:** Capital refers to the stock of physical imitation of factors of production. When the capital stock increases over time, it is called capital formation. Investment in capital goods does not only advance production but also generates employment opportunities. In other terms, capital refers to the total amount of money or other resources available; for an economic growth to occur, these resources must be invested.
- **Technological progress:** Technology refers to the use of new and innovative methods of production. Investments in research and development can lead to new technological breakthroughs which can in turn lead to economic growth. Technological improvements are considered as the most influential factors in economic growth

process. Changes in technology cause an increase in productivity of labour and other production factors.

- **Resources:** Resources refer to the availability of both natural and man-made resources. Natural resources are those that are naturally occurring such as land, water, and minerals. Man-made resources are things that are created or produced by humans such as capital and technology. One of the primary factors influencing economic growth is land. Land typically includes natural resources like climate, sea resources, water and so on. The presence of abundant natural resources is of a great significance in increasing economic growth.
- **Structural changes:** Structural changes include the passage from a traditional agricultural economy to a modern industrial economy consisting of transforming prevailing institutions, utilization of new resources and improvement in technology.
- **Organisation:** Organisation plays a very important role in economic growth. It is actually the getting together of all the factors of production to their best use and it complements the factors of production.
- **Education:** Education plays an important role in economic growth, as it helps to create a more educated workforce. Highly educated workers are more productive and can lead to increased economic growth.
- **The legal System:** The legal system is also important, as it helps to ensure that contracts are enforced and that property rights are protected. This helps to create an environment that encourages investment and economic growth.
- **The political System:** The political system is also important as it helps to create a stable environment for economic growth. When there is stability, investors are more willing to make long-term investment projects.

2.1.3. Economic Growth Cycle

The cycle of economic growth is the continuous process of improving economic performance through increased productivity, increased consumer demand and increased investment. It is the key to economic development and well-being of a nation.

The cycle of economic growth typically involves the following steps:

- **Increase in productivity:** This is the first step of the cycle and involves the use of new technologies, efficient management of resources and strategies to increase output from the existing resources.

- **Increase in consumer demand:** This is the second step and involves an increase in the demand for goods and services from consumers. This leads to a rise in prices and wages, stimulating further economic growth.
- **Increase in Investment:** This is the third step and involves increased investment in infrastructure, technology and human capital. This increases the production capabilities of the economy and contributes to economic growth.
- **Increase in economic growth:** This is the fourth step and is the result of the increased productivity, consumer demand and investment. This leads to an increase in GDP and other economic indicators, providing evidence of economic growth.

The cycle of economic growth is a continuous process that requires consistent effort to maintain. As each step in the cycle reinforces the others, it is important to ensure that all elements of the cycle are in place in order to ensure lasting economic development.

2.1.4. Measurement of Economic Growth

Measuring economic growth is the process of assessing the growth of a nation's economy over a period of time. It is usually done by looking at changes in the Gross Domestic Product (GDP) or Gross National Product (GNP). GDP is the total market value of all goods and services produced in a nation's economy in a given year. GNP is the total value of all goods and services produced by a nation's citizens and companies located overseas. To measure economic growth, economists and policy makers look at changes in the GDP or GNP of a nation. They look at the rate of growth, the composition of the GDP or GNP, and the sources of growth (such as output from agriculture, industry, services, or government). This helps to assess the strength of the economy and helps to determine if the economic policies of a nation are working. Other indicators can also be used to measure economic growth, such as unemployment rate and inflation. The unemployment rate measures the percentage of the population that is unemployed, while inflation measures the rate of increase of prices over time. Measuring economic growth is an important part of economic analysis, as it can be used to measure the performance of a nation's economy and its progress over time.

2.1.5. Theories of Economic growth

Theories of economic growth try to explain why some countries experience exponential growth in their economic prosperity while others remain stagnant. Generally, these theories focus on the factors that cause economic growth, such as increased productivity, technological advances, population growth, savings and investment, and the

globalization of markets. The most widely accepted theory of economic growth is known as the neoclassical growth theory.

Neoclassical theory of economic growth is a theory that states that economic growth is determined by the amount of capital, labour, technology, and resources available in an economy. It suggests that the rate of economic growth is determined by the marginal product of capital, and that the optimal level of capital is determined by the interaction between the demand and supply of capital. This theory also states that long-term economic growth is determined by technological progress. It suggests that economic growth can be enhanced by investments in physical capital, human capital, and technological progress. Additionally, neoclassical theory suggests that the efficiency of labour and capital is improved through competition, and that the growth of an economy is determined by the incentives and disincentives provided by the economic and political environment. It also suggests that economic growth is determined by the level of investment, technological innovation, and productivity. This theory suggests that the more capital an economy has, the more productive it will be. It also suggests that technological advances will lead to increased productivity and economic growth.[5]

Another well-known theory of economic growth is the endogenous growth theory. The endogenous theory of economic growth states that economic growth is the result of endogenous and not exogenous forces. According to this theory, economic growth is the result of investment in human capital, innovation, and technological progress. The theory focuses on the internal factors driving economic growth such as increases in productivity, new products, new markets, and the incentives to innovate. Economic growth is not determined by external factors such as resources, population, or nature. Instead, it is determined by the efforts of individuals, businesses, and governments to make improvements and develop new technologies. Endogenous growth theory suggests that economic growth can be accelerated through government policies and interventions that increase the incentives to invest in research and development, human capital, and infrastructure. This theory differs from the neoclassical growth theory in that it suggests that economic growth is largely driven by the environment rather than by the level of investment or technological advances[6].

Finally, the Harrod-Domar model of economic growth is a model that suggests that economic growth is determined by the level of savings and investments. The Harrod-Domar

[5] Solow Robert M. (1956),"A Contribution to the Theory of Economic Growth." *Quarterly Journal of Economics* Vol.70, pp 65-94.
[6] Schumpeter Joseph A. (1934), "The Theory of Economic Development", *Quarterly Journal of Economics* 16: pp. 305-326.

model of economic growth is an economic model developed by economists Roy Harrod and Evsey Domar. It is based on the premise that economic growth is determined by the level of saving and the productivity of capital. The model states that a country's rate of economic growth is determined by the ratio of its savings to its capital productivity. This ratio is expressed as the capital-output ratio, which is the amount of capital available for investment divided by the amount of output it produces. In the Harrod-Domar model, the level of saving is assumed to be constant, while the capital productivity is determined by the rate of technological progress. The model suggests that the rate of economic growth will be higher if the capital-output ratio is increased through increased saving or increased capital productivity. The model suggests that if the capital-output ratio remains constant, then the rate of economic growth will also remain constant. This model suggests that if an economy has a high level of savings and investments, it will experience economic growth. On the other hand, if an economy has a low level of savings and investments, it will experience economic stagnation.

2.2. Public Expenditure

Public expenditure is an expenditure incurred by a government or public institution in order to provide goods or services to the public. It includes spending on infrastructure such as roads and bridges, as well as social services like education, healthcare and welfare. It also includes spending on defence, law enforcement, and other public services. Public expenditure is an important part of fiscal policy and is often used to promote economic growth and employment.

2.2.1. Functions of public expenditure

Public expenditure involves the government spending money on goods, services, and transfers. It is one of the primary tools the government has to influence economic activity and the level of economic activity.

The functions of public expenditure include;

- **Providing public goods and services;** Public goods and services include things like defence, law enforcement, public health, infrastructure, and education.
- **Stabilizing the economy;** Stabilization of the economy involves government spending to offset fluctuations in economic activity and reduce economic instability.
- **Providing incentives for private sector activity;** Public expenditure can be used to provide incentives for private sector activity, such as tax credits and subsidies.

- **Redistributing income;** Redistribution of income involves the government's use of taxes and transfers to move money from one group to another, such as from the wealthy to the poor.

2.2.2. Different classes of public expenditure

Public expenditure is divided into three main categories: recurrent expenditure, capital expenditure and public sector debt repayment.

- **Recurrent expenditure:**

Recurrent government expenditure is the money that governments spend on goods and services that are consumed and used up in the same financial year. Examples of recurrent government expenditure include wages and salaries for public servants, operating costs for government departments, goods and services for public welfare such as healthcare and education, and goods and services for public works such as transfers and subsidies, as well as payments for interest.

- **Capital expenditure:**

This is the cost of acquiring fixed assets. Capital expenditure is money that a government spends on long-term investments such as infrastructure, buildings, information technology, and other capital assets. This type of spending is an investment because it creates long-term economic benefits, like improved transportation and communication networks. Examples of capital government expenditure include building new roads and bridges, constructing new schools and hospitals and improving public transportation systems.

- **Public sector debt repayment:**

This is the repayment of loans from other countries or institutions. Public sector debt repayment is the process of paying back the money a government has borrowed from lenders and creditors. This usually happens when a government can no longer afford to borrow from or pay back its creditors. In Uganda, public sector debt repayment has been a major challenge over the years as the country has accumulated large amounts of debt from foreign lenders. One example of public sector debt repayment in Uganda is through the debt relief program, which was initiated in the late 1990s. This program allowed Uganda to reduce its debt burden by up to 70%. Through the program, the government was able to reduce its debt payments by up to 40% and the remaining debt was restructured with longer repayment terms and lower interest rates. Another example of public sector debt repayment in Uganda is through the IMF Extended Credit Facility which was established in 2013. This program allows the government of Uganda to borrow money from the IMF in order to pay off its creditors. The terms of the

loan are very favourable with a lower interest rate and longer repayment periods. As of 2019, Uganda has successfully repaid the IMF loan. Public sector debt repayment is an important part of managing a country's finances and it is something that the government of Uganda has been actively working on for many years. By implementing debt relief programs and borrowing from the IMF, Uganda has been able to reduce its debt burden and improve its financial situation.

2.2.3. Theories of public expenditure

Public expenditure is the spending of public funds on goods and services in order to achieve certain public policy objectives. Generally, it is divided into three broad areas: national defence, social services, and public investments.

Theories of public expenditure include the following;

- **The Musgrave Theory of Public Expenditure**

The Musgrave Theory of Public Expenditure is a concept developed by Richard Musgrave in his 1959 book, "The Theory of Public Finance". The Musgrave Theory of Public Expenditure is based on the idea that public expenditure should be allocated according to three criteria: equity, efficiency and economy.

Equity means that public expenditure should be allocated fairly across the population, taking into account individuals' incomes and other factors. Efficiency means that public expenditure should be allocated in such a way that it maximises the outcome in terms of public goods and services. Economy means that public expenditure should be allocated in such a way that it minimises the cost of providing goods and services. The Musgrave Theory of Public Expenditure is a useful tool for governments to consider when allocating resources. For example, a government could use the theory to determine whether to invest in public healthcare, education or infrastructure. The theory has also been used to inform decisions about how to allocate resources for social security and welfare programs. The Musgrave Theory of Public Expenditure has been widely used by governments and economists around the world. It is an important concept in public finance and has been used to shape public policy in many countries.

- **The Keynesian theory of public expenditure**

The Keynesian theory of public expenditure is an economic theory developed by British economist John Maynard Keynes in 1936. It argues that government spending can help to stimulate economic growth and reduce unemployment. The theory suggests that government spending should be increased during economic downturns in order to stimulate aggregate

demand and increase consumer spending, while it should be reduced during economic booms in order to prevent inflation. The theory has been used to explain the origins of the Great Depression and has since been used to develop economic policies aimed at maintaining economic equilibrium. An example of Keynesian public expenditure is the implementation of an expansionary fiscal policy. This is when the government reduces taxes and increases spending in order to stimulate the economy. This can be done by reducing taxes on individuals or businesses, increasing government spending on infrastructure or social programs, or providing grants and loans to businesses to help them grow. Another example of Keynesian public expenditure is the implementation of an austerity program. This is when the government reduces spending in order to reduce the budget deficit and promote a more sustainable fiscal policy. This can be done by cutting back on social spending, raising taxes, and reducing government subsidies to businesses. Overall, Keynesian public expenditure is an economic theory that suggests that government spending can help to stimulate economic growth and reduce unemployment. It has been used to explain the origins of the Great Depression and has since been used to develop economic policies aimed at maintaining economic equilibrium. Examples of Keynesian public expenditure include subsidies and tax credits to encourage private consumption and investment. Examples of public expenditure under this theory include things like public works projects, public health care, public education, and public transportation.

- **Peacock-Wiseman's Theory of Public Expenditure**

Peacock-Wiseman's Theory of Public Expenditure is an economic theory developed by Allen Peacock and John Wiseman in 1956. This theory explains how a government should decide on its level of public expenditure. According to this theory, public expenditure should be determined primarily by the benefits derived from it. These benefits are calculated by taking into account factors such as the social and economic costs of the expenditure, the level of public satisfaction, and the long-term effects of the expenditure. The theory also states that the level of public expenditure should be related to the level of government revenue and should be changed in accordance with the changing economic conditions. The theory suggests that the government should allocate its resources in such a way that the cost of the service is not greater than the benefits derived from it[7]. It also states that the government should make sure that its expenditure is efficient, so that the maximum benefits can be gained from it. This means that the government should take into account the costs of production and the long-term

[7] Peacock A.T & Wiseman J. (1961), "The Analysis of Public Expenditure Decisions", *Economic Journal*, Vol. 71(283), pp. 449-471.

effects of the expenditure when making decisions about public expenditure. Examples of public expenditure according to the Peacock-Wiseman theory include public transport, health care, education, housing, and infrastructure. These types of public expenditure usually benefit a large number of people and have long-term effects. For example, investing in public transport will benefit the general public in the long run and will result in increased economic growth.

- **The Wagner law**

The Wagner law, also known as the Wagner–Peyser Act, is an economic theory put forth in the late-19th century by German economist Adolf Wagner. It states that public expenditure should grow at a rate equal to the growth of income generated by the private sector. Wagner believed that public expenditure should grow in tandem with income as this would help to maintain economic stability and growth. The origin of the Wagner law can be traced back to Wagner's book "Grundlegung der politischen Oekonomie (Foundation of Political Economy)", written in 1883. In the book, Wagner argued that public expenditure should increase in proportion to the increase in national income, so as to maintain a balance between public and private expenditures.

On the other hand, **Benefit-cost analysis** is an economic tool used to assess the costs and benefits associated with a particular project. It seeks to measure whether the benefits of an expenditure outweigh its costs. For example, a government may decide to build a bridge in order to reduce traffic congestion in a certain area. The government would need to weigh the cost of building the bridge against its expected benefits, such as shorter travel times, improved air quality, and reduced fuel costs.

Public choice theory is also an economic theory that seeks to explain how economic decisions are made by public officials. It looks at the incentives, preferences, and constraints faced by decision makers, as well as how these factors affect the decision-making process. For example, public choice theory can be used to evaluate whether a particular government policy will be successful in achieving its desired objectives.

2.2.4. The relationship between public expenditure and economic growth in Uganda.

Public expenditure can have a significant impact on economic growth. Broadly, public expenditure can stimulate economic growth if it is used to increase the productive capacity of the economy such as by investing in infrastructure and human capital. For example, by investing in education, health, transport and energy infrastructure, the government can help to improve productivity and encourage economic growth. Research has suggested that public

investment in these areas can lead to an increase in gross domestic product (GDP). Public expenditure can also reduce economic growth if it is used to finance activities that are not productive or that involve waste and corruption. In such cases, public expenditure does not help to increase the productive capacity of the economy and instead ends up reducing economic growth and leading to a deceleration of growth in the long run. In addition, public expenditure can be used to alleviate poverty and provide support to vulnerable groups and individuals. This can be beneficial to economic growth as it can improve living standards and reduce inequality. It can also help to stimulate economic activity by providing an injection of funds into the economy and increasing consumer spending. The relationship between public expenditure and economic growth is a complex one, and there is no single answer that works for all countries. However, in Uganda, there are a few key factors that have been observed to have a direct impact on economic growth.

Firstly, public expenditure on infrastructure is vital for economic growth. Investment in roads, bridges and other infrastructure projects can improve access to markets and resources which can lead to increased economic activity and higher economic growth. This is because infrastructure investments enable businesses to easily access markets and resources. Additionally, infrastructure investments can help to improve the productivity of businesses and workers as well as reduce transportation costs. Public investment in infrastructure has a positive and statistically significant impact on economic growth in the country. Specifically, the growth in GDP per capita is higher when public expenditure is higher. This suggests that public expenditure on infrastructure is an important factor in economic growth in Uganda. The benefits of public expenditure on infrastructure are more pronounced in certain industries such as manufacturing. This suggests that the government should focus its investments on those sectors that are likely to benefit the most from increased public expenditure. Public expenditure on infrastructure can have a positive effect on economic growth in Uganda. Investment in infrastructure can help to reduce transportation costs, improve productivity and open up new markets leading to increased economic growth.

Secondly, public expenditure and investment in research and development can create new markets and jobs, and increase productivity. This can lead to increased economic growth particularly in the long run. Governments in Uganda have been investing heavily in research and development (R&D) for decades. This investment has allowed the country to build a strong foundation of knowledge and technological capacity that has enabled it to develop a vibrant economy. Public expenditure on R&D has been correlated with economic growth in Uganda. Studies have shown that higher levels of public expenditure on R&D can lead to

higher economic growth. For example, a study by the World Bank found that a 10% increase in public expenditure on research and development was associated with a nearly 2.5% increase in GDP growth. Other research has found that public expenditure on R&D can lead to more efficient use of resources by encouraging private sector investment in R&D. This, in turn, creates a virtuous cycle of investment and economic growth. For example, a study conducted by the International Monetary Fund found that a 10% increase in public R&D spending was associated with a nearly 15% increase in private investment in R&D. Overall, the evidence suggests that increased public expenditure on R&D can lead to increased economic growth in Uganda. This investment can create a cycle of investment, innovation, and economic growth that has the potential to transform the country and its economic prospects.

