BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

DEPARTMENT OF ECONOMICS

CASUAL ANALYSIS BETWEEN GOVERNMENT SPENDING AND GROSS DOMESTIC PRODUCT IN ZIMBABWE (1960 TO 2022)

SUBMITTED BY

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APPROVAL FORM

The undersigned certify that they have supervised, read, and recommend the Bindura University of Science Education for acceptance a research project entitled: Causal analysis between government spending and Gross Domestic Product (1960to 2022) submitted by Mandimutsira Terence Tinotenda in partial fulfilment of the requirements for the Bachelor of Science Honors Degree in Economics

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DECLARATION

I MANDIMUTSIRA TERENCE TINOTENDA declare that the information in this dissertation prepared in partial fulfilment of the Bachelor of Science Honors Degree in Economic, Faculty of Commerce Bindura University of Science Education has never been presented, submitted, or published in this nature or part. Previous work has been accredited and acknowledged properly.

ABSTRACT

The research of analysis the causal relationship between government spending and Gross Domestic Product is based on debatable backbones that is the Keynesian hypothesis and the Wegner's law. Keynesian hypothesis posits that government expenditure is stimulates Gross domestic product and Wagner's Law posits that gross domestic product stimulates government spending. The study examined the causal relationship between the government spending and gross domestic product in Zimbabwe from 1960 to 2022 using data from World Bank. Employing the Granger causality test and the Autoregressive Distribution Lag, the Keynesian hypothesis was found in Zimbabwe. The results show that government spending has a significant positive impact on GDP. Additionally, there results shows that there is bidirectional causality between government spending and GDP, suggesting that economic growth also influences government expenditure. The research findings have significant implications for fiscal policy and economic development in Zimbabwe, highlighting the need for strategic government spending to promote sustainable economic growth.

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ACRONYMS

GDP	Gross Domestic Product
GFCE	Government Final Consumption Expenditure
ARDL	Autoregressive Distribution Model
ADF	Augmented Dickey- Fuller
AIC	Akaike information criterion
SC	Schwarz information criterion

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

Gross domestic product composers of consumption investment, government spending and net exports (Bondarenko, 2024). According to Daba and Adewale (2013), investigated the relationship between government spending and Gross Domestic Product using Econometric techniques. The study concluded that there is a relationship between the government spending and GDP, but there is no consensus on whether government spending should be the lead or lag variable in this relationship.

The research on causal relationship between government spending and Gross Domestic Product is built on the two controversial theories, “Wagner’s Law” and “Keynesian Hypothesis”. Wegner’s Law and Keynesian Hypothesis agree that government spending and Gross Domestic Product have a functional relationship, nevertheless both theories disagree on the direction of causality. Keynesian Hypothesis believes that government spending is the lead variable that influences GDP, which is the lag variable. Wagner’ s Law states that government spending and GDP are positively related, as the economy grows, government spending also increases. According to Wegner, Gross Domestic Product is the lag variable and public expenditure the lead variable.

To put is briefly, this research aims to explore the relationship between government spending and Gross Domestic Product in Zimbabwe and to establish the causal relationship between the two variables under consideration.

1.1 Background of the study

The research draws on the foundational theories of Wagner (1912) and Keynes (1936) to investigate the relationship between government spending and Gross Domestic product in Zimbabwe. Wagner's law of increasing state activities suggests that government spending tends to increase relative to GDP over time, while Keynes proposed an alternative theory. Following independence in 1980, Zimbabwe's government undertook significant capital expenditure on infrastructure development, social and economic reforms leading to higher budget deficit. Despite this, there is a notable lack of empirical studies exploring the relationship between government spending and GDP in Zimbabwe, which this research aims to address.

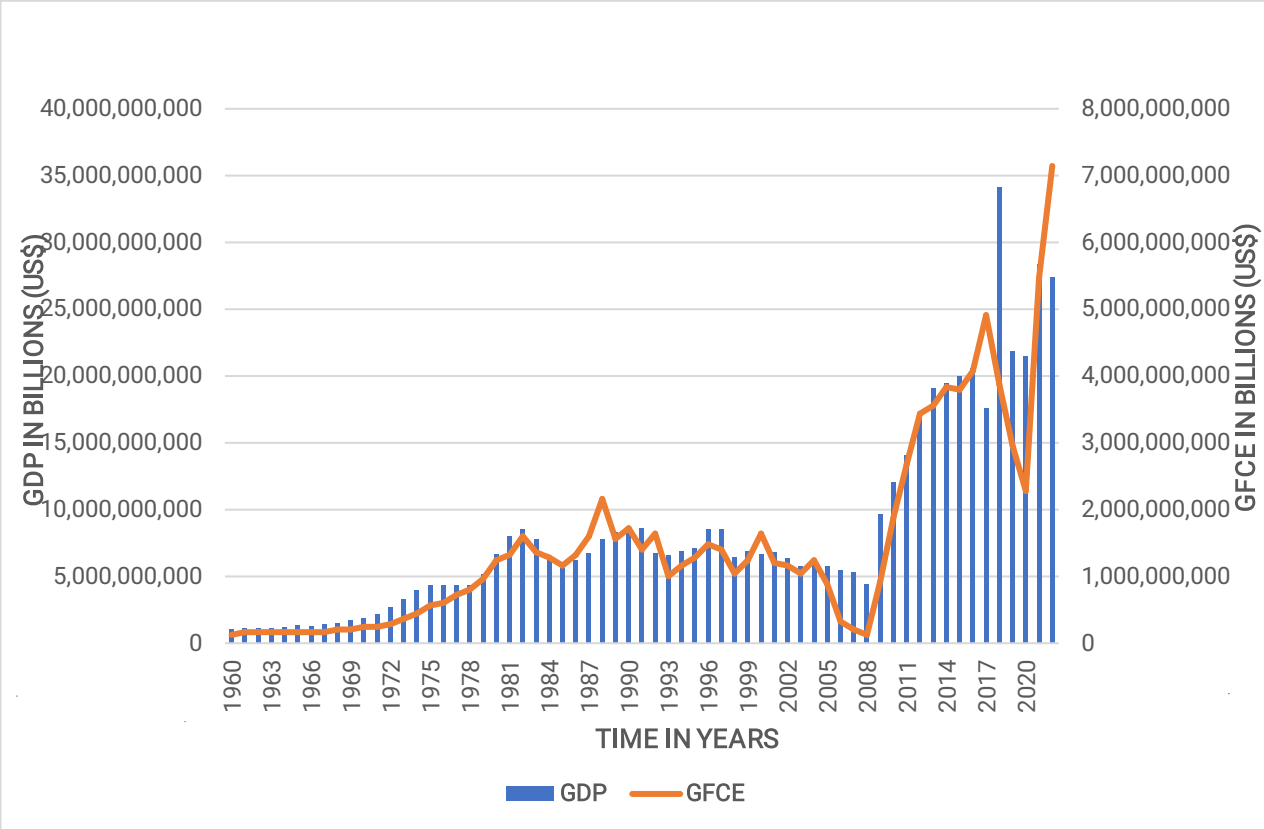

Fig 1.1: Historical trends of Gross Domestic Product and government spending

Reference: World Bank data.

The graphical display in Fig 1.1 illustrates the sharp trends in government expenditure (GFCE) and Gross Domestic Product (GDP). These sharp patterns suggest Zimbabwe is growing quickly, but the two theories supporting this discussion do not provide a satisfactory solution to the question of which variable is encouraging the other. Following Zimbabwe's adoption of the US dollar as its legal currency, GDP grew by 55.55% while government expenditure increased by 53. 6%. When examining the trajectory from 2008 to 2016, trends in GDP and government expenditure far surpass changes Zimbabwe underwent during the price stability years. From 2017 up to 2022 shows the unstable dynamic changes in the variables due to unstable prices during that period.

Government spending in Zimbabwe has experienced a remarkable surge, from a mare $0.11 billion in 1960 to a substantial $7.13 billion in 2022. Similarly, the country's Gross Domestic Product has undergone a significant transformation growing from $1.05 billion in 1960 to $27.36 billion in 2022. This stark contrast highlights the GDP growth rate has been sluggish during certain periods such as 2000 to 2008 and 2018 to 2019 with a record low of $442 billion in 2008 and a -17.66% growth rate. This warrants an investigation into the relationship between government expenditure and GDP in Zimbabwe.

Furthermore, as indicated by the moderate slopes in the trends depicted in Fig.1.1, government expenditures and Gross Domestic Product were modest and constant between 1960 and 1972. The total amount of government spending fluctuated between 1973 and 1992, and the Zimbabwean Gross Domestic Product appears to reflect this as well. More intriguing is the fact that while government spending increased between 1974 and 1978, the Gross Domestic Product remained stable. Since it is necessary to determine why government expenditure was not increasing GDP, the behavior of the study's variables tends to make the research more fascinating. Nevertheless,

increase in government spending may be attributed to an expansionary fiscal policy aimed at boosting economic growth, a key macroeconomic objective for Zimbabwe's government.

In contrast, Wagner's Law offers a logical explanation for the trends observed between 1966 and 2008, where both GDP and government spending decreased. This is reasonable as the Zimbabwean government have raised expenditure to stimulate economic growth. Consequently, it is reasonable to expect that the law should be true, suggesting a positive relationship between government expenditure and GDP.
After 2008, Zimbabwe economy underwent a significant transformation, which has not considered in the current discussion. To address the gap, it is essential to draw on evidence from similar studies conducted in Zimbabwe. The most appropriate approach to conduct is to conduct empirical investigation to investigate which theory is applicable in Zimbabwe.

Following 2008, a significant shift happened in Zimbabwe's economic growth. The modifications have not been taken into consideration in the discussion, it is necessary to offer proof for another comparable research that have been conducted in Zimbabwe. The most reasonable course of action is to conduct research and experiments in order to determine whether or not the Wagnerian viewpoint applies to Zimbabwe.

1.2 Problem Statement

Despite significant government spending in Zimbabwe between 1960 and 2022, Gross Domestic Product (GDP) has remained stagnant with the periods of decline and hyperinflation. Zimbabwe has experienced erratic economic growth since gaining independence in 1980 with government spending increasing significantly over the years. However, the GDP failed to reflect this increased spending leading to concerns about the effectiveness of government expenditure in driving economic growth.

This study aims to investigate the causal relationship between government spending and Gross Domestic Product in Zimbabwe from 1960 to 2022, to determine whether government spending has a significant impact on GDP. It also wants to provide evidence-based recommendations for fiscal policy decisions that can stimulate economic growth and development in Zimbabwe.

1.3 Research Objectives

- To investigate the causal relationship between government expenditure and Gross Domestic Product in Zimbabwe
- To examine the direction and strength of causality between Gross Domestic Product and government expenditure.
- To provide policy recommendations for the optimal government spending strategies to promote economic growth in Zimbabwe

1.3 Research questions

Is there a significant positive correlation between government expenditure and GDP in Zimbabwe from 1960 to 2022?

Does government spending lead to an increase in GDP or does GDP growth lead to an increase in government expenditure?

What are the implications of the findings for fiscal policing decisions to Zimbabwe?

1.5 Statement of Hypothesis

H_0: Government spending has no significant impact on Gross Domestic Product

H_1: Government spending has a significant positive impact on GDP

1.6 Significance of the study

The researcher hopeful that the significance of the study extends to various stakeholders including policymakers, economists, government officials, business leaders, international organizations, academics, and the Citizens of Zimbabwe. The findings will inform fiscal policy decisions enabling

policymakers to optimize government spending to enhance economic growth and development.

Economists and researchers will benefit from the contribution to the existing body of knowledge on the relationship between government spending and economic growth. The study will also help government officials to allocate resources more efficiently, reducing wasteful spending and improving the impact of government expenditures.

Business leaders will make informed investment decisions, contributing to economic development in Zimbabwe. The study is important to international organizations such as World Bank and IMF for they will gain valuable insights on the effectiveness of government spending in promoting Economic growth in developing countries.

Academics will have a framework for future studies, contributing to economic theory and practice. The research results will improve economic outcomes, leading to better living standards, reduced poverty and increased economic opportunities for Zimbabwean citizens.

1.7 Assumptions of the study

- ✧ All of the data concerning the variables in questions is accurate and trustworthy. As a result, statistics from world bank and other sources may be trusted.
- ✧ The econometric model that was applied is accurate and dependable.
- ✧ There is no fictitious connection.

1.8 Scope of the study

This research investigates the causal relationship between government expenditure and GDP in Zimbabwe, a period of 62 years that is from 1960 to 2022. The analysis will be conducted using annual data to examine the extent

to which government spending influences economic growth and development.

1.9 Delimitation's of the study

It only focuses on Zimbabwe and does not other countries or regions
The study only examines government spending and GDP and does not consider other macroeconomic variables that can influence the relationship between the two.
The study only covers the period from 1960 to 2022, does consider earlier or late days

1.10 Limitations of the study

The researcher encountered difficulties in collecting all of the data required due to confidentiality restrictions that made some of the information not publicly available. Also limited data availability particularly for the earlier years. Also, the study only covers the period from 1960 to 2022 which may not represent the entire history of the economy of Zimbabwe.

1.11 Definition of Terms

Gross Domestic Product – Is a macroeconomic measure that represents the total value of all final goods and services produced within a country over a specific period of time, typically a year (Karhina ,2017). According to Smith (2020) is a widely measure of a country's economic performance.

Government Expenditure - Refers to the funds allocated and utilized by the public sector to finance various sector activities, programs, and services. (Ortiz-Ospina and Rosser, 2018).