Thirdly, public expenditure on education can improve human capital, which leads to higher productivity and higher economic growth. Educating the population can reduce poverty and create new opportunities for economic growth by increasing the number of people with the skills necessary to create businesses and jobs. In Uganda, the public expenditure on education has increased significantly over the last decade. This increase in public spending has resulted in improvements in educational outcomes such as an increase in the number of students completing primary school and an increase in the number of students enrolling in secondary school. These improvements have had a positive effect on economic growth in Uganda, as better educated citizens are more likely to find employment and contribute to economic productivity. Furthermore, the Ugandan government has pursued a number of policies to increase public spending on education such as increasing access to primary and secondary education and providing scholarships for university education. These policies have resulted in increased opportunities for individuals to attain higher levels of education, which ultimately improves their employment prospects and contributes to economic growth. Overall, the increase in public expenditure on education in Uganda has had a positive effect on economic growth in the country. This suggests that investing in education is an effective way to promote economic growth and improve the lives of citizens.

Finally, public expenditure on health can improve life expectancy, reduce infant mortality and improve overall health. This can lead to increased economic activity as more people are able to work and participate in the economy. Studies have shown that public investment in health leads to higher economic growth, as it reduces poverty and improves access to basic services. Higher public expenditure on health can lead to improved outcomes across a range of health indicators, such as maternal mortality, infant mortality, and life

expectancy. Improved health outcomes can lead to higher productivity and improved economic growth. In addition, better access to health services can reduce the burden of diseases on society and can increase the labour supply, resulting in increased productivity. For example, research has found that an increase in public expenditure on health of 1 percent of GDP is linked to a 0.4 percent increase in GDP growth in Uganda. This implies that an increase in public expenditure on health can lead to an increase in economic growth, and vice versa. Overall, public expenditure in Uganda can have a significant effect on economic growth. Investing in infrastructure, research and development, education, and health can all lead to higher economic growth.

2.3. Empirical Literature

The empirical literature on the impact of public expenditure on economic growth is the study of the impact that increased public expenditure has on economic growth. This literature has been studied extensively, with many studies finding that increased public expenditure can significantly improve economic growth. In essence, research suggests that public expenditure has both a positive and negative impact on economic growth.

Kweka and Morrissey (2000) investigated the impact of public expenditures on economic growth using time series data on Tanzania. The study used disaggregated expenditure data into physical investment, consumption, and human capital development. Their findings showed that that public investment in Tanzania was not productive, but rather growth-reducing. They further noted that expenditures of physical investment had a significant negative impact while expenditure on consumption appeared to stimulate growth. Their findings further revealed that human capital expenditure was insignificant. They also found that aid significantly increases economic growth given the reform in the mid-1980s in Tanzania. In a similar manner, Sjoberg (2003) also examined the relationship between government expenditure and economic growth in Sweden using data from 1960-2001. He also disaggregated total expenditure into consumption, investment and transfer. The result met apriori anticipation however; the finding revealed that too much expenditure by Sweden might suppress economic growth perhaps due to crowding out of private investment. Naftaly et al. (2014) investigated empirically how government expenditure contributes to economic growth in East Africa. The study objective was to investigate how the expenditure affects economic growth within the East African region. The results showed that health and defence expenditures had a positive and significant effect on growth while expenditure on education and agriculture were insignificant.

Ram (1986) used a sample of 115 countries and found that government expenditure that is consumption expenditure has significant positive effect on economic growth particularly in developing countries but total spending has a negative impact, similarly Jin-Lung (1994) used a sample of 62 countries from 1960-1985 and found that non-productive expenditure that is expenditure on consumption has no effect on economic growth in developed countries, but positive impact in developing countries. However, some empirical literature found negative impact of government consumption expenditure on economic growth. For example, Barro (1991) produced evidence that pointed to a negative relationship between government consumption expenditure and economic growth and therefore, recommended that increasing such non-productive spending is likely to inhibit the growth rate of an economy.

Devarajan et al. (1993) used functional categories of public expenditure in their economic growth regressions. The study found out that public expenditure had an inverse relationship with growth in developing countries but had a positive relationship with growth in developed countries. The study categorized expenditure into productive and non-productive categories by taking into account the level of resources invested and output produced by different programs. For instance, the study reported that government expenditure on health, transport and communications is growth promoting but found no positive impact of education and military spending on economic growth. However, Ssewanyana (2008) concluded that public expenditure has had a positive and significant effect on economic growth in Uganda. Specifically, the study found that increased public expenditure on health, education, infrastructure and social services has resulted in higher economic growth rates.

Al-Shatti (2014) investigated the impact of public expenditure on economic growth in Jordan, his results indicated that there is a significant impact of current expenses on health, economic affairs, housing, community facilities and of the capital expenditures on economic growth in Jordan but there was statistically insignificant impact of the current expenses on education. Similarly, Banerjee and Duflo (2003) also conducted a research on the impact of public education expenditure on economic growth in India in which he found out that the rate of return on public education expenditure in India towards economic growth was around 7%, and the study by Mallikarjun and Pritchett (2010) found out that the rate of return on public health expenditure in India towards economic growth was around 16%.

Mbabazi et al. (2005) looked at the impact of public expenditure on economic growth in Uganda from 1975 to 2002. The study found that public expenditure had a positive and significant effect on economic growth, with a coefficient of 0.68. This suggests that for every

1% increase in public expenditure, economic growth would increase by 0.68%. Similarly, Adano and Ssewanyana (2012) found that an increase of 1% in public expenditure resulted on average in a 0.30% increase in economic growth for Uganda. The study also found that the effect of public expenditure on economic growth was stronger at higher levels of economic development. Matovu and Kyei-Mensah (2013) also looked at the impact of public expenditure on economic growth in Uganda from 1980 to 2010 and found that public expenditure had a positive and significant impact on economic growth, with a coefficient of 0.85. This suggests that for every 1% increase in public expenditure, economic growth would increase by 0.85%.

Aggrey (2000) examined the relationship between public expenditure and economic growth in Uganda. His results were that government Investment (capital expenditure) has a significant positive impact on the growth of the private sector. Similarly, Amin (1995) and Eko (1994) concluded in their results that Public investment in education, agriculture and roads has a positive impact on private sector investment resulting into economic growth. Okiror et al. (2017) examined the impact of public expenditure on economic growth in Uganda between 1981 and 2010. The study found that public expenditure had a statistically significant positive effect on economic growth in the country. In addition, the study showed that an increase in public expenditure of 1% resulted in a 0.1% increase in economic growth. Akabwai (2012) also used a fixed-effects panel data regression model to examine the relationship between public expenditure and economic growth in Uganda. The results showed that public expenditure had a positive and statistically significant effect on economic growth.

Mwesigwa and Tuwor (2015) analysed the effects of public expenditure on economic growth in Uganda, and found that public spending was an important factor in economic growth. The study found that an increase in public spending led to an increase in GDP per capita, with a 10% increase in public spending leading to an increase of 1.4% of GDP per capita. Similarly, Elibariki (2016) found that public expenditure was a key driver of economic growth in Uganda, with a 10% increase in public expenditure resulting in a 2% increase in GDP growth. In addition, the study found that public spending had a positive effect on both the short-term and long-term economic growth, with public spending increasing both the short-term and long-term growth rates. Kibuuka and Urbano (2018) also examined the impact of public spending on economic growth and found that there was a positive and statistically significant relationship between government expenditure and economic growth in Uganda. They found that an increase in total public spending of 1 percent of GDP could lead to a 1.2 percent increase in economic growth.

World Bank (2019) conducted a study entitled "The Impact of Public Expenditure on Economic Growth: Evidence from Developing Countries" which found that higher levels of public expenditures had a positive and statistically significant impact on economic growth in developing countries. The study also found that the impact was greater in countries where the quality of public expenditure management was better. Additionally, a study by IMF (2004), concluded that an increase in public expenditure leads to an increase in economic growth. The IMF also found that the impact of public expenditure on economic growth was greater in countries which had a higher quality of fiscal institutions.

2.4. Summary of Literature

The impact of public expenditure on economic growth in Uganda has generally found that such expenditures have a positive impact on economic growth. Specifically, studies have found that increases in public infrastructure spending and public health expenditure have a statistically significant positive effect on economic growth. Other expenditures such as education and defence spending have also been found to have positive effects, albeit weaker than those of infrastructure and health. In general, the positive economic growth effects of public expenditure are even more pronounced when the expenditure is targeted at the poorest households and regions. However, there is also evidence that this has a less significant impact, particularly in the areas of infrastructure and public administration. Furthermore, the impact of public expenditure on economic growth also depends on the quality of the expenditure, as well as the institutional and macroeconomic context within which it operates.

Chapter Three: Research Methodology

CHAPTER THREE
RESEARCH METHODOLOGY

3.1. Introduction

This chapter entails the data type and source, definition and measurement of variables, model description, estimation procedure, estimation technique and the diagnostic tests.

To better be able to carry out our analysis, it is necessary to be informed about the variables as well as the methodology used in the empirical works cited above to determine the impact of public expenditure on economic growth. It is in this sense that in the first part of this chapter we try to present the selected variables as well as their evolution from 1990 to 2021 and in the second part, a general view of the econometric methodology adopted for modelling in time series.

3.2. Data Type Source

This study uses secondary data from the World Development Indicators (WDI) published by the World Bank for macroeconomic variables. The annual data cover the period 1990-2021 that spans for a period of 32 years which is suitable for seasonal effects adjustment (The estimation period was chosen by considering the data availability). The data used in the study is time series data. The variables of interest are; Gross Domestic Product Growth, Gross Capital Formation, Total Labour Force, Military Expenditure, Exports of goods and services, Imports of goods and services.

3.3. Definition and measurement of variables

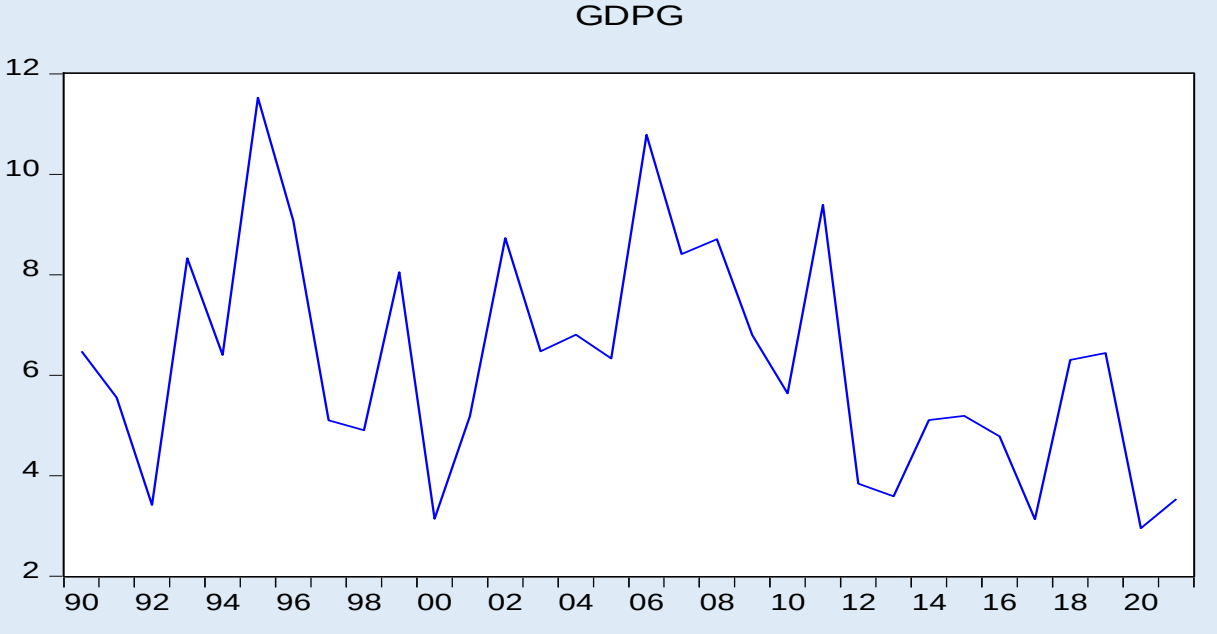
Dependent Variable

- **Gross Domestic Product Growth (GDPG)**

Gross Domestic Product (GDP) is an estimate of the total value of all goods and services produced within a country in a given year. It is typically expressed in terms of market prices and is the most commonly used measure of economic output. GDP is calculated by either the expenditure approach where the total value of all goods and services bought by households, businesses, and government is calculated, or the income approach which adds up all income earned by households, businesses, and government within a country. It is important to note that GDP is a measure of output and not wealth. Gross Domestic Product (GDP) is usually calculated on an annual basis and is considered an indicator of the economic health of a country. This includes consumer spending, investments, government spending, and net exports. GDP is used to measure the size of an economy and to compare the economic

performance of different countries. Gross Domestic Product (GDP) growth is a measure of economic growth in a country. The GDPG rate is an important indicator of the overall health of the economy and is often used to compare the relative performance of different countries. It is typically expressed as a percentage change from the same period in the previous year. GDPG is used to measure the performance of an economy and can be affected by a number of factors such as population growth, government spending, investments, and trade. A country's GDP growth rate can be used to compare it to other countries, to help forecast its future economic prospects, and to make policy decisions.

Figure 1. Evolution of Gross Domestic Product Growth in Uganda from 1990 to 2021.



Source: own computations Using Eviews 10

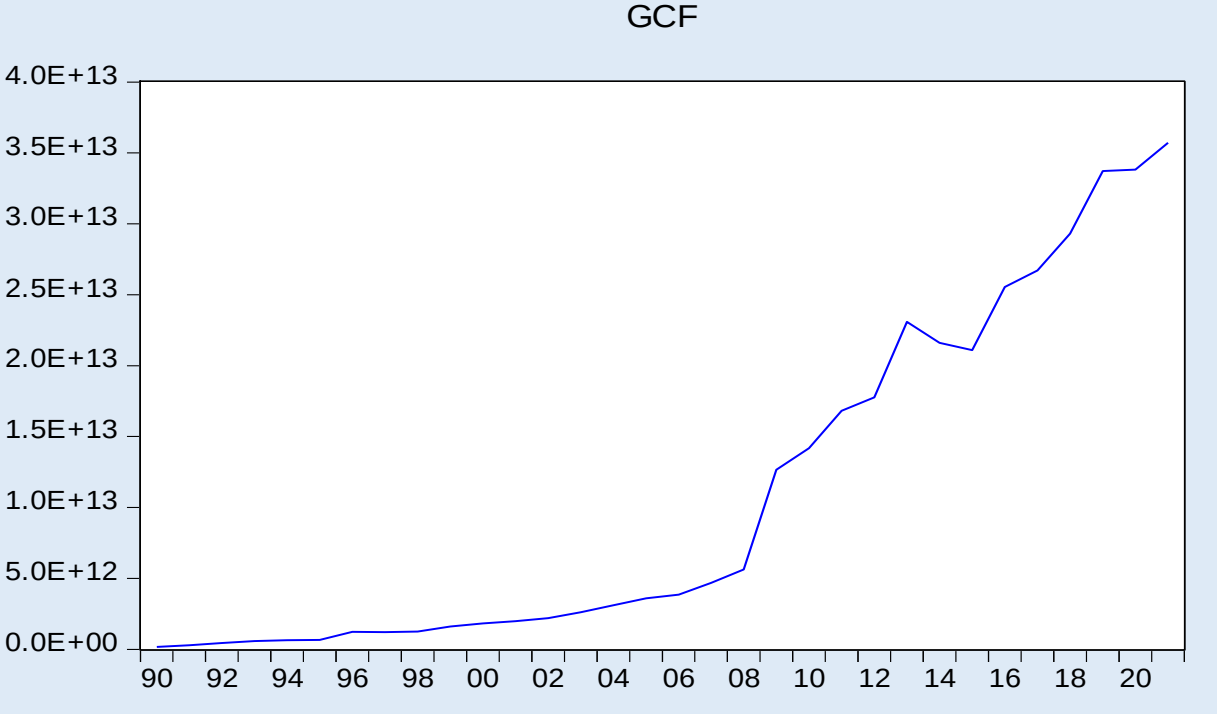
From the above graph, the Gross Domestic Product curve is on a fluctuating trend. From the period 1990 to 1993, the GDP Growth was on the downward trend and later gained momentum of the upward trend till 1996. From 1996, there was a significant decline in the GDP Growth in Uganda till the year 2000 (it was in these periods that the country was facing famine). From the years 2000, the country's GDP Growth again gained momentum of the upward trend till 2007 and later faced a downward trend till 2010 where it again rose before declining till like 2017. The upward trend was again detected till 2019 and significantly declined in 2020. From 2021, the GDP Growth has been seen on the upward trend again.