Economic growth – Refers to an increase in the production of goods and services in an economy over a specific period of time, typically measured by the increase in country's Gross Domestic Product (Todaro 2008). It

represents a sustainable expansion of the economy often accompanied by increase in income (Krugman, 2018)

1.12 Organization of the research

This research is organized into five chapters. Chapter one provides an overview of the study including the introduction, background, hypothesis, and objectives. Chapter Two shows the relevant theoretical and empirical literature to the topic. Chapter Three describes research methodology and data collection processes. Chapter four present the data analysis, visualization, and interpretations. Chapter five summarizes the findings, discuses policy implications and provide recommendations for the future research.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Chapter two aims to provide a comprehensive overview on the existing research on the relationship between government spending and Gross Domestic Product in Zimbabwe. The review will synthesize the findings of previous studies, highlighting the key themes, methodologies, and conclusions. The literature will be examined with the focus on the theoretical and empirical frameworks that have shaped our understanding of the relationship between government spending and GDP. The study will identify gaps in the existing literature and provide a foundation for the empirical analysis that follows.

2.1 THEORATICAL LITURATURE REVIEW

2.1.1 Wagner's Law

This study builds upon the foundational concept of Wagner's Law which posits that government expenditure is driven by Gross Domestic Product. This law was originally termed " Law of increasing state activity" by Wagner (1883). This hypothesis suggests that as real per capita income rises during industrialization, it leads to increase public expenditure as a proportion of GDP. According to Wagner's Law, government spending must adapt to meet the growing demands stemming from economic expansion implying a significant positive relationship between government expenditure and Gross Domestic Product. This theoretical framework provides the basis for investigating the application of the hypothesis in the context of the Zimbabwe's economy.

Wagner observed that as economic activities expand, government roles and functions expands. The government must increase spending to fill gaps in areas where private investment is lacking such as strategic industries and technological progress. According to Bird (1971) and Ahmad (2014) also emphasized the need for government invention to regulate natural monopolies and stimulate economic growth leading to increased government expenditure. Although Wagner ideas which never formally articulated as a law or hypothesis, were later distilled, and popularized as Wagner's hypothesis by others thereby solidifying their place in the economic theory.

Wagner's hypothesis (1863) posits that government spending increases as a country's wealth and population grow. Wegner views GDP as national income and on his view, he says government spending should also expand so as to meet the public demands in the economy. As a country's wealth and population grow, government spending increases to meet the expanding demands for the public service and infrastructure. According to Noko et al. (2020) also examines the relationship between government expenditure and Gross Domestic Product in the Zimbabwean context. He highlighted and

emphasized how government spending grows in tandem with a country's wealth and population, reflecting the increasing needs and expectations of a developing society. The theory supported Wagner's law indicating that GDP growth leads to increased government spending.

2.1.2 Keynesian Hypothesis

Keynes (1936) challenged Wagner's law with his hypothesis that government spending boosts national income through the multiplier effect, suggesting that government expenditure drives GDP growth. The multiplier's size determines the impact of the government spending on Gross Domestic Product. The Keynesian economist posits that government spending drives GDP. Further theories, Musgrave -Rostow Model also explore this relationship, aligning with the Wagner's law. Musgrave's model (1969) categorizes government spending based on the economic development stages. As outlined by the Rostow model, Sunde and Charumbira (2011) note that government expenditure varies across these stages which are summarized in Table 2.1

Table 2.1.1: Stages of Economic Growth and Development

Stage	Main Participant	Government Expenditure Level	Nature of spending behavior
Initial Stage	Government	High	development of infrastructure, improvement in agriculture and emergence of entrepreneur
Takeoff	Private Sector	High	Period of rapid industrialization and

			economic growth. Driven by technological innovations and investment.
High Mass consumption	Government	Low	Widespread consumerism, high living standards and strong service sector

Source: Sunde and Charumbira (2011)

According to the Rostow Model, government invention is necessary at various stages of economic development and government spending is stimulated by GDP. The government should adjust its spending strategies to support and foster continued economic development following the stages outline in the Rostow model.

Keynesian hypothesis posits that government spending has a positive impact on Gross Domestic Product. Mazorodze (2018), investigated the relationship between government expenditure in Zimbabwe using the Keynesian economics as a framework. According to Mazorodze (2018), the findings support Keynesian hypothesis since it suggested that government spending has a positive impact on Economic growth. Also, same research was done by Makina (2020), testing for the causal relationship in Zimbabwe and the findings also supported the Keynesian hypothesis.

The contrasting views of Keynesian theory and the Wagner's law on the relationship between government spending and Gross Domestic Product have sparked ongoing investigation on the causal relationship between GDP and government spending. Numerous studies have been conducted over the years to examine and better understand this relationship between government expenditure and Gross Domestic Product.

2.2 Empirical literature review

This study relies heavily on a thorough review of existing empirical research to

establish a strong foundation for examining the causal relationship between government expenditure and Gross Domestic Product. By analyzing the methodologies and findings of previous studies, this research aims to build upon existing knowledge and contribute to the understanding of the relationship between GDP and government expenditure. The country has received attention in examining the relationship between GDP and government expenditure since many researchers have looked into it.

2.2.1 Causal relationship between government expenditure and GDP

Using a Vector error correction model (VECM), Chinzete and Mhaka (2020), examined the relationship of government expenditure and economic growth in Zimbabwe from 1980 to 2018. The research results concluded that there is a positive long-run relationship between government expenditure and economic growth. The research concludes that government expenditure has a significant impact on economic growth in Zimbabwe and suggested that policy makers should prioritize public expenditure as a strategy for economic growth and development. The study is significant to this study since the two studies are both analyzing the causal relationship between the same variables and within the same country.

Ojewe (2013) investigated the relationship between government expenditure and economic growth. He used time series analysis of data from 1970 to 2010. The study found a positive correlation between government expenditure and economic growth with capital projects having a more significant impact than recurrent expenditure. Expenditure on education and health has a positive impact while on defence has a negative impact on growth. The study suggests that government expenditure can contribute to economic growth in Nigeria but the composition of expenditure matters and investment in human capital and physical infrastructure are likely to have a more significant impact.

Ncube and Ndlovu (2020) conducted a study on the impact of government

expenditure on economic growth in Zimbabwe from 1980 to 2018. They employed the Autoregressive Distribution lag to analyse the data and found positive correlation between government expenditure and economic growth in the long run. However, their study revealed a negative short-term relationship. The research discovered that investing in agriculture and manufacturing had the most significant impact on economic growth , highlighting the importance of targeted investments. The study shows that government expenditure can drive economic growth in Zimbabwe. The study is significant to this research for the research are investing the same country using same econometric techniques.

Shi, Gou, and Sun (2017) examined the relationship between infrastructure capital that is electricity generating capacity, roadways, railways, and telecommunications and China's regional economy over the period 1990-2013. In their 2017 study, Shi, Gou, and Sun looked at the connections between China's regional economy and infrastructure capital, which includes roads, trains, telephones, and energy generating capacity, between 1990 and 2013. Vector error correction model was employed to examine panel data on the 30 of the provinces and municipalities. Their findings demonstrated that excessive investment might be harmful to growth and that large infrastructure spending does not always result in quicker growth.