Independent Variables

- **Gross Capital Formation (GCF)**

Gross capital formation is an economic concept that measures the total amount of capital used by a country to increase its productive capacity. This includes all investments made in fixed capital (such as machines, tools and buildings) and changes in inventories. Gross capital formation is a key indicator of economic growth and development. It is used to measure the amount of new capital created in an economy which can then be used to finance new investment. The amount of gross capital formation also indicates the availability of resources for production, consumption and investment. This is broken down into two categories: gross fixed capital formation (GFCF) and changes in inventories. GFCF measures the amount of capital used for the purchase and installation of fixed assets such as buildings, equipment, and technology, while changes in inventories measure the amount of capital used to produce goods that are kept in stock. Gross capital formation includes both private and public investments. Private investments include investments made by households, businesses, and non-profits, while public investment includes government spending on infrastructure and other public works.

Figure 2. Evolution of Gross Capital Formation in Uganda from 1990 to 2021



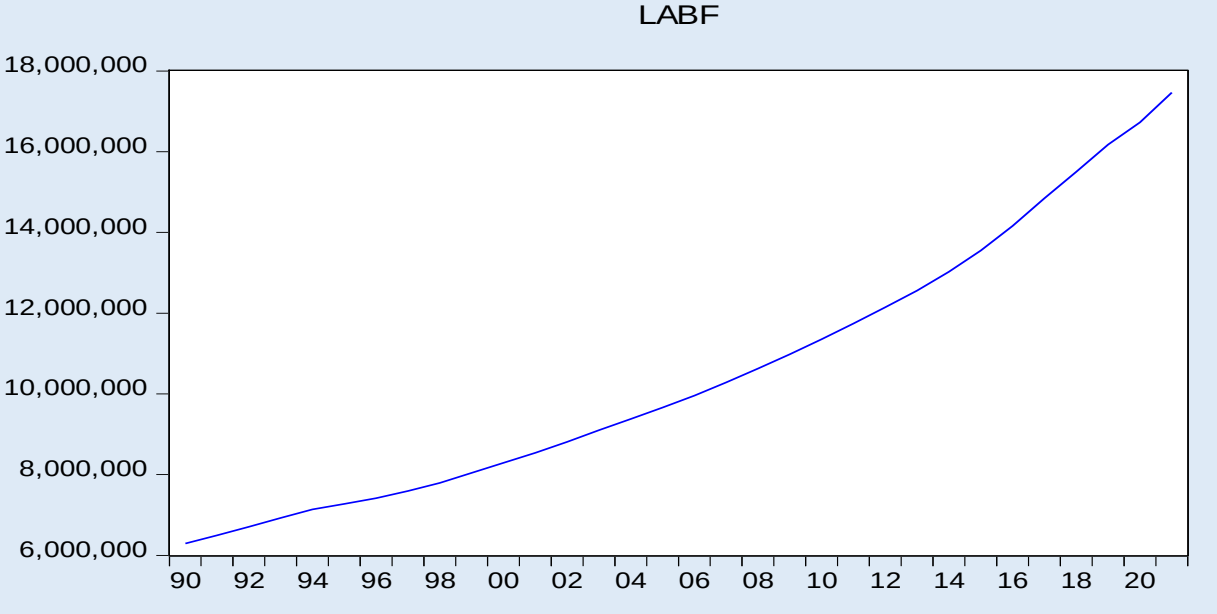
Source: own computations Using Eviews 10

The graph shows that the Gross Capital Formation curve has a tardily increasing uptrend from 1990 till 2007 where it gradually gained momentum of the upward trend.

- **Labour Force (LABF)**

Labour force is the sum of people employed plus those actively looking for work. It is a key indicator of an economy's health, as rising employment opportunities often indicate a strong economy. The labour force also englobes those who are underemployed, meaning they have a job but it does not provide them with enough income to keep them out of poverty. The labour force also accounts for those who are discouraged workers, meaning they have given up the search for employment due to a lack of job prospects. The labour force is a term used to describe all people who are either employed or actively seeking employment, as opposed to people who are unemployed or not actively seeking employment. It is also sometimes referred to as the workforce. The size of the labour force can be used to measure the overall health of an economy, as the size of the labour force is indicative of the number of people who are able to contribute to the economic output of a country or region. The labour force is also known as the "working population", is the total number of people employed or actively looking for employment in a particular region. It includes all people in-between 16-60 years who are employed or unemployed but actively seeking employment. The labour force does not include people who are not working and not looking for employment, such as full-time students, retirees, and stay-at-home parents.

Figure 3. Evolution of Labour Force in Uganda from 1990 to 2021.



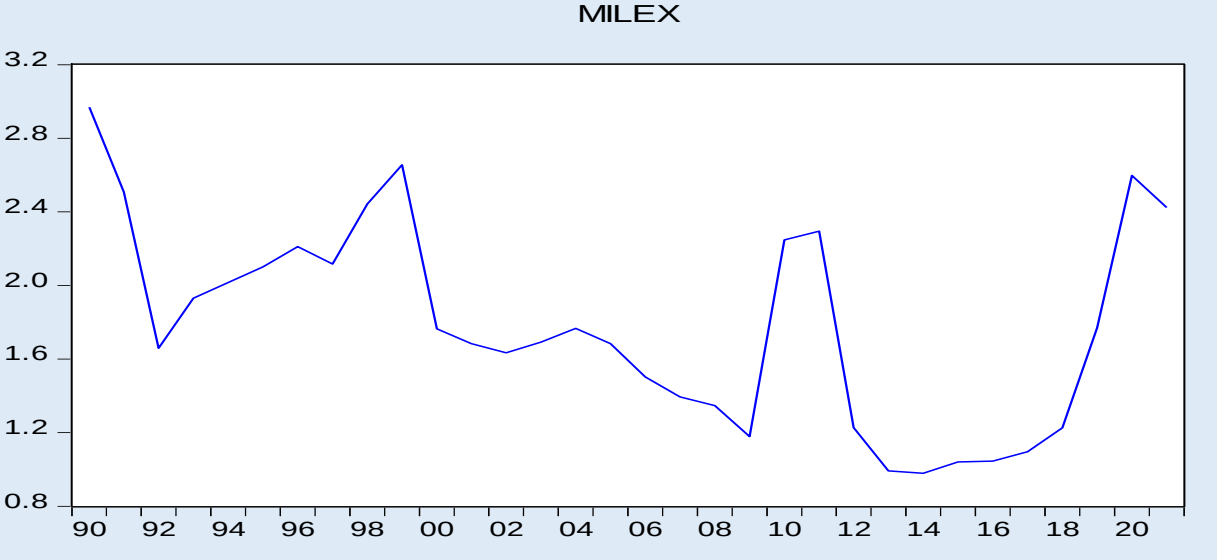
Source: own computations Using Eviews 10

From the graph, Uganda's Labour Force has been gradually increasing over time as it was estimated at around 6 Million people in 1990 and now estimated at around 18 Million people in 2021.

- **Military Expenditure (MILEX)**

Military expenditure refers to the funds allocated by a nation's government to fund its military operations, including the procurement of weapons, military hardware and personnel training, research and development, and the cost of maintaining military bases, military personnel salaries, and other related costs. It is usually calculated as a percentage of the nation's Gross Domestic Product (GDP). Military expenditure can be divided into three broad categories: operational expenditures, capital expenditures, and research and development. Operational expenditures include the costs associated with maintaining military personnel, supplies, and equipment. Capital expenditures include the costs associated with purchasing and maintaining weapons and other military infrastructure. Research and development expenditures include the costs associated with developing new weapons and other military technology. Military expenditure is one of the largest expenses for most governments, and can range from a few percentages to over 50% of a country's total budget. The amount of money given to the military by each country varies widely, with some countries spending more than others. The United States, for example, is the top military spender in the world, followed by China and Saudi Arabia. In the East African Community (EAC), Uganda is the top military spender.

Figure 4. Evolution of Military Expenditure in Uganda from 1990 to 2021.



Source: own computations Using Eviews 10

From figure 4, Uganda's Military Expenditure is on a fluctuating trend. The Military Expenditure declined from 1990 till 1992 where it tardily faced an uptrend till 1999. From 2000, there was a significant downward sloping till 2008 where the uptrend again gained momentum till 2010. From 2011, the Military Expenditure gradually fell till 2013 where it

again gained momentum of the uptrend till 2020. From 2021, the Military expenditure is apparently seen facing a downward trend.

- **Exports of goods and services (EXPO)**

Exports of goods and services refer to the sale of domestic output to other countries (goods and services that are produced in one country but sold to another country). Exports are an important component of a country's economy, as they generate income and help develop a healthy balance of trade. Goods and services are the two main types of exports. Goods are tangible items that are shipped to other countries such as automobiles, furniture, and electronics. Services are intangible activities that are bought and sold between countries such as consulting, banking, and software development. In addition to their contribution to a country's balance of trade, exports can also lead to economic growth by creating jobs and stimulating investment. For example, a product that is manufactured and sold in Uganda to a customer in Algeria is considered an export.

Exports are one component of international trade and an important part of international trade as they can have a big impact on a country's economy. Exports are important for a number of reasons; They can generate income for the exporting country, provide a country with foreign currency, create jobs, and help to spread new technologies, products, and services across countries. Exports can also increase competition in the global marketplace which can lead to lower prices for consumers and better products and services for consumers[8]. When exporting goods and services, companies often need to consider a number of factors including taxes, tariffs, regulations, and other obstacles that can affect their ability to access international markets.

Figure 5. Evolution of Exports of goods and services in Uganda from 1990 to 2021.

Source: own computations Using Eviews 10

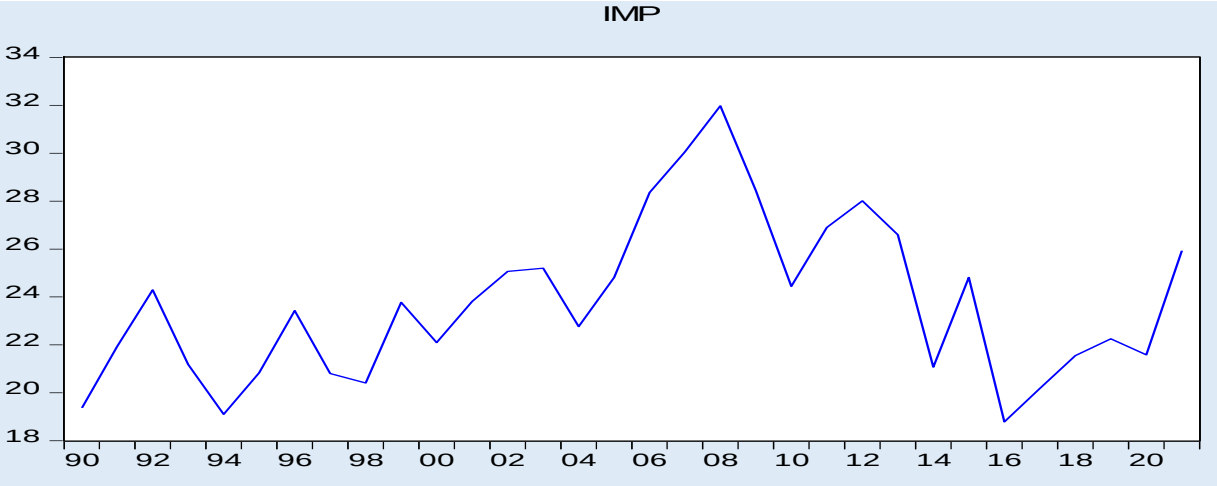
[8] Söderlund H. & Wijesiri W. (2010), "The Role of Exports and Imports in Economic Growth", *International Journal of Business and Management*, Vol. 5(9), pp. 90–99

From figure 5, Uganda's Exports have significantly been on an uptrend from 1990 till 2008 where they started facing a downward sloping trend till 2010. From 2011, Exports have been fluctuating as seen by an uptrend till 2013, from where a downward sloping is observed till 2016. From then, Exports have been on the uptrend with setbacks.

- **Imports of goods and services (IMP)**

Imports of goods and services refer to the value of all goods and other market services received from the rest of the world. Imports can also be termed as goods and services that are bought from other countries and brought into one's own country. Imports are an important part of any country's economy as it allows the country to obtain goods and services that it may not be able to produce domestically. Imports of goods and services are imports of tangible products, intangible services and other economic resources from other countries. These imports are accounted for in the balance of payments as part of the current account. Imports of goods and services may include items such as consumer and capital goods, raw materials, intermediate inputs, oil, and services such as travel, transportation and tourism. They also include investment income such as interest and dividends, and compensations such as remittances and transfers. The value of imports of goods and services can be measured in nominal or real terms. In nominal terms, it is the total value of goods and services imported from abroad. In real terms, it is the value of imports of goods and services adjusted for the effects of inflation. Imports of goods and services can be divided into two categories; visible and invisible. Visible imports are physical goods, such as cars and electronics, that can be seen and touched. Invisible imports are services, such as banking, transportation, and communication that are not directly visible. The total value of imports of goods and services is a key indicator of the economic health of a country.

Figure 6. Evolution of Imports of goods and services in Uganda from 1990 to 2021.



Source: own computations Using Eviews 10

From figure 6, Uganda's Imports have a fluctuating trend. An uptrend is witnessed from 1990 till 1992 where they faced they faced the downward sloping trend till 1994. From 1995, the country's Imports have gradually had an uptrend till 2008 where they gradually faced a downward sloping trend till 2016 where it gained momentum of the uptrend.

3.4. Model description

The model to be used is based on the neoclassical economic growth model. Solow and Swan were the first economists to specify an economic growth model in 1956. The model postulated in this study is based on this Solow growth model which emphasises the vital role that investment and labour force play in promoting economic growth.

According to Solow (1956), production (Y) or economic growth depends on capital (K) and labour (L) inputs. The production technology is given as follows:

$Y = \mathrm{F}(\mathrm{K}, \mathrm{L})$ ..... (1)

By considering a Cobb-Douglas type production function, the model becomes:

$\mathrm{Y} = \mathrm{AK}^{\alpha}\mathrm{L}^{\beta}$ ..... (2)

The parameter A captures technological changes. Following (Yovo, 2017), economic growth or growth output is closely related to the type of government expenditure used for the capital stock (K) and to the labour force (L). By considering the logarithm of the production function, we have the following linear form:

$\mathrm{InY} = \mathrm{InA} + \alpha\mathrm{InK} + \beta\mathrm{InL}$ ..... (3)

This equation can be rewritten as follows:

$Y = \alpha_0 + \alpha_1 DG + \alpha_2 L$ ..... (4)

In this equation, DG is the ratio of total government expenditure relative to GDP. The variable Y captures the growth rate of the real GDP, and L is as previously defined. In this study, attention is paid to DG. The equation can be expanded by disaggregating government expenditure into Gross Capital Formation (GCF), Labour Force (LABF), Military Expenditure (MILEX), Exports of goods and services (EXPO) and Imports of goods and services (IMP).

The functional form of the model to be estimated is as follows:

$GDPG = f(GCF, LABF, MILEX, EXPO, IMP)$ ..... *(5)*

Where;

GDPG is the real GDP growth rate which is the dependent variable.

The independent variables are as follows:

GCF is the Gross Capital Formation

LABF is the total Labour Force

MILEX is the Military Expenditure

EXPO is the Exports of goods and services

IMP is the Imports of goods and Services

Writing equation (5) in a linear form, we have the equation as,

$GDPG_t = \beta_0 + \beta_1 GCF + \beta_2 LABF + \beta_3 MILEX + \beta_4 EXPO + \beta_5 IMP + \varepsilon_t$ ……. *(6)*

β_0 represents intercept; β_i are the coefficients of respective explanatory variables, where i = 1, 2…5. and ε_t is the error term.

The above equation (6) was transformed to a log-linear model for the following reasons;

- To help bring all units to the same level and help the model to be stationary regardless of the unit size of the variable.
- To helps to make the distribution of data more normal. This makes it easier to plot the data on a graph and allows for more accurate analysis since some of the statistical tests require that the data be normally distributed.
- By log transformation of the data, this can help to ensure that the data meets the requirements of the test. Log transformations can help to reduce the impact of outliers in the data, making the results from your analysis more reliable.
- It can help to identify non-linear relationships between variables, which may not be visible with linear transformations.
- Finally, it can help to reduce the skewness of the data, which can make it easier for the model to learn from the data.

The resulting log-linear model was:

$LOGGDPG_t = \beta_0 + \beta_1 LOGGCF + \beta_2 LOGLABF + \beta_3 LOGMILEX + \beta_4 LOGEXPO +$
$\beta_5 LOGIMP + \varepsilon_t$ …… *(7)*

3.5. Estimation procedures

In this empirical analysis, the coefficients of the econometric model are estimated by using Ordinary Least Square (OLS). OLS is the method that estimates the parameters of a regression model by minimizing the total squared residuals.

3.5.1. Unit root tests[9]

The unit root implies that the time series data are non-stationary while absence of a unit root shows that the stochastic process is stationary. The results of using non-stationary time series may be spurious. Therefore, the first step was to carry out unit root test of all the variables. In order to conduct the unit root test, the Augmented Dickey Fuller (ADF) and the Phillips Perron (1988) unit root tests were used. With the null hypothesis of there is a unit root (non-stationary) against the alternative hypothesis (H1) stationary. The general equations are as follows;

The ADF general unit root test equation is given as:

$$\Delta Z_t = \alpha_0 + \alpha_1 t + pZ_{t-1} + \Sigma_{i=1}^{m} \beta_i \Delta Z_{t-1} + \varepsilon_t \quad \text{..... (8)}$$

where Z_t is the time series being tested, m is the number of lags and ε_t is the error term.