2.2.2 The direction of causality between GDP and government expenditure.

Akinlo et al. (2015) conducted a comprehensive study to investigate the relationship between government expenditure and economic growth in Nigeria, utilizing a time series data from 1960 to 2012. The research employed the Autoregressive Distribution Lag (ARDL) model and the Vector Error Correction Model to examine the direction of causality between government expenditure and GDP. The results revealed a long run relationship between the two variables, with bidirectional causality existing between government

expenditure and GDP. This implies that government expenditure can stimulate economic growth and simultaneously, economic growth can also lead to increased government expenditure. The study results support the Keynesian theory, which posits that government spending can stimulates economic growth but also highlight the importance of considering the feedback effects of economic growth on government expenditure. Overall, Akinko's study contributes to the ongoing debate on the direction of causality between government spending and economic growth emphasizing the need for a nuanced understanding of their interrelationship to inform effective policy decisions. The research conclusions underscore the complexity and dynamics of the relationship between government spending and GDP, suggesting that policies aimed at promoting economic growth should consider the interdependence of both variables.

Aziegbe et al. (2018) also conducted a comprehensive study to investigate the relationship between government expenditure and economic growth in Nigeria, utilizing a time series data from 1980 to 2017. The researcher employed the ARDL model and VECM to examine the direction of causality between thew two variables. The results revealed that government expenditure has a positive and a significant impact on economic growth but not vice versa. The research results support the Keynesian theory, which posits that government spending can stimulates economic growth. The researchers concluded that targeting government expenditure can boost economic growth in strategic sectors such as infrastructure, education, and healthcare. Therefore, the study recommends that the expenditure to stimulate growth. Aziegbe highlights the significance of government expenditure in promoting economic growth and provides valuable insights for policy makers seeking to stimulate economic growth through targeted government expenditure

Kunofiwa (2014) conducted a study to investigate the direction of causality between GDP and government expenditure paying particular attention to military expenditure in the country. He used VECM and data from 1970 to 2012. The results showed a unidirectional causality from GDP to government

expenditure indicating that economic growth drives government expenditure, but government expenditure does not drive economic growth. The theory supported the Keynesian theory which say that government spending is a function of economic activity.

2.2.3 Policy Implications and recommendations

Mukherjee (2015) conducted a comprehensive study on the relationship between infrastructure development and economic growth in India using data from 1980 to 2013 and found a positive and significant correlation between the two. The study highlighted the crucial role of infrastructure in promoting economic growth and development and recommended policymakers prioritize investment in infrastructure, encouraging private sector investment and focus on productive sectors such as transportation, energy, and communication. The research also suggested that policymakers develop a comprehensive infrastructure development plan, address bottlenecks, and increase access to infrastructure services particularly in rural areas to promote economic growth. The study findings and recommendations provide valuable insights for policymakers to promote sustainable and inclusive economic growth in India.

Gupta 2015 conducted a comprehensive study on the relationship between human capital development and economic growth in India using data from 1980 to 2012. The study found a positive and a significant correlation between human capital development and economic growth indicating that investment in human capital is crucial for economic growth and poverty reduction. The study concluded that human capital development is essential and recommended that policy makers prioritize investment in education and health care to promote human capital development and economic growth. According to Gupta (2015), the study underscores the critical need for India to prioritize human capital development through education and healthcare investment to drive economic growth, poverty reduction and archive sustainable development and by doing so, India can unlock its huma capital potential and archive sustainable development, ensuring a brighter future to

its citizens.

Using Wagner's law, Menyah and Wolde-Rufael (2013) examined the causal and long-term relationship between government expenditure and economic growth in Ethiopia. The years 1950–2007 were the focus of the inquiry. The data indicated that government spending was ineffectively employed as a tool of policy to promote Ethiopia's economic expansion. Katrakilidis and Tsaliki (2009) carried out a study akin to this one on the Greek economy from 1958 to 2004. The findings showed a long-term causal relationship between income and government spending that was both positive and statistically significant.

2.3 Conclusion.

The research review on the theoretical and empirical literature has shown an increased emphasis on co-integration and ARDL bounds test in examining the causal relationship between government expenditure and Gross Domestic Product. After concluding the theoretical and empirical literature review, the researcher proceeds to the methodology, outlining the methodological approach used to drive the study findings including the criteria and techniques employed to analyze the data.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, researcher employs a causal analysis research design to investigate the relationship between government spending and Gross Domestic product in Zimbabwe. The aim is to determine the direction and strength between the two variables. The researcher will utilize econometric techniques, specifically the Autoregressive Distribution Lag (ARDL) bounds test and the Granger causality to reach a conclusion of the relationship between government expenditure and Gross Domestic Product. The study will also conduct diagnostic tests to ensure the robustness and reliability of the results.

3.2 Research Design.

A research design is a detailed plan outlining the approach , methods and expected outcome of a study (sage ,2017). This research proposal outlines the plan and approach for investigating the relationship between government expenditure and economic growth in Zimbabwe from 1960 to 2022. According to Creswell (2014), a research design provides a framework for achieving the study's objectives and ensuring accurate results. Despite the

time constraints, using time series data from world bank website, the researcher examines the causal relationship between GDP and government expenditure in Zimbabwe.

According to Bryman (2016), a case study research approach is optimal for gaining a detailed understanding of a specific research context. Bryman (2016) also notes that this approach is useful for exploring existing theories and may even lead to challenging them and potentially result in new hypothesis. Considering this, the current study adopted an explanatory approach to investigate the causal relationship between government expenditure and Gross Domestic Product. Research that aims to establish the relationship between GDP and government spending can be classified as explanatory studies (Bryman , 2016).

3.3.1 Model Specification

The researcher has chosen specific models for this study. The ARDL bounds test model will be used to examine cointegration, while the Granger causality test will investigate the causal relationship between government spending and GDP which is the focus of this analysis. The Granger causality test is a widely accepted and trusted method to determine the direction of causality making it a popular choice among researchers. This approach allows for a thorough examination of the relationship between government spending and GDP enabling a conclusive evaluation of the Keynesian hypothesis and Wagner's Law. To examine the causal relationship between government spending and GDP, the study will use a system of equations based on Santiago (2014) model.

$$\Delta GFCE = \sum_{i=1}^{n} \vartheta_i \Delta GFCE_{t-i} + \sum_{i-1}^{n} \omega_i \Delta GDP_{t-1} + \mu_{1t} \ldots\ldots\ldots\ldots\ldots 1$$

$$\Delta GDP = \sum_{i=1}^{n} \varphi_i \Delta GFCE_{t-i} + \sum_{i=1}^{n} \lambda_i \Delta GDP_{t-i} + \mu_{2t} \ldots\ldots\ldots\ldots\ldots 2$$

This research aims to investigate the relationship between government spending (GFCE) and Gross Domestic Product (GDP) by estimating the parameters ϑ, φ ,ω and λ. The Lag operator 'n' is used to account for the lagged values of the variables. The error terms are represented by μ_{1t} and μ_{2t}. The direction of causality between the two variables will be examined using Granger Causality test. If GDP is found to granger cause GFCE, it will support Wagner's Law. If GFCE is found to granger cause GDP, it will support the Keynesian Hypothesis.