Phillips Perron general unit root test equation is given as:

$$\Delta Z_t = \alpha_0 + \alpha_1 Z_{t-1} + \varepsilon_t \quad \text{..... (9)}$$

3.5.2. Estimation technique

The impact of Public expenditure on Economic growth in Uganda was estimated using the Autoregressive Distributed Lag model (ARDL). The use of the ARDL model was informed by the unit root tests which showed that variables were both I (0) and I (1) and also had a long run relationship as shown by the bounds test. The appropriate lag length for each of the underlying variables in the ARDL model was determined to ensure that standard normal error terms do not suffer from non-normality, autocorrelation and Heteroscedasticity. Therefore, the optimum lag length was determined by using the proper model order selection criteria of the Schwarz Bayesian Information Criterion (SBIC) and Akaike information criterion (AIC).

The General ARDL equation;

$$\Delta Y_t = \alpha_0 + \Sigma_{i=1}^{p} \delta_i \Delta Y_{t-i} + \Sigma_{i=0}^{q} \beta_i \Delta X_{t-i} + \varepsilon_{it} \quad \text{..... (10)}$$

where Y_t is a dependent variable, α_0 is constant, δ_i and β_i are coefficients of explanatory variables in which i=1,2…. =p, and i=1, 2...=q and ε_{it} the error term.

[9] Bourbonnais R. (2015), Économétrie, 9èmé édition, 5 rue Laromiguière, 7500 Paris, pp. 249-251

3.6. Diagnosis tests

3.6.1. Serial correlation test

In order to test serial correlation, the Breusch Godfrey serial correlation Lagrange Multiplier (LM) test was used. The null hypothesis is that there is no serial correlation while the alternative, of presence of serial correlation. Serial correlation occurs when errors associated with a given period carry over into future time periods which makes the error term take either an autoregressive process or a moving average process. If NR^2 exceeds the critical Chi-square value at the chosen level of significance, we reject the null hypothesis of autocorrelation. Alternatively, if the probability of chi-square distribution is greater than 0.05 means the errors are not correlated.

3.6.2. Heteroscedasticity test[10]

The Breusch- Pagan LM test was used to determine whether the variance of the errors from a regression is dependent on the values of the independent variables. Heteroscedasticity is when the variance (δ^2) is not the same for all variables, making the standard errors to be inflated. The decision rule is based on the Chi-square test. Calculating NR^2, the sample size (N) times the coefficient of determination (R^2) and then comparing it with the critical chi-square value. If NR^2 is greater than critical Chi-square value, then we reject the null hypothesis of homoscedasticity.

3.6.3. Normality test[11]

The normality test was used to check whether the error term of the model is normally distributed or not given that if the error term of the model is not normally distributed, the estimated model would be biased and the hypothesis testing result will be affected as well. Jarque-Bera normality test was used to see through the normality of the error term. A simple asymptotic test for the normality assumption is given by Jarque and Bera. This is based on the fact that the normal distribution has a skewness measure of zero and a kurtosis of 3 (Badi Baltagi).

For the normal distribution Skewness (S) = 0 and Kurtosis (K) = 3. Hence, the Jarque-Bera (JB) statistic is given by,

$$JB = \text{n}\,[\frac{S^2}{6} + \frac{(K-3)^2}{24}] \quad \ldots\ldots (11)$$

[10] Idem, pp. 142-153

[11] Idem, pp. 244

Where, S = skewness and K = kurtosis of the OLS residuals.

If probability of Jarque-Bera is greater than 0.05 we accept the hypothesis that residuals are normally distributed.

3.6.4. Multicollinearity test[12]

Multicollinearity occurs when there are high correlations between two or more predictor variables. In other words, one predictor variable can be used to predict the other. The variance inflation factor (VIF) was used to identify the correlation between independent variables and the strength of that correlation. When the R-squared and VIF values are high for any of the variables, the model is affected by multicollinearity (Motulsky, 2002). The VIF equation is given as follows;

$$VIF = \frac{1}{1-R^2} \quad \text{..... (12)}$$

3.6.5. Stability tests[13]

Investigating the Stability over time is another important way to check a model. In order to assess the stability of the long-run and short-run coefficients the Cumulative sum of the recursive residuals (CUSUM) and the Cumulative sum of squared recursive residuals (CUSUMQ) were employed in this study. The tests were proposed by Brown et al. (1975). The tests are in graphical nature where the residuals are plotted against the break points for the 5% significance line. The decision is, the coefficients are stable if the plot stay within the 5% significance level.

3.6.6. Specification tests[14]

Model specification refers to the determination of which independent variables should be included in or excluded from a regression equation. The researchers' estimates on the parameters of a model and their interpretation of them depend on the correct specification of the model in order to avoid problems associated with wrongly specifying a model. Model specification error occurs when there involves any omission of relevant variable or inclusion of unnecessary or irrelevant variable or due to the wrong functional form (Gujarati & Porter, 2009). The test used to detect the model specification error is Ramsey's RESET test.

$$y = x\beta + z\alpha + u \quad \text{..... (13)}$$

[12] Idem, pp. 114-118
[13] Idem, pp. 84-86
[14] Idem, pp. 86

Where z contains powers of the predicted values of the dependent variable.

3.7. Conclusion

This chapter first enlightens that there is a methodology that attempts to provide an overview of the econometric methodology of time series. Then comes the variables selected to conduct our analysis, their sources as well as their evolution over the entire study period. We find that the variable to explain, which is in this case the GDPG, has known a considerable evolution during this period.

Chapter Four: Empirical Data Analysis, Discussion and Interpretation

CHAPTER FOUR: EMPIRICAL DATA ANALYSIS, DISCUSSION AND INTERPRETATION

4.1. Introduction

This chapter looks at the findings and discusses the descriptive data analysis, correlation of variables, unit root tests, econometric results of the ARDL model, diagnostic tests and bounds test as an attempt to investigate the impact of public expenditure on economic growth.

4.2. Descriptive Data Analysis

Descriptive data analysis is the use of statistical methods to analyse and summarize the characteristics of data. This analysis seeks to answer questions such as what is the average value of a particular variable, what is the range of values, and what is the distribution of values in the data given. Additionally, descriptive data analysis can be used to determine relationships between variables and to examine the presence of outliers or extreme values. In econometrics, descriptive data analysis techniques are used to identify and analyse trends in economic data. These techniques can also be used to identify potential areas of study in more depth, such as causal relationships between variables.

Table 1 : Descriptive Statistics

	LOGGDPG	LOGGCF	LOGLABF	LOGMILEX	LOGEXPO	LOGIMP
Mean	1.767013	29.08700	16.12327	0.532377	2.545940	3.158257
Median	1.843439	28.94358	16.09883	0.546828	2.554629	3.161167
Maximum	2.444366	31.20680	16.67580	1.088066	3.189659	3.465052
Minimum	1.082248	25.88677	15.65453	-0.021089	1.954802	2.932909
Std. Dev.	0.375442	1.601966	0.303677	0.321195	0.283086	0.135889
Skewness	-0.194896	-0.216213	0.218008	-0.212721	-0.346475	0.333699
Kurtosis	2.171962	1.828873	1.881201	1.947993	2.993567	2.377085
Jarque-Bera	1.116778	2.078041	1.922427	1.716960	0.640295	1.111258
Probability	0.572130	0.353801	0.382428	0.423806	0.726042	0.573711
Sum	56.54441	930.7838	515.9447	17.03605	81.47007	101.0642
Sum Sq. Dev.	4.369650	79.55516	2.858808	3.198153	2.484268	0.572439
Observations	32	32	32	32	32	32

Source: own computations Using Eviews 10

LOGGDPG, LOGGCF, LOGLABF, LOGMILEX, LOGEXPO and LOGIMP signify the Logarithm of Gross Domestic Product Growth, Logarithm of Gross Capital Formation, Logarithm of Labour Force, Logarithm of Military Expenditure, Logarithm of Exports of goods and services and Logarithm of Imports of goods and services respectively.

For the measure of central tendency, the mean ranges in between 0.532377 and 29.08700 with LOGMILEX having the lowest mean and LOGGCF having the highest mean. The Median ranges from 0.546828 to 28.94358 with LOGMILEX having the lowest value and LOGGCF having the highest value. LOGGCF has the highest maximum value of 31.20680 and LOGMILEX has the lowest minimum value of -0.021089.

For the measures of dispersion (how data is spread out); we have the standard deviation that shows how far the observations are from the sample average. LOGGCF is too far from its sample mean compared to other variables with a standard deviation of 1.601966.

Skewness measures the degree of asymmetry of the variables; LOGGDPG, LOGGCF, LOGMILEX and LOGEXPO have negative values of skewness meaning their distribution will have a long left tail indicating more lower values than the sample mean. LOGLABF and LOGIMP have positive values for skewness meaning their distribution will have a long right tail indicating more higher values than the sample mean.

Kurtosis shows the peakness or flatness of the distribution of the variables; Mesokurtic means the variable has a normal distribution with Kurtosis value of 3. Leptokurtic means the variable has a peaked-curve (Kurtosis value greater than 3) and Platykurtic means the variable has a flatted-curve (Kurtosis value less than 3). The results also show that LOGGDPG, LOGGCF, LOGLABF, LOGMILEX, LOGEXPO and LOGIMP are all Platykurtic that is have a flatted-curve because their Kurtosis value is less than 3.

Jarque-Bera is the test statistic that measures the difference of the skewness and Kurtosis of the series with those from the normal distribution while Probability is the probability that a Jarque-Bera statistic exceeds (in absolute value) the observed value under the null hypothesis. LOGGDPG, LOGGCF, LOGLABF, LOGMILEX, LOGEXPO and LOGIMP have all shown the Jarque-Bera probability greater than 0.05 indicating that Growth Domestic Product Growth, Gross Capital Formation, Labour Force, Military Expenditure, Exports of goods and services and Imports of goods and services are all normally distributed.

4.3. Correlation of variables

Correlation is a statistical measure that indicates the extent to which two or more variables fluctuate together. A positive correlation indicates the extent to which those variables increase or decrease in parallel while a negative correlation indicates the extent to which one variable increases as the other decreases. Mathematically, correlation is a measure of the degree of association between two variables and is measured by a coefficient that ranges between -1.0 and +1.0. A correlation of +1.0 indicates a perfect positive correlation, meaning that both variables move in the same direction together while a correlation of -1.0 indicates a perfect negative correlation, meaning that both variables move in opposite directions. A correlation of 0, on the other hand, indicates that there is no relationship between the two variables.

Table 2 : Correlation matrix[15]

Correlation Probability	LOGGDPG	LOGGCF	LOGLABF	LOGMILEX	LOGEXPO	LOGIMP
LOGGDPG	1.000000	-0.319367	-0.357051	0.170951	-0.036143	0.234705
LOGGCF	-0.319367	1.000000	0.975350	-0.539978	0.770078	0.268029
LOGLABF	-0.357051	0.975350	1.000000	-0.469129	0.725605	0.189550
LOGMILEX	0.170951	-0.539978	-0.469129	1.000000	-0.505198	-0.252128
LOGEXPO	-0.036143	0.770078	0.725605	-0.505198	1.000000	0.570483
LOGIMP	0.234705	0.268029	0.189550	-0.252158	0.570483	1.000000

Source: own computations Using Eviews 10

Table 2 shows the correlation matrix used to determine the relationship between the different variables. The results indicate that there is a positive and negative linear relationship between the dependent and independent variables. There is a strong positive correlation of 0.975350 between Gross capital formation and Labour force, a positive correlation of 0.770078 between Exports and Gross Capital Formation, a positive correlation of 0.725605 between Exports and Labour Force and a positive correlation of 0.570483 between Exports and Imports.

4.4. Stationarity test

A stationary test is a statistical test used to determine if a time series data is stationary or not. Stationarity is a property of a time series which means that the mean, variance, and

[15] See appendix two for full table

autocorrelation of the series are all constant over time. If a time series is not stationary, then it is non-stationary and must be transformed before analysis can be conducted. The process of testing for stationarity involves analysing the properties of the time series to determine if they remain constant over time. This can be done using various techniques such as the Augmented Dickey-Fuller test and the Phillips Perron test. Each of these tests assess the stationarity of a time series by analysing its mean, variance, and autocorrelation structure. If the tests determine that the series is non-stationary, then it must be transformed before further analysis can be conducted. The Augmented Dickey-Fuller (ADF) test is one of the most commonly used stationary tests in econometrics. The ADF test is a regression-based test that uses an augmented autoregressive model to test for the presence of a unit root in the series. If a unit root is present, the time series is said to be non-stationary.

Table 3. Results of ADF Unit Root Test[16]

Models / Variables	ADF at Level								ADF at 1st Difference		ADF at 2nd Difference		ORDER (I)
	Trend and Intercept		Intercept				None						
	ß	Tab ADF	C	Tab ADF	φ	Tab ADF	φ	Tab ADF	φ	Tab ADF	φ	Tab ADF	
LOGGDPG	1.61	2.79	3.97	2.54	-4.11	-2.96	-	-	-	-	-	-	I(0)
LOGGCF	1.97	2.79	2.55	2.54	-2.27	-2.96	-	-	-5.42	-2.96	-	-	I(1)
LOGLABF	0.48	2.79	4.66	2.54	4.76	-2.97	-	-	-4.84	-2.96	-	-	I(1)
LOGMILEX	1.45	2.79	2.44	2.54	-	-	-1.32	-1.95	-5.26	-1.95	-	-	I(1)
LOGEXPO	1.74	2.79	2.45	2.54	-	-	0.54	-1.95	-6.37	-1.95	-	-	I(1)
LOGIMP	0.29	2.79	2.83	2.54	-2.81	-2.96	-	-	-6.60	-1.95	-	-	I(1)

Source: own computations Using Eviews 10

The results of the unit root test for Augmented Dickey fuller are indicated in table 3 above. The results for indicate that the Gross Domestic Product Growth (LOGGDPG) is stationary at level thus integrated of Order zero (I (0)), with the significance of an intercept. Gross Capital Formation (LOGGCF), Labour Force (LOGLABF) and Imports of goods and

[16] See appendix One for detailed results

services (LOGIMP) are non-stationary at levels but became stationary after the first difference implying that they are of Order One (I (1)), with the significance of an intercept. Military Expenditure (LOGMILEX) and Exports of goods and services (LOGEXPO) are non-stationary at levels but became stationary after the first difference implying that they are of Order One (I (1)), at none (trend and intercept, intercept are all not significant). The stationarity test shows that one variable is integrated at the level (I (0)) while others are integrated in first difference (I (1)). Hence the conditions for the use of ARDL model of Pesaran et al. (2001) are satisfied.

4.5. Estimation of the model

The study adopted the ARDL with the error correction term approach in the presence of both orders of integration at I (0) and I (1) to test for the existence of the long run and short run relationships. ARDL stands for Autoregressive Distributed Lag, and it is a cointegration technique used to estimate long-run equilibrium relationships between variables. It is a powerful tool for analysing time series data as it allows for both short-run and long-run estimations in econometrics. The optimal lags for the study variables was selected using the Akaike information criterion (AIC) with maximum lag length of one as indicated in the Appendix. The determination of the number of lags in our ARDL model is shown in the following table.

4.5.1. Lag Selection

Table 4: ARDL Lag Selection results[17].