3.3.2 Justification of Variables.

Khromov et al. (2022) discuss Wanger's law, which states that government expenditure increases as a country's economy grows. The authors note that Wagner did not provide a clear mathematical formulation of his law leading researchers to test various forms of the hypothesis. The researcher examined the direct financial relationship between government spending and Gross Domestic Product in Zimbabwe, focusing on government final consumption expenditure as a measure of government spending. Since this enables us to see the full effects of the fiscal policy as posed by the World Bank and Economic Websites, the researcher opted to collect the data under examination at the current US dollars rather than constant US dollars. The study variables are independently justified under the following subheadings:

3.3.2.1 GFCE (Government Final Consumption Expenditure)

It refers to the value of the final products and services that the government consumes, and it is a metric used to estimate the amount of money the government will spend on the economy. GFCE is a crucial component of government spending that plays a significant role in the economy of Zimbabwe. According to Mwanza and Mwansa (2015), government final consumption expenditure is a vital indicator of government spending as it

reflects the government's direct economic activity and influence aggregate demand. Moreover, according to Ncube and Ndou (2019), GFCE accounts for a substantial share of government expenditure in Zimbabwe, making it a vital component of the government's fiscal policy. Therefore, examining GFCE is essential to understand the causal relationship between government spending and Gross Domestic product in Zimbabwe.

3.3.2.2 Gross Domestic Product (GDP).

Gross Domestic Product is a suitable indicator for analysing the causal relationship between government expenditure and GDP in Zimbabwe from 1960 to 2022. GDP represents the total value of goods and services produced within a country, providing a comprehensive measure of economic activity. According to Karambakuwa et al. (2015), Gross Domestic Product is a widely accepted indicator of economic growth and development and its relationship with government spending has important implications for fiscal policy. According to Chinzete et al (2020), GDP is a key macroeconomic variable that reflects the overall performance of an economy, making it an appropriate outcome variable for examining the impact of government spending.

3.4 Data Source and Collection Procedure.

The research utilized readily available secondary data on government expenditure and Gross Domestic Product which was retrieved from World Banks online database, providing convenient and accessible source of information for analysis.

The research relied on secondary data due to its advantage in longitudinal studies, notably reducing the time and cost associated with collecting primary data over an extended period. The readily available secondary data facilitated the analysis of the relationship between government spending and Gross Domestic Product. Moreover , using secondary data ensures data permanence , allowing easy verification and validation of the study results by others enhancing the research's reliability and transparency.

However, secondary data has its drawbacks. The data may have been collected for a different purpose which could lead to inconsistencies with this study's objectives. Additionally accessing the data can be challenging . Also, the initial purpose of the data collection may influence how the data is presented and aggregations may result in data that is not entirely suitable for other researchers, potentially limiting its usefulness and applicability in this study

3.5 Data presentation and analysis procedures.

This involves a systematic approach to cleaning, visualising, and interpreting data to extract insights and meaning full conclusions. To ensure accurate results, the researcher employed diagnostic tests including the unit root testing to prevent spurious regression , optimal lags selection to determine the best model and cointegration testing to identify long-term relationship between the variables. These diagnostic tests are crucial in achieving reliable outcomes in this study.

3.5.1 DIAGNOSTIC TESTS

Diagnostic test are statistical tools used to evaluate the validity and reliability of econometric models. These tests help researchers to detect potential issues and ensure that their models are properly specified and accurate. In this study, unit root test was employed to determine if the times series data has a unit root.

3.5.1.1 Unit Root

A unit root is a statistical test used to determine if a time series data has a unit root which means the data has a persistent trend that does not change over time. Unit root is used to check if the data is stationary or non-stationary. F-statistic from the ARDL limits test may be misleading for variable I (2) variables, this test is only suitable for I (0) and I (1) variables. Henceforth, the Augmented Dickey Fuller (ADF) test was employed to confirm the absence of

I (2) variables. The ADF test involves the following hypothesis:

Hypothesis :

H_o: Non-Stationary

H_1: Stationary

Decision Rule: Reject the null hypothesis if the P-values are less than 0.05

3.5.2 COINTEGRATION TEST

Cointegration test are statistical tools used to determine if two or more time series share long-run relationship despite short run deviations. These tests are essential in econometrics to validate economic theories, conduct accurate forecasting and inform policy makers. In this study, the researcher employed the Autoregressive distribution Lag (ARDL) model and the Granger causality so as to test the relationship between government expenditure and Gross Domestic Product in Zimbabwe between 1960 and 2022.

3.5.2.1 Granger Causality Test

Granger causality is a statistical technique used to examine the causal relationship between two time series variables, determining id the past values of one variable can predict another variable's future values according to Peters et al. (2017). This research employs Granger causality to investigate the direction of causality between government expenditure and Gross Domestic Product. The Pairwise Granger Causality test will be employed based on the frameworks for Granger (1969) and Rahman et al. (2020). According to Kleinberg et al. (2019), causality is a fundamental concept, and it is generally understood as the relationship between cause and effect, where the cause occurs before the effect. Granger causality was employed to determine whether government expenditure influences GDP or GDP influences government expenditure providing insights into the dynamics between the two economic variables.

3.5.2.2 Autoregressive Distribution Lag (ARDL)

The Autoregressive Distribution Lag (ARDL) model is a versatile statistical tool used to examine relationship between variables and useful for analysing economic data , focusing future values, and testing hypothesis (Kumar et al., 2018) The ARDL model captures both short term and long-term relationship between variables making it an ideal choice to investigate the relationship between government expenditure and Gross Domestic Product in Zimbabwe, which is this scope of this study. Kumar et al (2018) highlighted the model's flexibility in handling nonstationary data , capturing both short-run and long-run relationship and minimize endogeneity problems. The ARDL bounds test long- run and short-run relationship between variables simultaneously and address issues related to autocorrelation. The test is robust to integration orders except for I(2) variables which have undefined critical values. The ARDL bounds test hypothesis are as follows

Hypothesis

H_o: No long- run relationship exists

H_1: A long-run relationship exists

Decision Rule: Reject the null hypothesis if the F-statistic is greater than the upper bound and the lower bound values

3.5.4 Optimal Lags

Optimal lags refer to the optimal number of lagged terms to include in an autoregressive distribution lag model. Optimal lag selection is crucial for ensuring the accuracy and reliability of the models estimate and forecasts. According to Kumar et al.(2018), the correct lag order is crucial for detecting cointegration and granger causality between variables. The optimal lags are determined by selecting lag order that minimizes the Akaike Information criterion (AIC), Hannan- Quinn information criterion (HQ), and the Schwarz

information criterion (SC). The researcher then employed she Schwarz information criteria in selecting the optimal lags.