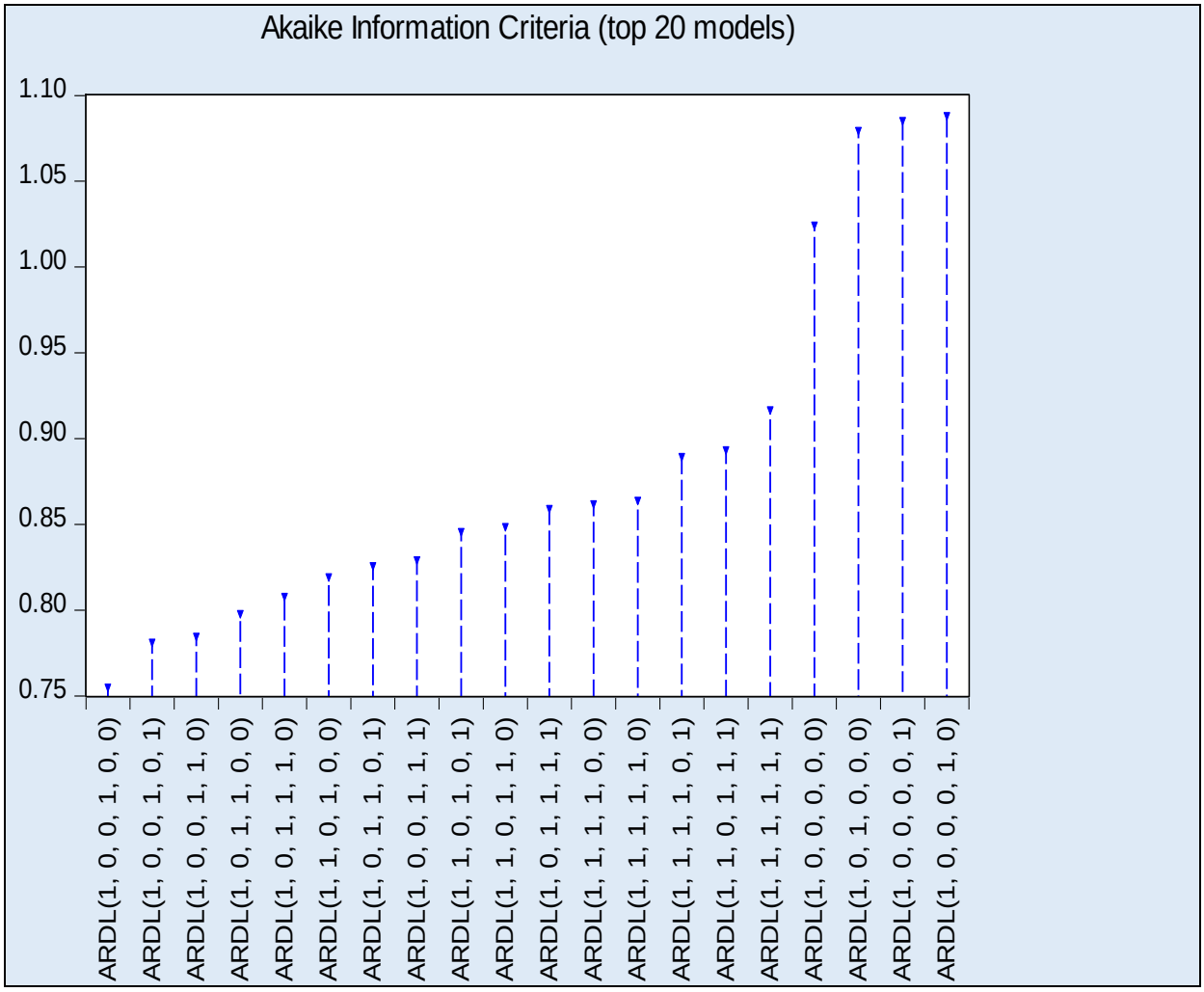
Model	LogL	AIC*	BIC	HQ	Adj.R-sq	Specification
28	**-3.703589**	**0.755070**	**1.125131**	**0.875701**	**0.310318**	**ARDL (1,0,0,1,0,0)**
27	-3.109483	0.781257	1.197576	0.916967	0.306083	ARDL (1,0,0,1,0,1)
26	-3.160958	0.784578	1.200897	0.920287	0.303775	ARDL (1,0,0,1,1,0)
20	-3.366171	0.797817	1.214136	0.933527	0.294496	ARDL (1,0,1,1,0,0)
18	-2.524088	0.808006	1.270583	0.958794	0.299983	ARDL (1,0,1,1,1,0)
12	-3.699829	0.819344	1.235663	0.955053	0.279144	ARDL (1,1,0,1,0,0)
19	-2.799122	0.825750	1.288326	0.976538	0.287451	ARDL (1,0,1,1,0,1)
25	-2.852590	0.829199	1.291776	0.979988	0.284988	ARDL (1,0,0,1,1,1)
11	-3.108426	0.845705	1.308281	0.996493	0.273089	ARDL (1,1,0,1,0,1)
10	-3.152978	0.848579	1.311156	0.999368	0.270996	ARDL(1,1,0,1,1,0)

Source: own computations Using Eviews 10

[17] See appendix three for full table

The optimal lag is the one that minimizes the criteria of AIC and SC, the lag retained is then 1 for Gross Domestic Product Growth GDPG), 0 for Gross Capital Formation (GCF), 0 for Labour Force (LABF), 1 for Military Expenditure (MILEX), 0 for Exports of goods and services and 0 for Imports of goods and services.

Figure 07: Lag Selection Results



Source: own computations Using Eviews 10

The figure shows that the optimum lag length for our ARDL model is (1,0,0,1,0,0) for LOGGDPG, LOGGCF, LOGLABF, LOGMILEX, LOGEXPO, and LOGIMP respectively.

4.5.2. Estimation of ARDL (1,0,0,1,0,0) model

Table 5. Results of ARDL (1,0,0,1,0,0) model

Selected Model: ARDL (1,0,0,1,0,0)				
Variable	Coefficient	Std. Error	t-statistic	Prob.*
LOGGDPG (-1)	-0.016604	0.193233	-0.085927	0.0023
LOGGCF	-0.085544	0.208429	-0.410424	0.0053
LOGLABF	-0.582477	1.039550	-0.560316	0.0007
LOGMILEX	0.699554	0.289851	2.413497	0.0042
LOGMILEX (-1)	-0.974054	0.322601	-3.019373	0.0061
LOGEXPO	0.267750	0.439757	0.608860	0.0086
LOGIMP	1.202738	0.612961	1.962177	0.0062
C	9.345582	11.67460	0.800506	0.0016
R-squared	0.471244	Mean dependent var		1.763761
Adjusted R-squared	0.310318	S.D. dependent var		0.381189
S.E. of regression	0.316567	Akaike info criterion		0.755070
Sum squared resid	2.304932	Schwarz criterion		1.125131
Log likelihood	-3.703589	Hannan-Quinn criter.		0.875701
F-statistic	2.928332	Durbin-Watson stat		2.412294
Prob (F-statistic)	0.024058			

Source: own computations Using Eviews 10

The results show that the Imports of goods and services of 2021, Exports of goods and services of 2021 and Military Expenditure of 2021 have a positive impact on economic growth meanwhile the Gross Capital Formation of 2021, Labour Force of 2021, and Military Expenditure of 2020 have a negative impact on economic growth. It is also observed that the variables are non-significant because their probabilities are greater than 0.05, apart from Military Expenditure of 2020 and of 2021. The probability of Fisher (Prob(F-statistic)) is less than 0.05 implying that the model is globally good. The Durbin-Watson statistic (2.412294) shows that our model is authentic.

4.5.3. ARDL Bounds test

The ARDL bounds test is employed to test the null hypothesis that no co-integration exists against the alternative hypothesis that the co-integration exists between the variable of interest Gross Domestic Product Growth and the explanatory variables Gross Capital Formation, Labour Force, Military Expenditure, Exports of goods and services and Imports of

goods and services. The results of F-bounds test and t-bounds test on the model are shown in the following table.

Table 6. Results of Bounds test[18]

F-statistic:= 6.10		
Level of Significance	Order of Integration	
	I(0)	I(1)
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68
t-statistic:= 5.26		
Level of Significance	Order of Integration	
	I(0)	I(1)
10%	2.57	3.86
5%	2.86	4.19
2.5%	3.13	4.46
1%	3.43	4.79

Source: own computations Using Eviews 10

The results for the ARDL bound test as shown in Table 6 above indicate that the F-statistics=6.10 and the t-statistic=5.26 are all greater than the critical bound values at all significant levels (1%, 2.5%, 5% and 10%). This means that the variables are co-integrated at level 1%, 2.5%, 5% and 10%. Therefore, the overall ARDL bounds test results exhibit co-integration thus indicating that there is a long run relationship among the variables.

4.5.4. Long-Run ARDL Regression Results

After finding there is long run relationship between the variables of study the following long run ARDL model was estimated.

[18] See appendix five for full table

Table 7. Results of Long-run ARDL model[19]

Levels Equation Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-statistic	Prob.
LOGGCF	-0.084147	0.207953	-0.404645	0.0005
LOGLABF	-0.572963	0.995665	-0.575458	0.0006
LOGMILEX	-0.270017	0.278121	-0.970861	0.0017
LOGEXPO	0.263377	0.414382	0.635591	0.0013
LOGIMP	1.183094	0.653391	1.810698	0.0033
EC = LOGGDPG – (-0.0841*LOGGCF – 0.5730*LOGLABF – 0.2700*LOGMILEX + 0.2634*LOGEXPO + 1.1831*LOGIMP)				

Source: own computations Using Eviews 10

In functional form, this estimated relation is written as follows:

$$LOG(GDPG_t) = -0.08LOG(GCF_t) - 0.57LOG(LABF_t) - 0.27LOG(MILEX_t) + 0.26LOG(EXPO_t) + 1.18LOG(IMP_t) \quad \ldots\ldots (14)$$

After the estimation of the long-term relation, it is observed that Exports of goods and services and Imports of goods and services have a positive impact on economic growth and on the contrary, it is seen that Gross Capital Formation, Labour Force, Military Expenditure and have a negative impact on economic growth. Statistically, it can be seen that the Gross Capital Formation, Labour Force, Military Expenditure, Exports of goods and services and Imports of goods and services present a student statistic lower than 1.96 and the probability less than 0.05 so the null hypothesis thus accepted, demonstrating that in the long term the variables are significant.

Gross capital formation in Uganda has a negative effect on economic growth because when government and businesses invest less, the country's economic output will decrease. This decrease in economic output means that fewer jobs will be created and wages will remain low. Low wages in turn mean lower consumer spending which further reduces economic output. This cycle of reduced economic output leading to lower wages and consumer spending can cause a prolonged period of stagnation in the economy. The inadequate investment in infrastructure and other long-term investments limits the ability of businesses to expand and also limits the ability of the government to provide services to its citizens. The limited investment in infrastructure makes it more difficult for businesses to

[19] See appendix four for full table

access outside markets and reduces the ability of the economy to grow. Another most significant reason is that capital investment might not be used effectively. Poorly planned projects and a lack of skilled labour can lead to capital being wasted, diminishing returns on investments, and a decrease in the overall capital available to the economy. Additionally, if capital investment is not channelled into the right areas or rather corruption, it can lead to too much investment in one sector and not enough in others, leading to an unbalanced economy and slower growth. A one percent increase in Gross Capital Formation leads to a 0.08% decrease in economic growth.

The main reason for the negative impact of the labour force on economic growth in Uganda is due to the high population growth rate. As the population growth rate increases, the amount of available jobs do not increase in proportion and the labour force becomes more competitive. This reduces the wages for labourers and increases the cost of production, which in turn affects the economic growth of Uganda. Additionally, the lack of adequate education, skills, and training is also a major factor in the negative impact of the labour force on economic growth in Uganda. A one percent increase in Labour Force leads to a 0.57% decrease on economic growth.

Military expenditure often generates significant negative impacts on Uganda's economic growth. This is because military expenditure competes with other components of the government budget such as education, health, and infrastructure, which are essential for economic growth. Furthermore, military expenditure in Uganda leads to higher taxes, which can have a negative effect on consumer spending and investment. In addition, increased military spending in Uganda increases the public debt which also leads to negative economic growth. The government has diminishing returns from military spending as the more money it spends on defence; the less money it has to invest in other areas of the economy. This leads to lower economic growth rates as resources are diverted away from productive activities. A one percent increase in military expenditure leads to a 0.27% decrease in Economic growth.

Exports of goods and services have a positive effect on economic growth because they increase a nation's foreign exchange earnings. This foreign exchange can then be used to invest in other areas of the economy such as infrastructure and consumer goods. Additionally, exporting goods and services encourages competition and innovation, which also drives economic growth in the long run.

Exports of goods and services can have a positive effect on economic growth in Uganda by increasing the demand for the country's products and services which can lead to increased

production and employment opportunities. This can help to boost the country's economy and raise its overall GDP. Exports bring in foreign currency which can be used to pay for imports that are necessary for the country's development. Exports of goods and services also help to increase the flow of money into the economy. This money can be used to create jobs, improve infrastructure and stimulate investment. By increasing the demand for Ugandan goods and services, exports can also help to grow and diversify the country's economy. A one percent increase on Exports of goods and services leads to a 0.26% increase on economic growth.

Imports of goods and services have a positive impact on economic growth primarily due to the increased levels of capital, labour, and productivity and because they provide access to resources and products that are not available domestically, thus stimulating competition and allowing businesses to produce goods and services more efficiently and cost-effectively. The increased influx of goods and services can lead to increased spending, investment, and job creation which in turn can help to drive economic growth. Additionally, the imports of goods and services can also help to diversify Uganda's economy and bring in new technology and expertise that can be used to drive economic growth. A one percent increase on imports of goods and services leads to a 1.18% increase on economic growth.

4.5.5. Results of ECM model

The Error-Correction Model (ECM) is a statistical model used in econometrics to capture the dynamics and short-run fluctuations in a time-series regression. It is a type of dynamic linear regression model which is useful in capturing the effects of lagged variables on the current values of the dependent variable. The ECM is an extension of the usual linear regression model and incorporates lagged values of the dependent variable in the regression equation. The ECM is useful in certain situations where the effects of lagged variables on the current values of the dependent variable is important. This helps explain the dynamics of the series and the direction of causation between the independent and dependent variables.

Table 8. Results of ECM model[20]

ECM Regression Case 3: Unrestricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-statistic	Prob.
C	9.345582	1.402829	6.661953	0.0000
D(LOGMILEX)	0.699554	0.225432	3.103164	0.0050
CointEq(-1)*	-1.016604	0.152241	-6.677605	0.0000
R-squared	0.647955	Mean dependent var		-0.019505
Adjusted R-squared	0.622809	S.D. dependent var		0.467164
S.E. of regression	0.286913	Akaike info criterion		0.432490
Sum squared resid	2.304932	Schwarz criterion		0.571263
Log likelihood	-3.703589	Hanna-Quinn criter.		0.477726
F-statistic	25.76764	Durbin-Watson stat		2.412294
Prob(F-statistic)	0.000000			

Source: own computations Using Eviews 10

The overall significance of the model presented above demonstrates that globally the model is valid and it can be used for the prediction of economic growth as the Prob(F-statistic) which is the measure of the global significance of the model is largely statistically significant. The R-squared indicates that the total variation of LOGGDP is well explained by its explanatory variables involved in the model at approximately 64% implying that the independent variables used in the model jointly explain almost 64% of the total variation in the economic growth in Uganda. The D-W statistic is approximately 2 which is also a good sign that the model does not suffer from autocorrelation, further-more this D-W statistic is also greater than the R-squared which implies that the regression is not spurious.

It is also observed that in the short-run, it is only Military Expenditure that explains economic growth in Uganda and it has a positive impact on economic growth. A one percent increase in military expenditure leads to a 0.69% increase in Economic growth.

The coefficient of error correction term (ECM) is negative and significant, showing that the model has a self-adjusting mechanism for adjusting the short-run dynamics of the variables with their long-run values. The speed of adjustment to equilibrium is given by the coefficient of CointEq (-1) as -1.01, which implies that the speed of adjustment to equilibrium after a

[20] See appendix six for full table

shock is high. This indicates that a deviation of economic growth from equilibrium is corrected by as high as approximately 100 percent. When the level of GDP is above equilibrium it will be pulled back to equilibrium because the adjustment parameter is negative.

4.6. Diagnostic Tests.

Several diagnostic tests were conducted to ensure that our estimated ARDL (1, 0, 0, 1, 0, 0) model is free from serial correlation, heteroscedasticity, stability, normality and specification error.

4.6.1. Test for Serial Correlation

Breusch-Godfrey Serial Correlation test was performed and the results are shown below:

Table 9. Breusch-Godfrey Serial Correlation (LM) Test[21]

Breusch-Godfrey Serial Correlation LM Test:			
F-Statistic	2.606530	Prob. F(2.21)	0.0975
Obs*R-squared	6.165051	Prob. Chi-Square(2)	0.0458

Source: own computations Using Eviews 10

The results show that the probability of F-Statistic is greater than 0.05 thus rejecting the hypothesis of serial correlation of errors. Therefore, it can be concluded that there is no serial correlation of errors in the model.

4.6.2. Heteroscedasticity Test

Breusch-Pagan-Godfrey heteroscedasticity test was conducted to make sure all residuals are homoscedastic.

Table 10. Breusch-Pagan-Godfrey Heteroscedasticity Test[22]

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.464983	Prob. F(7.23)	0.8496
Obs*R-squared	3.843143	Prob. Chi-Square (7)	0.7977
Scaled explained SS	1.593008	Prob. Chi-Square (7)	0.9789

Source: own computations Using Eviews 10

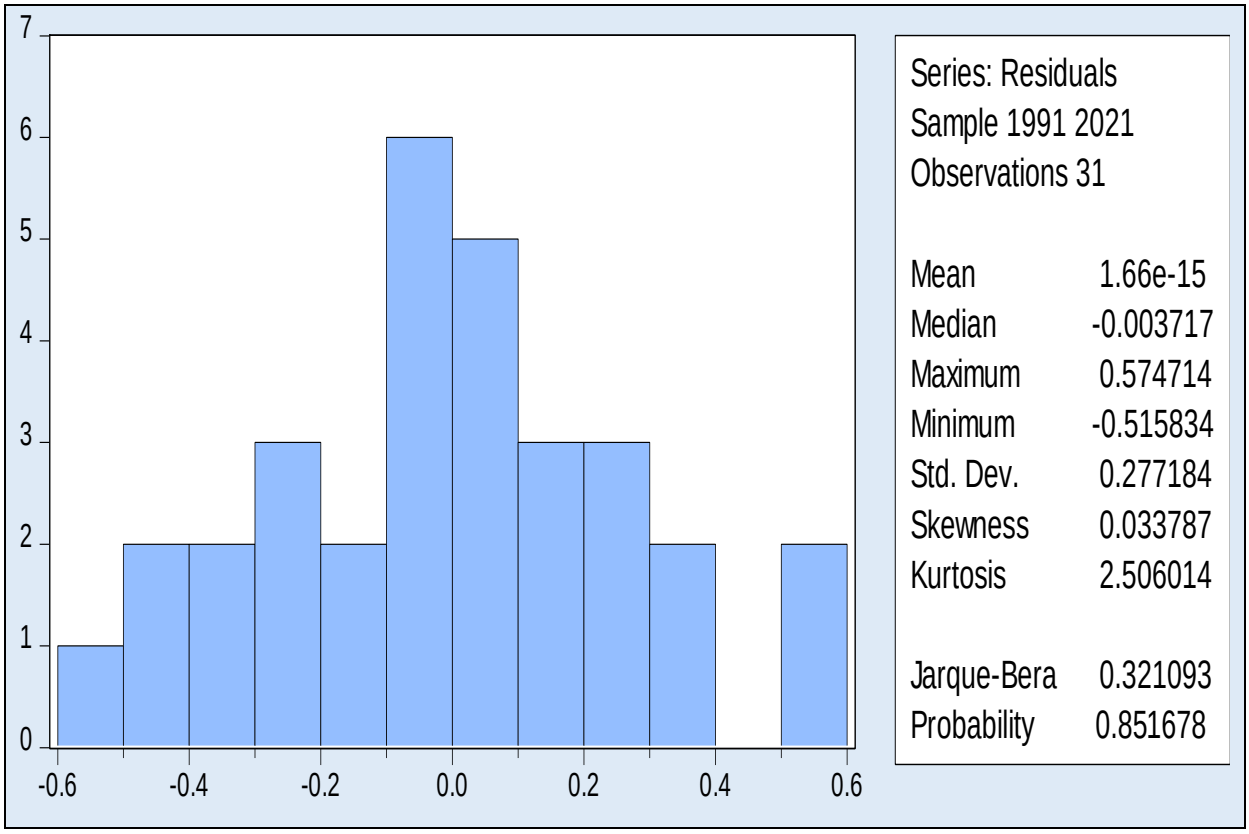
[21] See appendix seven for full results
[22] See appendix eight for full table

The results show that the probability of F-statistic and Chi-square are greater than 0.05 so we accept the null hypothesis of homoscedastic. This show that the residuals of the model do not have the problem of heteroscedasticity.

4.6.3. Test for Normality

The histogram test was applied for checking the normality of residuals. The histogram is shown together with the probability for Jarque-Bera statistic to test for normality. If the p-value of Jarque-Bera is greater than 0.05 then the residuals are normally distributed.

Figure 08. Histogram for Normality Test



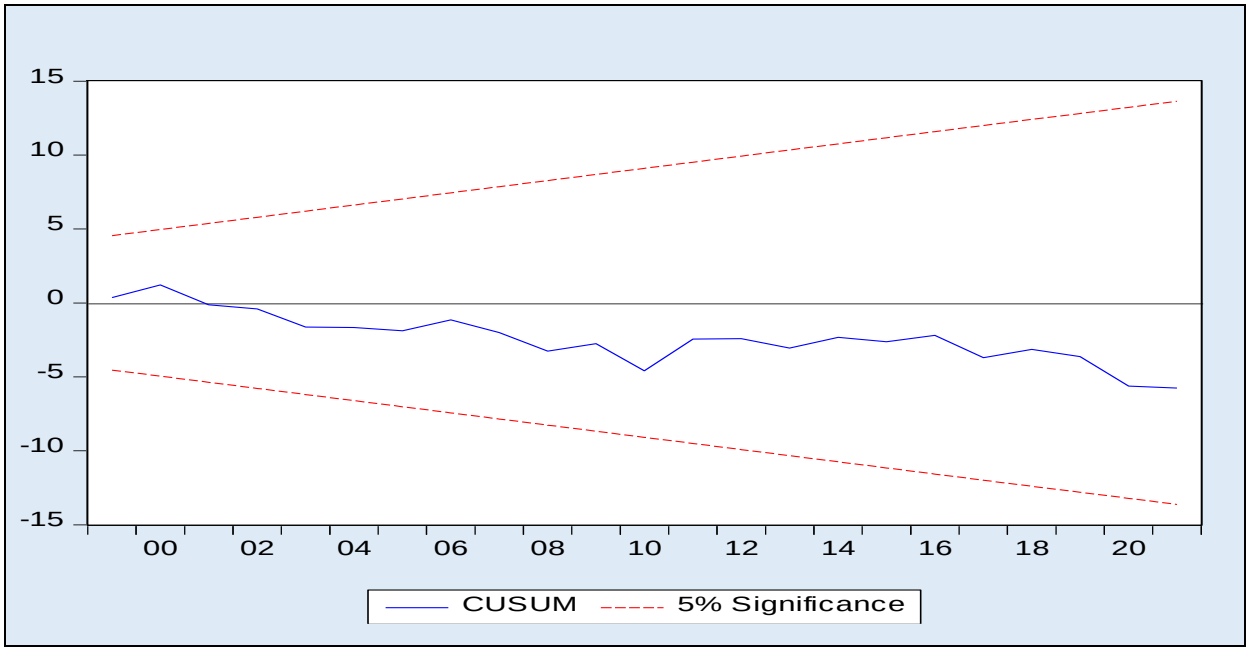
Source: own computations Using Eviews 10

The residuals are normally distributed because the probability of Jarque-Bera is 0.85 which is greater than 0.05.

4.6.4. Test for Stability

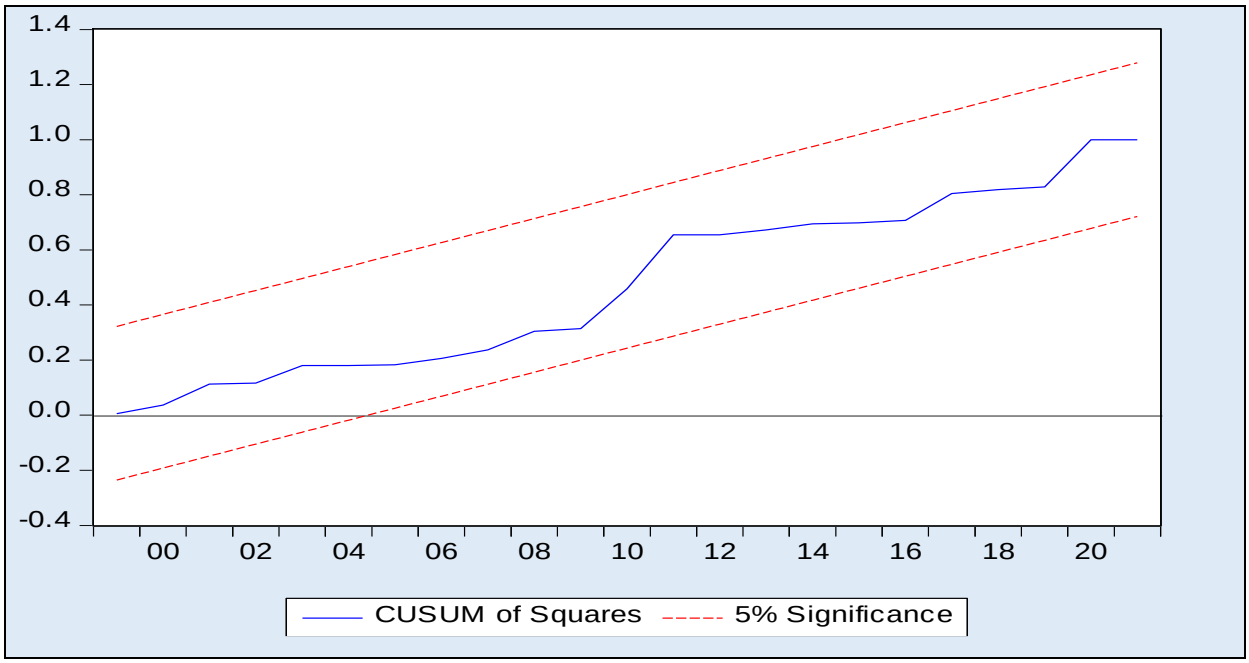
The CUSUM and CUSUMQ test for stability of the long-run and short-run coefficients were carried out to further enhance the reliability of our results.

Figure 09. The CUSUM Test for Stability



Source: own computations Using Eviews 10

Figure 10. The CUSUMQ Test for Stability



Source: own computations Using Eviews 10

The CUSUM and CUSUMQ test is carried out on the residuals of the estimated model and makes it possible to show the stability of the model. Thus we can see on the graphic representation that the curve is between the two lines of the critical values at the 5% threshold. We can thus conclude that the parameters are stable so it is the true relationship that binds economic growth and public expenditure.

4.6.5. Specification Error Test

The results of Ramsey Regression Specification Error Test (RESET) are presented in the table below:

Table 11. RESET Test[23]

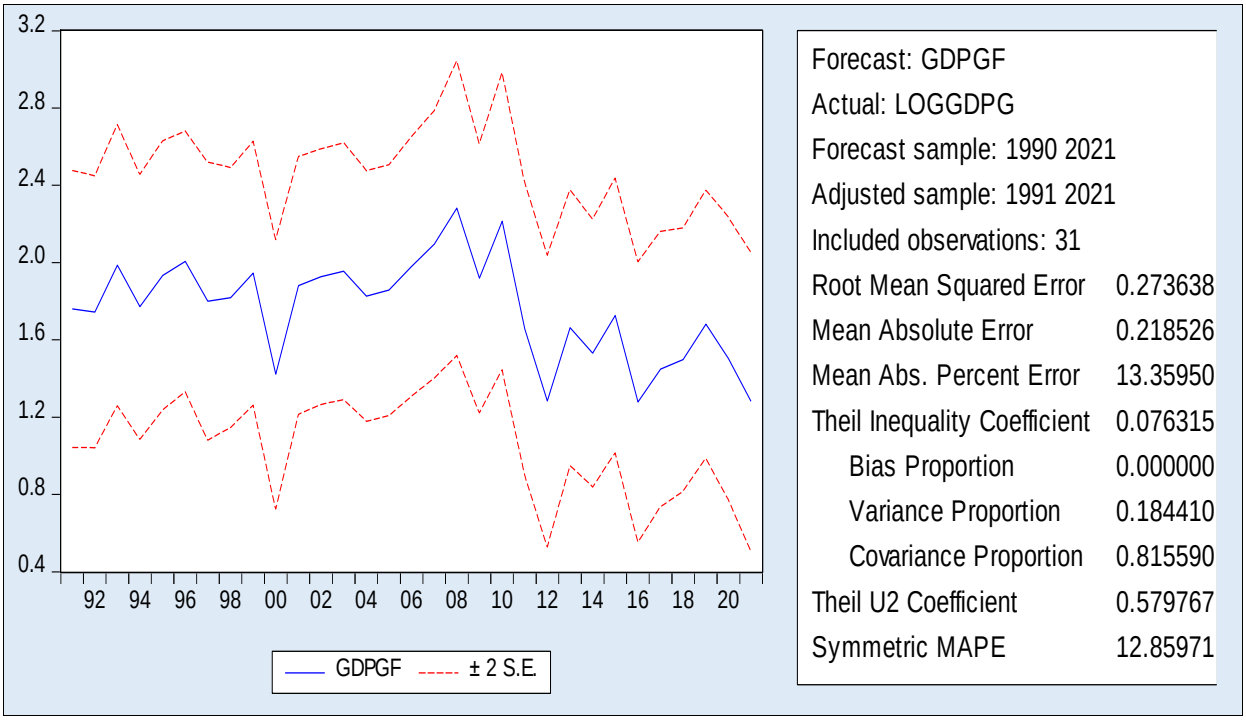
	Value	df	Probability
t-statistic	0.437768	22	0.6658
F-statistic	0.191641	(1,22)	0.6658

Source: own computations Using Eviews 10

The results show that the probability of F-statistic (0.6658) and t-statistic (0.6658) are greater than 0.05 meaning that the null hypothesis of no misspecification in the model is accepted. The variables in our ARDL (1, 0, 0, 1, 0, 0) are specified well.

4.7. Forecast of GDP

Figure 11. Forecast of GDP



Source: own computations Using Eviews 10

We observe from the GDP reconstructed by the model in Figure 17 that:

- the adjusted GDP is almost perfect because the Theil inequality coefficient (0.07) is close to zero;

[23] See appendix nine for full table

- the difference between the average of the real series and the simulated one is nil (bias proportion equal to 0.00). Moreover, the difference between the variation of the two series is indicated by the variance proportion whose value is 0.18.

4.8. Conclusion

It emerges in this chapter that most series were non-stationary and integrated of different orders, this was witnessed when performing unit root tests. We therefore subsequently opted for an ARDL model because of the non-stationary characteristics of the variables in the study carried and them being integrated of different orders. Following the various simulations carried out, the estimated model successfully passed the various validity tests and can be used for forecasting purposes. Finally, the model was validated as all diagnostic tests were found to be good.

Chapter Five: Summary, Conclusions and Policy Recommendations

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1. Introduction

This final chapter presents the summary of major findings in our study, brings the conclusion of the study, policy recommendation to the Ugandan government and then the presentation of the limitations of the study and recommendations for the future researchers.

5.2. Summary of the Study.

The study examines the Impact of public expenditure on Economic growth in Uganda for the period 1990 to 2021 using time series data from the World Development Indicators (WDI) published by the World Bank for macroeconomic variables. Gross Domestic Product Growth (GDPG) is the dependent variable and the independent variables are Gross Capital formation (GCF), Labour Force (LABF), Military Expenditure (MILEX), Exports of goods and services (EXPO) and Imports of goods and services (IMP).

The descriptive statistics and ARDL method was estimated for the study. The stationarity of the variables was established using the ADF unit root test, the ARDL model using time series data was estimated to determine both the long and short run relationship between the dependent and independent variables.

The ARDL bounds test of cointegration for the ARDL (1,0,0,1,0,0) proved the existence of long-run relationship between the variables. The long-run ARDL model shows Exports of goods and services and Imports of goods and services have a positive impact on Uganda's economic growth while gross capital formation, labour force and military expenditure have a negative impact. The short-run ARDL model shows that only Military Expenditure explains economic growth in Uganda in the short-run and it has a positive impact on economic growth, implying that other variables (gross capital formation, labour force, exports of goods and services and imports of goods and services) are not capable to explain economic growth in the short-run. The coefficient of adjustment term in the ECM model is negative and significant which shows that the model has a self-adjusting mechanism. The model estimated is valid both statistically and economically as it possesses all diagnostics and is globally significant, therefore it can be applied in so many uses such as forecasting and policy analysis.

5.3. Conclusion

Generally, the government in Uganda spends on various variables but due to the unavailability of data, this study used only five variables and measured their power in explaining economic growth. Among these variables only exports of goods and services and imports of goods and services are found to have a long-run positive significant impact on economic growth, which shows the country is benefiting with international trade. International trade exposure among Ugandans and high economic diversification in the country impacts the country's ability to benefit and compete in the international trade. On the other hand, gross capital formation, labour force and military expenditure are found to have a negative impact on economic growth.

Public expenditure on Exports of goods and services has a positive effect on economic growth in the long-run because they increase a nation's foreign exchange earnings. This foreign exchange can then be used to invest in other areas of the economy such as infrastructure and consumer goods. Additionally, exporting goods and services encourages competition and innovation, which also drives economic growth in the long run.

Exports of goods and services can have a positive effect on economic growth in Uganda by increasing the demand for the country's products and services which can lead to increased production and employment opportunities. This can help to boost the country's economy and raise its overall GDP.

Public expenditure on Imports of goods and services has a positive impact on economic growth primarily due to the increased levels of capital, labour, and productivity and because they provide access to resources and products that are not available domestically thus stimulating competition and allowing businesses to produce goods and services more efficiently and cost-effectively. The increased influx of goods and services can lead to increased spending, investment, and job creation which in turn can help to drive economic growth. Additionally, the import of goods and services can also help to diversify Uganda's economy and bring in new technology and expertise that can be used to drive economic growth.

Public expenditure on Gross capital formation in Uganda has a negative effect on economic growth in the long-run because when government and businesses invest less, the country's economic output will decrease. This decrease in economic output means that fewer jobs will be created and wages will remain low. Low wages in turn mean lower consumer spending which further reduces economic output. This cycle of reduced economic output

leading to lower wages and consumer spending can cause a prolonged period of stagnation in the economy.

Labour force was also found to negatively contribute economic growth in the long-run. The quality of human capital skills given to the labour force, significant unemployment rate and low female labour force participation rate might be the factors behind this negative contribution of labour force to economic growth.

Military expenditure in the long-run generates significant negative impacts on Uganda's economic growth. This is because military expenditure competes with other components of the government budget such as education, health, and infrastructure, which are essential for economic growth. Furthermore, military expenditure in Uganda leads to higher taxes, which can have a negative effect on consumer spending and investment. In addition, increased military spending in Uganda increases the public debt, which also leads to negative economic growth. In the short-run, Military expenditure has a positive effect on economic growth in Uganda because it helps to improve the country's security and stability which can attract foreign investment and increase the overall economic growth. Military expenditure can also have a positive effect on economic growth in Uganda by increasing the overall level of economic activity. This is because military expenditure acts as a form of government spending which can lead to the creation of jobs and the development of infrastructure both of which have a positive effect on economic growth. Additionally, military spending can also provide a boost to the economy by increasing consumer spending as military personnel and their families have an increased purchasing power.