3.6 Conclusion

The research methodology provides a clear and detailed approach to answering the research question and achieving the objectives. The conceptual framework guided the selection of appropriate methods which are built upon established research in filed. With confidence in the adopted models and diagnostic tests , this study aims to contribute to the existing body of knowledge by shading light on the relationship between public spending and economic growth in Zimbabwe. Having established the methodological framework, we can now proceed to the practical application of these methods and the presentation of the study findings.

CHAPTER FOUR

DATA PRESENTATION AND DISCUSION

4.0 Introduction

Study results on research on the causal relationship between the government expenditure and Gross Domestic Product are summarized in this chapter. Using E-views, the researcher employed a comprehensive range of econometric models to examine the dynamic relationship between government spending and GDP. Validity of the models was tested using diagnostic test followed by unit root test to examine the stationarity of the variables. The long run and short run relationship between the variables was also examined using the Autoregressive Distribution Lag. In the study, Granger causality test was conducted to determine the direction of causality between Gross domestic product and government expenditure. The results of the study will be carefully interpreted to make the findings of the study more meaningful to all the scholars and students that may be interested in the subject.

4.1 Diagnostic test

Diagnostic tests play a crucial role in detecting errors both before and after running regression. By identifying potential issues , diagnostic test helps to ensure the accuracy and reliability of the results. The absence of errors such as serial correlation and non-stationarity, as indicated by diagnostic test, increasing the confidence in the estimates and make the results more robust and reliable. Stability diagnostic tests provide assurance that the regression

model is not flawed. Employing diagnostic test, we can trust that our regression model is reliable and not spurious.

4.1.1 Unit root test

The order of integration does not affect the ARDL bounds test, its essential to check for variables with an order of integration higher than 1 that is I(2) variables. The ARDL bounds test is designed for variables with an order of integration on I(0) and I(1) . if I(2) variables are present, alternative techniques like the Phillips and Johansen cointegration method must be employed. Stationarity tests results are presented in the table below

Table 4.1.1: The Unit Root Test Results

Variable	ADF Statistics	Critical Values		Intercepts	P-Values	Order of Integration
GDP	-0.179939	1%	-3.540198	Yes	0.8319	I(1)
		5%	-2.909206			
		10 %	-2.592215			
GFCE	0.426416	1%	-3.540198	Yes	0.9938	I(1)
		5%	-2.909206			
		10 %	-2.592215			

Source: Appendix 2 and 3 for more information

Hypothesis:

H_0: Non-stationary (there is no unit root)

H_1: Stationary (there is unit root)

Decision Rule: Reject the null hypothesis if the P-values are less than 0.05

Table 4.1.1 shows the unit root test reveals that the series for GDP and GFCE are stationary. P- values are above 5%, indicating that we fail to reject the Null hypothesis of no unit root. Since P-values for both variables are above 5% significant level , it means both the variables are stationary. The researcher then proceeds to the next crucial steps in this chapter.

4.1.2 Optimal Lag Length selection

Optimal lags refer to the ideal number of lagged terms in an autoregressive distribution lag model, essential for ensuring accurate estimates and forecasts. Selecting the correct lag order is vital for identifying cointegration and Granger causality between variables as emphasized by Kumar et al (2018). The optimal lags are determined by choosing the lag order that minimizes the Akaike Information criterion (AIC), Hannan-Quinn Information criterion and Schwarz information criterion (SC). In this study, the researcher used the Schwarz information criterion to select the optimal lags.

Table 4.1.2 Optimal Lag Selection

Lag	Schwarz Information Criterion
0	43.41209
1	43.21307
2	43.12013*
3	43.17468

Source: Appendix 4 for more information

4.1.3 Cointegration test

4.1.3.1 Objective 1: To investigate the causal relationship between government expenditure and Gross Domestic Product in Zimbabwe .

The ARDL model is suitable for analysing the dynamic relationship between government spending and GDP including short-term and long-term effects and testing for cointegration between the two variables. The investigation of the relationship between government spending and Gross Domestic Product was performed using Autoregressive Distribution Lag (ARDL) model and the bounds test was accompanied with the Pesaran tables (Peseran et al., 2001) which will depict the critical upper bound and the critical lower bound values crucial in determining whether the relationship is shown on not. Using the results obtained by the researcher from E-Views 10, the following cointegration results shown in the table 4.2 were obtained.

Test Statistic	Value	K
F- statistic	27.93927	1
Critical Value Bounds		
Significance	Lower bound	Upper bound
5%	3.62	4.16

Source: Appendix 6 for more Information

Hypothesis:

H_0: No long-run relationship exists.

H_1: Long-run relationship exists.

Decision rule: Reject the null hypothesis if the F-statistic is greater than the upper bound and the lower bound.

After estimating the long run ARDL bound test , the researcher found that the F-statistic is greater than the lower and the upper bound test. The researcher concluded that there is cointegration between the variables. Therefore, there is the long run relationship between government expenditure and gross domestic Product in Zimbabwe.

4.1.4 Granger Causality test

4.1.4.1 Objective 2 : To examine the direction and strength of causality between Gross Domestic Product and government expenditure.

The researcher employed Granger causality test; a statistical technique used to determine the direction of causality between two time series variables (Granger, 1969). This test is essential in understanding whether government spending cause GDP or GDP cause government spending. This is crucial for policy makers to make informed decisions about government spending and its potential impact on economic growth according to Taylor (2019). The Granger causality was employed in this study to determine the direction of causality between Gross Domestic Product and government expenditure. The results obtained from the Granger Causality test are being shown in the tables below.

Table 4.1.4a Granger causality test results

Null Hypothesis	F-statistic	Prob
GFCE does not granger cause GDP	15.6316	0.0002
GDP does not Granger cause GFCE	5.62276	0.0210

Source: Appendix 7 for more information

Table 4.1.4b Granger Causality test results.

Null Hypothesis	F- statistic	Prob
D(GFCE) does not granger cause D(GDP)	12.1656	0.0009
D(GDP) does not Granger cause D(GFCE)	0.35293	0.5548

Source: Appendix 7 for more information

Decision Rule: Reject the null Hypothesis if the P values are less than 0.05

The data was I(1); it was necessary to differentiate the data to conduct the granger causality and the results of the differentiated data are shown in **table 4.1.4b.** The first difference operation is represented by D in **table 4.1.4b**. Looking into hypothesis which states that GFCE does not have a significant impact on GDP, the P-values is below 5% which implies that we reject the null hypothesis. In the second null hypothesis which posits that GDP does not influence GFCE, the P-value is above 5% significant level, and it means we failed to reject the null hypothesis and we conclude that government expenditure has a significant impact on Gross Domestic Product in Zimbabwe.

Table 4.1.4a depicts the results for undifferenced data. In **able 4.1.4b**, the researcher showed the results where the first difference operator was employed, and they are also supported by the results from **table 4.1.4a**. We can conclude that there is evidence of the Keynesian evidence in Zimbabwe since government expenditure stimulates Gross Domestic Product.

4.5 Conclusion

This chapter presented the empirical results between government spending and gross domestic product in Zimbabwe from 1960 to 2022. The empirical results showed a strong positive correlation between government spending and GDP in Zimbabwe, indicating a significant relationship between the two variables. The Granger causality test results showed that government spending Granger cause GDP and not vice versa. The results showed that

government expenditure plays a vital role in driving economic growth in Zimbabwe , making it a crucial policy tool. The ARDL bounds test confirms a long-term relationship between government spending and Gross Domestic Product implying a sustainable relationship between government spending and Gross Domestic Product. The results provide robust evidence supporting the Keynesian hypothesis that posits that government spending can stimulate GDP. The results suggest that government spending can be an effective tool for economic development in Zimbabwe. This study provides evidence of the causal relationship between government spending and Gross Domestic Product in Zimbabwe.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECCOMMENDATIONS

5.1 INTRODUCTION

This chapter presents the summary of the key findings, conclusions and policy recommendations derived from the research investigations. It interprets the significant of the results, highlighting their implications and contributions to the existing body of knowledge. The chapter outlines how the findings can benefit the future Zimbabweans by providing valuable insights and recommendations.

5.2 SUMMARIES

5.2.1: Summary on objective 1

This research investigated the causal relationship between government expenditure and Gross domestic product in Zimbabwe from 1960 to 2022.Using time series analysis , the Autoregressive distribution lag (ARDL) model and Granger causality tests, the researcher a significant and a positive causal relationship between government expenditure and Gross Domestic Product. The findings confirm Keynesian Hypothesis which states that government spending increases Gross Domestic Product growth. The application of econometric techniques in this study enabled the saucerful identification of the causal relationship between government expenditure and Gross Domestic Product thereby fulfilling the research objective.

5.2.2 Summary on objective 2

This study investigates the causal relationship between government spending and Gross Domestic Product in Zimbabwe from 1960 to 2022, aiming to uncover the direction of influence between the two variables. The research seeks to determine whether government expenditure significantly impacts GDP or Gross Domestic Product significantly impacts government expenditure or if a bidirectional relationship exists. The researcher employed the Granger Causality test, a statistical technique to determine the direction of causality between the two variables under consideration. The study found a unidirectional causality running from government spending to GDP, indicating that government spending has a significant impact on GDP. The findings of the research supported the Keynesian hypothesis which posits that government spending has a positive impact on economic growth.

5.2.3 Summary on Objective 3

The research provides policy recommendations grounded in the empirical findings. The study provides policy implications and recommendations based on the results of the research investigation. The results obtained from the econometric techniques, the ARDL , granger causality and the regression analysis will be used to provide an evidence-based recommendation and insights that government spending can be used as a tool for the economic stimulation and growth in Zimbabwe supported by the Keynesian hypothesis.

5.3 CONCLUSIONS

5.3.1 Conclusion on Objective 1

The research has successfully determined the causal relationship between government spending and Gross Domestic Product in Zimbabwe for the years stretching from 1960 to 2022. The study found a strong positive correlation between government spending and economic growth in Zimbabwe, indicating

that increased government expenditure has a stimulating effect on the economy. The conclusion obtained from the research supports the Keynesian hypothesis. Therefore, one can certainly conclude that the Zimbabwean government should prioritize effective fiscal policy and increase government spending on productive sectors to archive sustainable growth and development.

5.3.2 Conclusion on Objective 2

Conclusively, the research has revealed a unidirectional causality between government spending and Gross Domestic Product in Zimbabwe. The researcher is satisfied with the research results and the objective of determining the direction of causality between government expenditure and Gross Domestic Product was met by the employment econometric techniques that is Granger causality test and the Autoregressive Distribution Lag bound test.

5.3.3 Conclusion on Objective 3

This research provides valuable insights for policymakers in Zimbabwe, highlighting the positive correlation between government expenditure and GDP growth from 1960 to 2022. The findings suggest that strategic government spending can drive sustainable economic growth and development. To capitalise on this, the government is advised to increase investment in productive sectors like infrastructure , healthcare and education and implement effective fiscal policies to maximise impact. By adopting these recommendations , policymakers can create a framework for sustainable economic growth , leveraging spending to drive development and prosperity in Zimbabwe.

5.4 RECOMMENDATIONS

- Effective Fiscal policy - considering the findings, the government spending and taxation should be able to influence economic activity and achieve desired economic outcomes which is to stimulate economic growth , improve living standards and reduce poverty. Since the results have shown a positive relationship between government spending and GDP, the government can use fiscal policy as a tool to stimulate economic growth.
- Strengthen fiscal discipline – The government should maintain a balanced budget by balancing government spending with the revenues collected to avoid excessive budget deficits and inflationary pressures. Fiscal discipline ensures that government spending is sustainable and does not lead to macroeconomic imbalances.
- Promote Private sector participation – The government should create a conducive environment for private sector investment by streaming regulation, providing incentives, and ensuring a level playing field. Private sector investment complements government spending and fosters a more dynamic and competitive economy.
- Regular evaluations - Regularly evaluate the effectiveness of government spending programs in the country and make necessary adjustments to maximize their impact on economic growth. Evaluations provide valuable feedback and allow policymakers to identify areas of improvements and fine-tune government spending strategies.

5.5 Conclusion.

The researcher was satisfied w the finding obtained from the study. After the study investigation , the Keynesian hypothesis was supported by the research, the study results showed that there is a positive long run relationship between government spending and Gross Domestic Product. It also shows that government spending stimulates Gross Domestic Product. However, it is important to note that the relationship between the two is influenced by other factors such as inflation , interest rates and political instability. Overall, the

study highlighted the importance of government expenditure on economic growth and development.