5.4. Policy recommendations

Results show that increase in gross capital formation leads to a decrease in economic growth, therefore in order to correct the negative impact of gross capital formation on economic growth in Uganda, a few different strategies can be employed. Firstly, the government should focus on creating an environment that is conducive to investment, by taking steps to improve the business climate and reduce regulatory burdens. This may include providing tax incentives for businesses that are willing to invest in the country or enacting reforms to make it easier for businesses to start and operate.

Secondly, the government should focus on increasing access to financing for businesses. This could include providing financial support to enable businesses to access credit and other forms of financing. It could also involve developing financial instruments that enable businesses to raise capital from external sources. Thirdly, the government should focus on

improving the infrastructure in the country. This could involve investing in projects to upgrade the roads, bridges, ports, and other transportation networks. It could also involve investing in projects to improve access to electricity and other forms of energy.

Finally, the government should focus on developing the human capital in the country. This could involve investing in education and healthcare as well as providing job training and other forms of support to help Ugandans develop the skills necessary to succeed in the modern economy.

In order to correct the negative impact of labour force on economic growth in Uganda, the government should increase the employability of the Ugandan workforce by introducing and implementing labour market reforms that make it easier for employers to hire workers. This includes making the labour market more flexible and reducing the costs of hiring and firing workers. Secondly, the government should invest in job creation and entrepreneurship. This includes creating incentives for businesses to start up and grow as well as providing financial and technical assistance to promote entrepreneurship. This could also include providing training and education opportunities to promote the development of skills needed to succeed in the job market. Thirdly the government should also introduce social protection measures to assist vulnerable workers. This could include providing access to health care, pension benefits, and other protections to low-income workers. The government should also invest in infrastructure and education. This includes improving access to transportation, electricity, and other public services as well as investing in the educational system to ensure that the workforce is adequately prepared for the job market. Finally, the government should introduce measures to reduce inequality. This includes measures to reduce gender discrimination, reduce discrimination against minorities, and reduce the barriers to employment for disadvantaged groups. By implementing these measures, Uganda can improve the labour force's contribution to economic growth and reduce the impact of labour force on economic growth.

In order to address the negative impact of military expenditure on economic growth in Uganda, the government should first analyse the current economic growth indicators of the country and identify the sectors in which economic growth has been stagnant or declining and understand the reasons for the same. This can help in understanding how military expenditure has been affecting economic growth. The government should review the existing military expenditure patterns in Uganda and assess how it has been affecting economic growth in the chosen sectors. The government should also review the budget allocation for military

expenditure vis-a-vis other sectors and determine if there is a need to reduce or shift the budget allocations.

Based on the analysis, the government should then develop a plan to correct the negative impact of military expenditure on economic growth. This could include reducing military expenditure or reallocating resources to other sectors. The plan would also outline the steps that need to be taken to ensure effective implementation of the plan.

Finally, the government should analyse the impact of the plan and monitor the implementation of the same. This would help in assessing the effectiveness of the plan and take corrective action, if required.

In order to improve the positive impact of exports and imports of goods and services on economic growth in Uganda, the government should increase investment in infrastructure; Investing in infrastructure such as roads, ports, and other logistics is essential for boosting exports and imports in Uganda. This will create a more efficient and effective system for moving goods and services in and out of the country leading to greater economic growth.

Secondly, the government should invest in human capital development. Investing in human capital such as education and training will help create a skilled workforce that is capable of producing higher quality goods and services that can be exported. This will create economic opportunities and increase economic growth. Thirdly, the government should establish trade agreements. Establishing trade agreements with other countries can open up new markets for Ugandan exports and imports. This will provide greater access to foreign markets which will allow Ugandan businesses to increase their sales and expand their operations.

The government should also encourage foreign investment. Encouraging foreign investment in Ugandan businesses will provide the capital needed for businesses to grow and expand. This will create more jobs and lead to greater economic growth.

Finally, the government should improve the business climate. Improving the business climate in Uganda will make the country more attractive to foreign investors. This will create more opportunities for businesses to expand their operations and increase economic growth.

5.5. Limitations of the Study

Restricting discussion to limitations related to the research problem under investigation is of great significance since all studies have limitations. Due to lack of data and the existence of some missing data for some years on certain variables such as government expenditure on education, infrastructure and health, the scope of the study had to be limited only to the variables involved and ignore some like government expenditure on education, infrastructure and health

which in one way or another we really wished to include them in this study as they have an exceptional significance in determining the impact of public expenditure on economic growth in Uganda.

5.6. Areas for further study

Firstly, future researchers are advised to examine the relationship between public investment and economic growth in Uganda. This could include looking at the types of public investments made, their impact on economic growth, and any differences in the impact of these investments across sectors. They could also explore the role of the government in providing economic incentives to encourage private investment, the effectiveness of these incentives and the impact on economic growth.

Secondly, they should consider the impact of government policies and regulations on economic growth in Uganda. This could include looking at the effects of government policies such as taxation, public procurement, and labour regulations on economic growth. They could also explore the impact of regional or international organizations on the economy of Uganda such as any agreements or loans that have been made with foreign entities.

Thirdly, they could consider the role of social and cultural capital in economic growth. This could include looking at the role of traditional institutions and values in promoting economic growth, as well as the role of civil society organizations in influencing economic outcomes. They could also examine the impact of gender, ethnicity, and other factors on economic growth in Uganda.

The future researchers are also advised to use other indicators for the independent variables for example political risk index, which is an institutional indicator reflecting government stability, socioeconomic conditions, corruption, the conduct of democracy, the quality of the bureaucracy. The researchers also may use monthly, quarterly and semi-annual data instead of using annual data.

Finally, they should analyse the impact of external shocks on economic growth in Uganda.

This could include looking at the effects of natural disasters, war and economic downturns on economic growth.

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Appendices

APPENDICES

APPENDIX ONE: UNIT ROOT TEST

Null Hypothesis: LOGGDPG has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.113257	0.0032
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGGDPG)
Method: Least Squares
Date: 05/01/23 Time: 13:45
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGDPG(-1)	-0.766349	0.186312	-4.113257	0.0003
C	1.347099	0.339095	3.972631	0.0004

R-squared	0.368452	Mean dependent var	-0.019505
Adjusted R-squared	0.346674	S.D. dependent var	0.467164
S.E. of regression	0.377602	Akaike info criterion	0.952389
Sum squared resid	4.134916	Schwarz criterion	1.044904
Log likelihood	-12.76203	Hannan-Quinn criter.	0.982547
F-statistic	16.91889	Durbin-Watson stat	1.966761
Prob(F-statistic)	0.000294		

Null Hypothesis: LOGGDPG has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.507361	0.0059
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGGDPG)
Method: Least Squares
Date: 05/01/23 Time: 13:39
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGDPG(-1)	-0.852279	0.189086	-4.507361	0.0001
C	1.698580	0.395795	4.291567	0.0002
@TREND("1990")	-0.012390	0.007695	-1.610104	0.1186

R-squared	0.421970	Mean dependent var	-0.019505
Adjusted R-squared	0.380682	S.D. dependent var	0.467164
S.E. of regression	0.367643	Akaike info criterion	0.928357
Sum squared resid	3.784519	Schwarz criterion	1.067130
Log likelihood	-11.38953	Hannan-Quinn criter.	0.973593
F-statistic	10.22018	Durbin-Watson stat	1.970813
Prob(F-statistic)	0.000465		

Null Hypothesis: D(LOGGCF) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.427639	0.0001
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGGCF,2)
Method: Least Squares
Date: 05/01/23 Time: 14:24
Sample (adjusted): 1992 2021
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGGCF(-1))	-0.990035	0.182406	-5.427639	0.0000
C	0.160159	0.047095	3.400776	0.0020

R-squared	0.512698	Mean dependent var	-0.013609
Adjusted R-squared	0.495295	S.D. dependent var	0.266287
S.E. of regression	0.189177	Akaike info criterion	-0.427926
Sum squared resid	1.002063	Schwarz criterion	-0.334513
Log likelihood	8.418890	Hannan-Quinn criter.	-0.398042
F-statistic	29.45926	Durbin-Watson stat	2.078791
Prob(F-statistic)	0.000009		

Null Hypothesis: LOGGCF has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.271380	0.1870
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGGCF)
Method: Least Squares
Date: 05/01/23 Time: 14:19
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGCF(-1)	-0.046872	0.020636	-2.271380	0.0307
C	1.531787	0.599690	2.554299	0.0162

R-squared	0.151033	Mean dependent var	0.171614
Adjusted R-squared	0.121758	S.D. dependent var	0.190594
S.E. of regression	0.178615	Akaike info criterion	-0.544833
Sum squared resid	0.925191	Schwarz criterion	-0.452318
Log likelihood	10.44491	Hannan-Quinn criter.	-0.514675
F-statistic	5.159166	Durbin-Watson stat	2.118215
Prob(F-statistic)	0.030725		

Null Hypothesis: LOGGCF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.329331	0.4069
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGGCF)
Method: Least Squares
Date: 05/01/23 Time: 14:17
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGCF(-1)	-0.288628	0.123910	-2.329331	0.0273
C	7.866277	3.256103	2.415856	0.0225
@TREND("1990")	0.042558	0.021536	1.976123	0.0581

R-squared	0.254944	Mean dependent var	0.171614
Adjusted R-squared	0.201725	S.D. dependent var	0.190594
S.E. of regression	0.170289	Akaike info criterion	-0.610877
Sum squared resid	0.811951	Schwarz criterion	-0.472104
Log likelihood	12.46859	Hannan-Quinn criter.	-0.565640
F-statistic	4.790521	Durbin-Watson stat	1.886993
Prob(F-statistic)	0.016242		

Null Hypothesis: D(LOGLABF) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.849817	0.0005
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGLABF,2)
Method: Least Squares
Date: 05/01/23 Time: 15:00
Sample (adjusted): 1992 2021
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGLABF(-1))	-1.040524	0.215550	-4.849817	0.0000
C	0.000376	0.000742	0.507175	0.6161

R-squared	0.462845	Mean dependent var	0.000386
Adjusted R-squared	0.449018	S.D. dependent var	0.003856
S.E. of regression	0.003819	Akaike info criterion	-8.233086
Sum squared resid	0.000408	Schwarz criterion	-8.139673
Log likelihood	125.4963	Hannan-Quinn criter.	-8.203202
F-statistic	23.56224	Durbin-Watson stat	1.848439
Prob(F-statistic)	0.000088		

Null Hypothesis: LOGLABF has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		4.760332	1.0000
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGLABF)
Method: Least Squares
Date: 05/01/23 Time: 14:33
Sample (adjusted): 1994 2021
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGLABF(-1)	0.020631	0.004334	4.760332	0.0001
D(LOGLABF(-1))	0.394469	0.203615	1.937332	0.0651
D(LOGLABF(-2))	0.099197	0.287091	0.345524	0.7328
D(LOGLABF(-3))	-0.488274	0.225823	-2.162196	0.0412
C	-0.300547	0.064428	-4.664815	0.0001

R-squared	0.837797	Mean dependent var	0.033035
Adjusted R-squared	0.809587	S.D. dependent var	0.006832
S.E. of regression	0.002981	Akaike info criterion	-8.632672
Sum squared resid	0.000204	Schwarz criterion	-8.394778
Log likelihood	125.8574	Hannan-Quinn criter.	-8.559945
F-statistic	29.69930	Durbin-Watson stat	2.220265
Prob(F-statistic)	0.000000		

Null Hypothesis: LOGLABF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.997223	0.9998
Test critical values:	1% level	-4.323979	
	5% level	-3.580623	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGLABF)
Method: Least Squares
Date: 05/01/23 Time: 14:31
Sample (adjusted): 1994 2021
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGLABF(-1)	0.039872	0.039983	0.997223	0.3295
D(LOGLABF(-1))	0.398719	0.207276	1.923613	0.0674
D(LOGLABF(-2))	0.071407	0.297579	0.239959	0.8126
D(LOGLABF(-3))	-0.538009	0.251602	-2.138339	0.0438
C	-0.598656	0.619169	-0.966870	0.3441
@TREND("1990")	-0.000587	0.001213	-0.484186	0.6330

R-squared	0.839507	Mean dependent var	0.033035
Adjusted R-squared	0.803031	S.D. dependent var	0.006832
S.E. of regression	0.003032	Akaike info criterion	-8.571843
Sum squared resid	0.000202	Schwarz criterion	-8.286371
Log likelihood	126.0058	Hannan-Quinn criter.	-8.484571
F-statistic	23.01548	Durbin-Watson stat	2.275375
Prob(F-statistic)	0.000000		

Null Hypothesis: D(LOGMILEX) has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.260508	0.0000
Test critical values:	1% level	-2.647120	
	5% level	-1.952910	
	10% level	-1.610011	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGMILEX,2)
Method: Least Squares
Date: 05/01/23 Time: 15:14
Sample (adjusted): 1993 2021
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGMILEX(-1))	-1.187313	0.225703	-5.260508	0.0000
D(LOGMILEX(-1),2)	0.350411	0.178720	1.960672	0.0603

R-squared	0.539750	Mean dependent var	0.011866
Adjusted R-squared	0.522704	S.D. dependent var	0.309762
S.E. of regression	0.214004	Akaike info criterion	-0.179169
Sum squared resid	1.236542	Schwarz criterion	-0.084873
Log likelihood	4.597955	Hannan-Quinn criter.	-0.149637
Durbin-Watson stat	1.886590		

Null Hypothesis: LOGMILEX has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.321701	0.1683
Test critical values:	1% level	-2.641672	
	5% level	-1.952066	
	10% level	-1.610400	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGMILEX)
Method: Least Squares
Date: 05/01/23 Time: 15:12
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGMILEX(-1)	-0.088358	0.066852	-1.321701	0.1963

R-squared	0.054256	Mean dependent var	-0.006539
Adjusted R-squared	0.054256	S.D. dependent var	0.232955
S.E. of regression	0.226547	Akaike info criterion	-0.099998
Sum squared resid	1.539713	Schwarz criterion	-0.053741
Log likelihood	2.549974	Hannan-Quinn criter.	-0.084919
Durbin-Watson stat	1.635458		

Null Hypothesis: LOGMILEX has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.813761	0.0683
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGMILEX)
Method: Least Squares
Date: 05/01/23 Time: 15:11
Sample (adjusted): 1992 2021
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGMILEX(-1)	-0.384880	0.136785	-2.813761	0.0090
D(LOGMILEX(-1))	0.322208	0.177583	1.814409	0.0807
C	0.193541	0.079062	2.447977	0.0211

R-squared	0.243496	Mean dependent var	-0.001138
Adjusted R-squared	0.187459	S.D. dependent var	0.234955
S.E. of regression	0.211791	Akaike info criterion	-0.171795
Sum squared resid	1.211096	Schwarz criterion	-0.031675
Log likelihood	5.576924	Hannan-Quinn criter.	-0.126969
F-statistic	4.345250	Durbin-Watson stat	1.821531
Prob(F-statistic)	0.023118		

Null Hypothesis: LOGMILEX has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.051891	0.1357
Test critical values:	1% level	-4.296729	
	5% level	-3.568379	
	10% level	-3.218382	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGMILEX)
Method: Least Squares
Date: 05/01/23 Time: 15:09
Sample (adjusted): 1992 2021
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGMILEX(-1)	-0.583446	0.191175	-3.051891	0.0052
D(LOGMILEX(-1))	0.502900	0.213698	2.353321	0.0264
C	0.449308	0.191924	2.341077	0.0272
@TREND("1990")	-0.009410	0.006460	-1.456581	0.1572

R-squared	0.300570	Mean dependent var	-0.001138
Adjusted R-squared	0.219867	S.D. dependent var	0.234955
S.E. of regression	0.207524	Akaike info criterion	-0.183571
Sum squared resid	1.119725	Schwarz criterion	0.003256
Log likelihood	6.753560	Hannan-Quinn criter.	-0.123803
F-statistic	3.724382	Durbin-Watson stat	1.899879
Prob(F-statistic)	0.023703		

Null Hypothesis: D(LOGEXPO) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.378653	0.0000
Test critical values:	1% level	-2.644302	
	5% level	-1.952473	
	10% level	-1.610211	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGEXPO,2)
Method: Least Squares
Date: 05/01/23 Time: 15:23
Sample (adjusted): 1992 2021
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGEXPO(-1))	-1.167512	0.183034	-6.378653	0.0000

R-squared	0.583854	Mean dependent var	-0.000232
Adjusted R-squared	0.583854	S.D. dependent var	0.276145
S.E. of regression	0.178139	Akaike info criterion	-0.579737
Sum squared resid	0.920274	Schwarz criterion	-0.533031
Log likelihood	9.696062	Hannan-Quinn criter.	-0.564796
Durbin-Watson stat	2.010845		

Null Hypothesis: LOGEXPO has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.545389	0.8284
Test critical values:	1% level	-2.641672	
	5% level	-1.952066	
	10% level	-1.610400	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGEXPO)
Method: Least Squares
Date: 05/01/23 Time: 15:22
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGEXPO(-1)	0.006782	0.012435	0.545389	0.5895

R-squared	-0.011070	Mean dependent var	0.025132
Adjusted R-squared	-0.011070	S.D. dependent var	0.175898
S.E. of regression	0.176869	Akaike info criterion	-0.595094
Sum squared resid	0.938474	Schwarz criterion	-0.548836
Log likelihood	10.22395	Hannan-Quinn criter.	-0.580015
Durbin-Watson stat	2.372435		

Null Hypothesis: LOGEXPO has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.371361	0.1577
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGEXPO)
Method: Least Squares
Date: 05/01/23 Time: 15:18
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGEXPO(-1)	-0.248692	0.104873	-2.371361	0.0246
C	0.656579	0.267900	2.450842	0.0205

R-squared	0.162415	Mean dependent var	0.025132
Adjusted R-squared	0.133533	S.D. dependent var	0.175898
S.E. of regression	0.163733	Akaike info criterion	-0.718819
Sum squared resid	0.777446	Schwarz criterion	-0.626304
Log likelihood	13.14170	Hannan-Quinn criter.	-0.688661
F-statistic	5.623354	Durbin-Watson stat	2.212311
Prob(F-statistic)	0.024580		

Null Hypothesis: LOGEXPO has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.924705	0.1689
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGEXPO)
Method: Least Squares
Date: 05/01/23 Time: 15:17
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGEXPO(-1)	-0.453811	0.155165	-2.924705	0.0068
C	1.041506	0.340067	3.062647	0.0048
@TREND("1990")	0.008493	0.004865	1.745884	0.0918

R-squared	0.244644	Mean dependent var	0.025132
Adjusted R-squared	0.190690	S.D. dependent var	0.175898
S.E. of regression	0.158240	Akaike info criterion	-0.757637
Sum squared resid	0.701121	Schwarz criterion	-0.618864
Log likelihood	14.74337	Hannan-Quinn criter.	-0.712400
F-statistic	4.534306	Durbin-Watson stat	1.995689
Prob(F-statistic)	0.019684		

Null Hypothesis: D(LOGIMP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.600111	0.0000
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGIMP,2)
Method: Least Squares
Date: 05/01/23 Time: 15:30
Sample (adjusted): 1992 2021
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGIMP(-1))	-1.239581	0.187812	-6.600111	0.0000
C	0.006442	0.021445	0.300385	0.7661

R-squared	0.608728	Mean dependent var	0.001964
Adjusted R-squared	0.594754	S.D. dependent var	0.184425
S.E. of regression	0.117403	Akaike info criterion	-1.382072
Sum squared resid	0.385935	Schwarz criterion	-1.288659
Log likelihood	22.73109	Hannan-Quinn criter.	-1.352189
F-statistic	43.56147	Durbin-Watson stat	2.075286
Prob(F-statistic)	0.000000		

Null Hypothesis: LOGIMP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.814003	0.0679
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGIMP)
Method: Least Squares
Date: 05/01/23 Time: 15:27
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGIMP(-1)	-0.401107	0.142540	-2.814003	0.0087
C	1.274953	0.450139	2.832354	0.0083

R-squared	0.214488	Mean dependent var	0.009414
Adjusted R-squared	0.187402	S.D. dependent var	0.118612
S.E. of regression	0.106922	Akaike info criterion	-1.571102
Sum squared resid	0.331534	Schwarz criterion	-1.478587
Log likelihood	26.35208	Hannan-Quinn criter.	-1.540944
F-statistic	7.918610	Durbin-Watson stat	1.993772
Prob(F-statistic)	0.008697		

Null Hypothesis: LOGIMP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.769764	0.2182
Test critical values:	1% level	-4.284580	
	5% level	-3.562882	
	10% level	-3.215267	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LOGIMP)
Method: Least Squares
Date: 05/01/23 Time: 15:26
Sample (adjusted): 1991 2021
Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGIMP(-1)	-0.410083	0.148057	-2.769764	0.0098
C	1.292837	0.461477	2.801519	0.0091
@TREND("1990")	0.000652	0.002230	0.292486	0.7721

R-squared	0.216881	Mean dependent var	0.009414
Adjusted R-squared	0.160944	S.D. dependent var	0.118612
S.E. of regression	0.108648	Akaike info criterion	-1.509637
Sum squared resid	0.330524	Schwarz criterion	-1.370864
Log likelihood	26.39937	Hannan-Quinn criter.	-1.464400
F-statistic	3.877231	Durbin-Watson stat	1.981815
Prob(F-statistic)	0.032628		

APPENDIX TWO: CORRELATION MATRIX

Correlation Probability	LOGGDPG	LOGGCF	LOGLABF	LOGMILEX	LOGEXPO	LOGIMP
LOGGDPG	1.000000 -----					
LOGGCF	-0.319367 0.0748	1.000000 -----				
LOGLABF	-0.357051 0.0448	0.975350 0.0000	1.000000 -----			
LOGMILEX	0.170951 0.3495	-0.539978 0.0014	-0.469129 0.0068	1.000000 -----		
LOGEXPO	-0.036143 0.8443	0.770078 0.0000	0.725605 0.0000	-0.505198 0.0032	1.000000 -----	
LOGIMP	0.234705 0.1960	0.268029 0.1380	0.189550 0.2988	-0.252158 0.1638	0.570483 0.0007	1.000000 -----

APPENDIX THREE: LAG LENGTH SELECTION

Model Selection Criteria Table
Dependent Variable: LOGGDPG
Date: 05/07/23 Time: 23:57
Sample: 1990 2021
Included observations: 31

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
28	-3.703589	0.755070	1.125131	0.875701	0.310318	ARDL(1, 0, 0, 1, 0, 0)
27	-3.109483	0.781257	1.197576	0.916967	0.306083	ARDL(1, 0, 0, 1, 0, 1)
26	-3.160958	0.784578	1.200897	0.920287	0.303775	ARDL(1, 0, 0, 1, 1, 0)
20	-3.366171	0.797817	1.214136	0.933527	0.294496	ARDL(1, 0, 1, 1, 0, 0)
18	-2.524088	0.808006	1.270582	0.958794	0.299983	ARDL(1, 0, 1, 1, 1, 0)
12	-3.699829	0.819344	1.235663	0.955053	0.279144	ARDL(1, 1, 0, 1, 0, 0)
19	-2.799122	0.825750	1.288326	0.976538	0.287451	ARDL(1, 0, 1, 1, 0, 1)
25	-2.852590	0.829199	1.291776	0.979988	0.284988	ARDL(1, 0, 0, 1, 1, 1)
11	-3.108426	0.845705	1.308281	0.996493	0.273089	ARDL(1, 1, 0, 1, 0, 1)
10	-3.152978	0.848579	1.311156	0.999368	0.270996	ARDL(1, 1, 0, 1, 1, 0)
17	-2.316347	0.859119	1.367953	1.024986	0.274767	ARDL(1, 0, 1, 1, 1, 1)
4	-3.358440	0.861835	1.324411	1.012623	0.261269	ARDL(1, 1, 1, 1, 0, 0)
2	-2.390616	0.863911	1.372745	1.029778	0.271284	ARDL(1, 1, 1, 1, 1, 0)
3	-2.786807	0.889471	1.398306	1.055339	0.252417	ARDL(1, 1, 1, 1, 0, 1)
9	-2.847554	0.893391	1.402225	1.059258	0.249482	ARDL(1, 1, 0, 1, 1, 1)
1	-2.207373	0.916605	1.471697	1.097551	0.241945	ARDL(1, 1, 1, 1, 1, 1)
32	-8.878717	1.024433	1.348237	1.129985	0.077073	ARDL(1, 0, 0, 0, 0, 0)
24	-8.732265	1.079501	1.449562	1.200132	0.046003	ARDL(1, 0, 1, 0, 0, 0)
31	-8.822223	1.085305	1.455366	1.205935	0.040450	ARDL(1, 0, 0, 0, 0, 1)
30	-8.867293	1.088212	1.458274	1.208843	0.037656	ARDL(1, 0, 0, 0, 1, 0)
16	-8.878641	1.088945	1.459006	1.209575	0.036951	ARDL(1, 1, 0, 0, 0, 0)
23	-8.684566	1.140940	1.557259	1.276649	0.005704	ARDL(1, 0, 1, 0, 0, 1)
8	-8.723972	1.143482	1.559801	1.279192	0.003173	ARDL(1, 1, 1, 0, 0, 0)
22	-8.731517	1.143969	1.560288	1.279678	0.002687	ARDL(1, 0, 1, 0, 1, 0)
29	-8.775750	1.146823	1.563141	1.282532	-0.000163	ARDL(1, 0, 0, 0, 1, 1)
15	-8.822222	1.149821	1.566140	1.285530	-0.003166	ARDL(1, 1, 0, 0, 0, 1)
14	-8.866370	1.152669	1.568988	1.288379	-0.006027	ARDL(1, 1, 0, 0, 1, 0)
21	-8.668371	1.204411	1.666988	1.355199	-0.040556	ARDL(1, 0, 1, 0, 1, 1)
7	-8.675037	1.204841	1.667418	1.355630	-0.041004	ARDL(1, 1, 1, 0, 0, 1)
6	-8.723961	1.207997	1.670574	1.358786	-0.044295	ARDL(1, 1, 1, 0, 1, 0)
13	-8.773988	1.211225	1.673802	1.362013	-0.047671	ARDL(1, 1, 0, 0, 1, 1)
5	-8.664150	1.268655	1.777489	1.434522	-0.092286	ARDL(1, 1, 1, 0, 1, 1)

APPENDIX FOUR: ARDL LONG RUN FORM

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LOGGDPG)
Selected Model: ARDL(1, 0, 0, 1, 0, 0)
Case 3: Unrestricted Constant and No Trend
Date: 05/15/23 Time: 08:25
Sample: 1990 2021
Included observations: 31

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.345582	11.67460	0.800506	0.0016
LOGGDPG(-1)*	-1.016604	0.193233	-5.261020	0.0000
LOGGCF**	-0.085544	0.208429	-0.410424	0.0053
LOGLABF**	-0.582477	1.039550	-0.560316	0.0007
LOGMILEX(-1)	-0.274500	0.267524	-1.026076	0.0055
LOGEXPO**	0.267750	0.439757	0.608860	0.0086
LOGIMP**	1.202738	0.612961	1.962177	0.0020
D(LOGMILEX)	0.699554	0.289851	2.413497	0.0042

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGCF	-0.084147	0.207953	-0.404645	0.0005
LOGLABF	-0.572963	0.995665	-0.575458	0.0006
LOGMILEX	-0.270017	0.278121	-0.970861	0.0017
LOGEXPO	0.263377	0.414382	0.635591	0.0013
LOGIMP	1.183094	0.653391	1.810698	0.0033

EC = LOGGDPG - (-0.0841*LOGGCF -0.5730*LOGLABF -0.2700*LOGMILEX
+ 0.2634*LOGEXPO + 1.1831*LOGIMP)

APPENDIX FIVE: ARDL BOUNDS TEST

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	6.104639	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68
			Finite Sample: n=35	
Actual Sample Size	31			
		10%	2.508	3.763
		5%	3.037	4.443
		1%	4.257	6.04
			Finite Sample: n=30	
		10%	2.578	3.858
		5%	3.125	4.608
		1%	4.537	6.37
t-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-5.261020	10%	-2.57	-3.86
		5%	-2.86	-4.19
		2.5%	-3.13	-4.46
		1%	-3.43	-4.79

APPENDIX SIX : THE ERROR-CORRECTION MODEL (ECM)

ARDL Error Correction Regression
Dependent Variable: D(LOGGDPG)
Selected Model: ARDL(1, 0, 0, 1, 0, 0)
Case 3: Unrestricted Constant and No Trend
Date: 05/08/23 Time: 02:34
Sample: 1990 2021
Included observations: 31

ECM Regression
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.345582	1.402829	6.661953	0.0000
D(LOGMILEX)	0.699554	0.225432	3.103164	0.0050
CointEq(-1)*	-1.016604	0.152241	-6.677605	0.0000

R-squared	0.647955	Mean dependent var	-0.019505
Adjusted R-squared	0.622809	S.D. dependent var	0.467164
S.E. of regression	0.286913	Akaike info criterion	0.432490
Sum squared resid	2.304932	Schwarz criterion	0.571263
Log likelihood	-3.703589	Hannan-Quinn criter.	0.477726
F-statistic	25.76764	Durbin-Watson stat	2.412294
Prob(F-statistic)	0.000000		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.104639	10%	2.26	3.35
k	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-6.677605	10%	-2.57	-3.86
		5%	-2.86	-4.19
		2.5%	-3.13	-4.46
		1%	-3.43	-4.79

APPENDIX SEVEN: SERIAL CORRELATION TEST

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.606530	Prob. F(2,21)	0.0975
Obs*R-squared	6.165051	Prob. Chi-Square(2)	0.0458

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 05/08/23 Time: 02:41
Sample: 1991 2021
Included observations: 31
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGGDPG(-1)	0.373858	0.311150	1.201535	0.0029
LOGGCF	-0.124495	0.203967	-0.610368	0.0042
LOGLABF	0.567570	1.042378	0.544495	0.0018
LOGMILEX	-0.166380	0.291284	-0.571195	0.0039
LOGMILEX(-1)	0.110852	0.306071	0.362178	0.0008
LOGEXPO	0.399955	0.502527	0.795888	0.0050
LOGIMP	-0.488878	0.615804	-0.793885	0.0041
C	-5.637901	11.81243	-0.477286	0.0031
RESID(-1)	-0.732229	0.358573	-2.042065	0.0039
RESID(-2)	-0.312460	0.257493	-1.213471	0.0034

R-squared	0.198873	Mean dependent var	1.66E-15
Adjusted R-squared	-0.144468	S.D. dependent var	0.277184
S.E. of regression	0.296531	Akaike info criterion	0.662367
Sum squared resid	1.846545	Schwarz criterion	1.124944
Log likelihood	-0.266692	Hannan-Quinn criter.	0.813156
F-statistic	0.579229	Durbin-Watson stat	1.966065
Prob(F-statistic)	0.799170		

APPENDIX EIGHT : HETEROSCEDACITICITY TEST

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.464983	Prob. F(7,23)	0.8496
Obs*R-squared	3.843143	Prob. Chi-Square(7)	0.7977
Scaled explained SS	1.593008	Prob. Chi-Square(7)	0.9789

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/08/23 Time: 02:50
Sample: 1991 2021
Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.460950	3.656483	0.946524	0.0037
LOGGDPG(-1)	-0.040920	0.060521	-0.676126	0.0047
LOGGCF	0.082127	0.065280	1.258082	0.0010
LOGLABF	-0.355227	0.325587	-1.091035	0.0036
LOGMILEX	0.104973	0.090781	1.156327	0.0024
LOGMILEX(-1)	-0.009363	0.101039	-0.092669	0.0010
LOGEXPO	-0.033904	0.137732	-0.246156	0.0027
LOGIMP	0.018850	0.191979	0.098189	0.0026

R-squared	0.123972	Mean dependent var	0.074353
Adjusted R-squared	-0.142645	S.D. dependent var	0.092754
S.E. of regression	0.099149	Akaike info criterion	-1.566757
Sum squared resid	0.226101	Schwarz criterion	-1.196696
Log likelihood	32.28473	Hannan-Quinn criter.	-1.446126
F-statistic	0.464983	Durbin-Watson stat	2.385194
Prob(F-statistic)	0.849649		

APPENDIX NINE : RESET TEST

Ramsey RESET Test
Equation: UNTITLED
Specification: LOGGDPG LOGGDPG(-1) LOGGCF LOGLABF LOGMILEX
LOGMILEX(-1) LOGEXPO LOGIMP C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.437768	22	0.6658
F-statistic	0.191641	(1, 22)	0.6658

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.019905	1	0.019905
Restricted SSR	2.304932	23	0.100214
Unrestricted SSR	2.285028	22	0.103865

Unrestricted Test Equation:
Dependent Variable: LOGGDPG
Method: ARDL
Date: 05/08/23 Time: 03:23
Sample: 1991 2021
Included observations: 31
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (1 lag, automatic):
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOGGDPG(-1)	-0.026878	0.198116	-0.135670	0.0033
LOGGCF	-0.197338	0.332024	-0.594348	0.0043
LOGLABF	-1.279691	1.912221	-0.669217	0.0003
LOGMILEX	1.587257	2.049154	0.774592	0.0028
LOGMILEX(-1)	-2.205025	2.831044	-0.778874	0.0044
LOGEXPO	0.626906	0.934628	0.670755	0.0034
LOGIMP	2.767421	3.628297	0.762733	0.0037
C	19.35177	25.76271	0.751154	0.0005
FITTED^2	-0.365255	0.834358	-0.437768	0.0048

R-squared	0.475810	Mean dependent var	1.763761
Adjusted R-squared	0.285196	S.D. dependent var	0.381189
S.E. of regression	0.322281	Akaike info criterion	0.810913
Sum squared resid	2.285028	Schwarz criterion	1.227232
Log likelihood	-3.569154	Hannan-Quinn criter.	0.946623
F-statistic	2.496192	Durbin-Watson stat	2.422011
Prob(F-statistic)	0.042682		

*Note: p-values and any subsequent tests do not account for model selection.