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APPENDICES

Appendix 1: Data set

YEAR	GDP	GFCE
1960	1052990400	111069000
1961	1096646600	127335000
1962	1117601600	134728700
1963	1159511700	149187400
1964	1217138000	142450900
1965	1311435800	147380000
1966	1281749500	153952100
1967	1397002000	165124800
1968	1479599900	180240700
1969	1747998800	195520900
1970	1884206300	207022100
1971	2178716300	235643500
1972	2677729400	278755200
1973	3309353600	360897000
1974	3982161400	444942500
1975	4371300700	526980200
1976	4318372000	598399900
1977	4364382100	713670400
1978	4351600500	781449700
1979	5177459400	926985700
1980	6678868200	1236362800
1981	8011373800	1297397300
1982	8539700700	1587813500
1983	7764067000	1342635100
1984	6352125900	1272979000
1985	5637259300	1138918500
1986	6217523700	1283795600
1987	6741215100	1575127200
1988	7814784100	2148056100
1989	8286322700	1548747800
1990	8783816700	1708112700

1991	8641481700	1392982800
1992	6751472200	1631025400
1993	6563813300	981098000
1994	6890675000	1150315700
1995	7111270700	1280950400
1996	8553146600	1448888900
1997	8529571600	1391606100
1998	6401968200	1010489900
1999	6858013100	1220101700
2000	6689957600	1623341300
2001	6777384700	1199101800
2002	6342116400	1136730400
2003	5727591800	1026170400
2004	5805598400	1219212100
2005	5755215200	875441400
2006	5443896500	320246200
2007	5291950100	169775000
2008	4415702800	90394800
2009	9665793300	912702200
2010	12041655200	1844254600
2011	14101920300	2647483100
2012	17114849900	3423989500
2013	19091020000	3520135400
2014	19495519600	3813378900
2015	19963120600	3768540600
2016	20548678100	4056585200
2017	17584890937	4881963061
2018	34156069918	3846854598
2019	21832234921	2942967273
2020	21509698407	2243763309
2021	28371238666	5432175457
2022	27366627153	7130829116

Appendix 2: unit root test GDP

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.726928	0.8319
Test critical values:	1% level	-3.540198	
	5% level	-2.909206	
	10% level	-2.592215	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 06/02/24 Time: 11:14
Sample (adjusted): 1961 2022
Included observations: 62 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.040023	0.055058	-0.726928	0.4701
C	7.50E+08	5.89E+08	1.274201	0.2075

R-squared	0.008730	Mean dependent var	4.24E+08
Adjusted R-squared	-0.007791	S.D. dependent var	3.00E+09
S.E. of regression	3.01E+09	Akaike info criterion	46.51811
Sum squared resid	5.43E+20	Schwarz criterion	46.58673
Log likelihood	-1440.061	Hannan-Quinn criter.	46.54505
F-statistic	0.528424	Durbin-Watson stat	2.775123
Prob(F-statistic)	0.470097		

Appendix 3: unit root test GFCE

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

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.826251	0.9938
Test critical values:	1% level	-3.540198	
	5% level	-2.909206	
	10% level	-2.592215	

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GFCE)
Method: Least Squares
Date: 06/02/24 Time: 11:17
Sample (adjusted): 1961 2022
Included observations: 62 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFCE(-1)	0.049515	0.059927	0.826251	0.4119
C	45159464	1.11E+08	0.405480	0.6866

R-squared	0.011250	Mean dependent var	1.13E+08
Adjusted R-squared	-0.005229	S.D. dependent var	5.89E+08
S.E. of regression	5.90E+08	Akaike info criterion	43.26154
Sum squared resid	2.09E+19	Schwarz criterion	43.33015
Log likelihood	-1339.108	Hannan-Quinn criter.	43.28848
F-statistic	0.682690	Durbin-Watson stat	1.464875
Prob(F-statistic)	0.411935		

Appendix 4: Optimal Lag Length selection

VAR Lag Order Selection Criteria
Endogenous variables: GFCE
Exogenous variables: C GDP
Date: 06/02/24 Time: 10:05
Sample: 1960 2022
Included observations: 58

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1254.890	NA	3.89e+17	43.34104	43.41209	43.36871
1	-1247.088	14.79658	3.08e+17	43.10649	43.21307	43.14800
2	-1242.363	8.798989	2.71e+17	42.97803	43.12013*	43.03338
3	-1241.914	0.819439	2.76e+17	42.99705	43.17468	43.06624
4	-1238.661	5.833613*	2.56e+17	42.91935	43.13250	43.00238
5	-1237.049	2.835325	2.50e+17*	42.89824*	43.14691	42.99510*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Appendix 5: Estimation of the ARDL bounds test model

Dependent Variable: GFCE
Method: ARDL
Date: 06/02/24 Time: 16:00
Sample (adjusted): 1963 2022
Included observations: 60 after adjustments
Maximum dependent lags: 8 (Automatic selection)
Model selection method: Schwarz criterion (SIC)
Dynamic regressors (8 lags, automatic): GDP
Fixed regressors: C
Number of models evalulated: 72
Selected Model: ARDL(3, 3)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GFCE(-1)	1.004039	0.110132	9.116660	0.0000
GFCE(-2)	-0.356433	0.147560	-2.415512	0.0193
GFCE(-3)	-0.804105	0.192470	-4.177814	0.0001
GDP	-0.025740	0.022472	-1.145409	0.2573
GDP(-1)	0.013069	0.020566	0.635473	0.5279
GDP(-2)	0.048154	0.025369	1.898136	0.0632
GDP(-3)	0.194864	0.025179	7.739190	0.0000
C	-1.16E+08	69588616	-1.670573	0.1008

R-squared	0.953963	Mean dependent var	1.53E+09
Adjusted R-squared	0.947766	S.D. dependent var	1.45E+09
S.E. of regression	3.31E+08	Akaike info criterion	42.19816
Sum squared resid	5.71E+18	Schwarz criterion	42.47741
Log likelihood	-1257.945	Hannan-Quinn criter.	42.30739
F-statistic	153.9319	Durbin-Watson stat	1.870146
Prob(F-statistic)	0.000000		

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

Appendix 6: ARDL Long Run Form and Bounds test Results

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GFCE)
Selected Model: ARDL(3, 3)
Case 2: Restricted Constant and No Trend
Date: 06/02/24 Time: 16:03
Sample: 1960 2022
Included observations: 60

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.16E+08	69588616	0.000000	0.0000
GFCE(-1)*	-1.156500	0.144473	-8.004974	0.0000
GDP(-1)	0.230347	0.026517	8.686806	0.0000
D(GFCE(-1))	1.160538	0.146250	7.935324	0.0000
D(GFCE(-2))	0.804105	0.192470	4.177814	0.0001
D(GDP)	-0.025740	0.022472	-1.145409	0.2573
D(GDP(-1))	-0.243018	0.040232	-6.040412	0.0000
D(GDP(-2))	-0.194864	0.025179	-7.739190	0.0000

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.199176	0.006944	28.68143	0.0000
C	-1.01E+08	60236940	-1.668765	0.1012

EC = GFCE - (0.1992*GDP -100521279.3210)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	27.93927	10%	3.02	3.51
K	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58
			Finite Sample: n=60	
Actual Sample Size	60			
		10%	3.127	3.65
		5%	3.803	4.363
		1%	5.383	6.033

Appendix 7: Granger Causality Test Results.

Pairwise Granger Causality Tests
Date: 06/02/24 Time: 11:11
Sample: 1960 2022
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
DGFCE does not Granger Cause DGDP	61	12.1656	0.0009
DGDP does not Granger Cause DGFCE		0.35293	0.5548

Pairwise Granger Causality Tests
Date: 06/02/24 Time: 11:12
Sample: 1960 2022
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
GFCE does not Granger Cause GDP	62	15.6316	0.0002
GDP does not Granger Cause GFCE		5.62276	0.0210