THE IMPACT OF DOMESTIC DEBT ON ECONOMIC GROWTH IN ZAMBIA

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by

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ABSTRACT

Many developing countries like Zambia are faced with budgetary constraints. As a result, they bridge this gap in budgetary financing through borrowing. The borrowing is sometimes externally and can also be internally. Specifically, Zambia has gone through different phases as regards borrowing whether domestically or externally from the long ago. From the time Zambia received debt forgiveness there seems to be a rise again in the amount of debt that has been contracted both domestically and externally amidst falling growth in the economy. Therefore, this paper investigated the impact of Zambia's domestic debt on economic growth. To accomplish this, the debt-to-GDP ratio was used as a measure for domestic debt, while real GDP growth was used to gauge Zambia's economic growth from 1980 to 2018. The analysis was conducted using the Vector Error Correction model (VECM) and causality time series techniques. The results indicate that increased domestic borrowing led to a decline in Zambia's economic growth. Precisely, it was discovered that a 1% increase domestic debt resulted to a decrease (increase) of 0.988% in economic growth in the long run, holding all other factors constant. The Granger causality test shows that all variability does not cause economic growth. These results are further confirmed by the variance decomposition analysis. Based on the study findings the study makes the following recommendations. Firstly, the Zambian government should aim for lower levels of domestic borrowing that can be used for productive and efficient purposes. Secondly, to encourage faster growth, the real interest rate should be stable and real effective exchange rate can be improved through increased manufacturing, which results in increased exports. Lastly, governments can sell some parastatal companies to reduce large public expenditures while also increasing revenue, thereby boosting real GDP growth.

Key words: Cointegration, Granger Causality, Domestic Debt, Economic Growth, Vector Error Correction Model.

DEDICATION

To my Wife and Children; Mutiba, Thando and Nkosi, WE MADE IT.

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I appreciate God Almighty for his Wisdom, Favor, Unwavering Love shown towards me. He alone has taken my hand and led me to this conclusion of my journey at the University of Cape Town. He has given me tremendous growth in knowledge and understanding throughout this journey, even when I was entertaining thoughts of a possible surrender.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

ADF	Augmented Dickey-Fuller
BOZ	Bank of Zambia
ECM	Error Correction Model
ERP	Economic Reform Program
GDP	Gross Domestic Product
GRZ	Government of the Republic of Zambia
INF	Inflation rate
MDRI	Multilateral Debt Relief Initiative
REER	Real Effective Exchange Rate
WDI	World Development Index
VDC	Variance Decomposition Analysis

CHAPTER ONE: INTRODUCTION

1.1. BACKGROUND TO THE STUDY

Zambia like most developing countries considers public debt as an essential tool through which to bridge the gap in government financing. Nevertheless, public debt maybe be viewed as a good and at the same time bad. For example, if public debt is used effectively and efficiently it can lead to growth in the economy and enable the government to attain its social and economic objectives. Literature shows that debt-financed development projects can assist a country in increasing its productivity capacity and facilitate economic growth. (Cohen, 1993).

Zambia, like several other African countries, had engaged in a lot of borrowing between 1980 and 1990. Smith (2017) and Trading Economics (2019) points out that by the close of 1990, the public debt had risen to approximately US$8 billion (or 244 percent of Gross Domestic Product), resulting in critical financial constraints and slow growth in the economy from 1990 to somewhere around the year 2000. In clear disparity from the years back in the 1980s, total public debt rose slightly between 1990 and 2000, from US$ 8000 million to US$ 9,100 million which represent a 254% as a ratio of Gross Domestic Product. Zambia completed the Multilateral Debt Relief Initiative (MDRI) and the Initiative for Heavily Indebted Poor Countries (HIPC) in 2005, qualifying for US$ 6,600 million in public debt forgiveness (Smith et al., 2017). This resulted in cancellation of over 80% of debt that Zambia owed externally (US$6,500 million in 2000, US$7,100 million in 2004, and US$700 million in 2006).

These favorable macroeconomic environments resulted in Zambia's domestic borrowing to increase, posing a threat to the sustainability of domestic debt. The government had moved funding of deficits away from external borrowing and toward domestic borrowing, specifically through Treasury securities. Additionally, there was a rise in the demand for government securities from both domestic and foreign investors because of the financial markets' stability (Bank of Zambia, 2005, 2009; Muyatwa, 2008)

Between 2006 and 2011, sovereign debt increased slowly, from US$ 3,200 million (representing 25% of GDP in 2006) to about US$ 5,100 million (22% of GDP) by 2011. Conversely, sovereign debt in Zambia has grown at an exponential rate, rising from

approximately US$ 5,100 million towards the close of 2011 to US$ 14,910 million in December of 2018. Additionally, debt servicing was a significant component for Zambia's national budget in 2019, about 30% (US$ 2,130 million) of all spending by the government (Smith et al., 2017).

1.1.1. The Early Growth in Public Debt for Zambia

Since achieving political independence in 1964, the Zambian government has invested heavily in human resource development as well as infrastructure. The infrastructure seen includes manufacturing industries, housing, railway lines, schools, oil pipelines (through to INDENI) and hospitals (Kragelund, 2017). Despite these investments in capital, Zambia's public debt continued to grow gradually, reaching approximately US$ 800 million in December of 1970 which is marginally over 40%t of GDP. In addition, many of Zambia's neighbours after 1964 were still embroiled in power struggles. As a result, substantial spending was done in the first 20 years following independence to support emancipation struggles in neighbouring Southern African countries. Nonetheless, Ng'andwe (1980) postulates that copper the primary revenue source for Zambia came to be heavily mined and sold at a high price during this period, generating sufficient earnings to cover the previously mentioned as well as and additional routine spending.

Hence in this period, 1960s, there was gradual accumulation of public debt which was primarily due to the substantial revenue generated by copper production as at this time the prices of copper were at the peak (Chikalipah, 2019). From independence until 1974, a flourishing period of great economic expansion with an average annual growth rate of 7% lasted only ten years. Following that, from 1975 to 1980, copper prices fell precipitously, while crude oil prices reached a record height. Consequently, the government had to borrow money to restore an ailing economy that was fundamentally depressed. As a result, public debt skyrocketed from approximately US$ 800 million in 1970 to approximately US$ 4000 million by December of 1980 (Chikalipah, 2021).

In 1981, public debt was US$ 4000 million and it had more than tripled to approximately US$ 8000 million (representing 244% of GDP) in 1990. The prompt increase in public debt had been primarily due to subsidy on food, and falling copper price, which exacerbated the budget deficit. Towards the middle of the 1980s, the amount of debt available had created an acute financial crisis, prompting the IMF to institute recovery plans. With the coming of the IMF,

there also came austerity measures in 1986. These austerity measures led to the removal of subsidy on food ; however, an uproar ensued, and again the subsidy on food were reinstated (Good, 1989). In 1987 public debt problems intensified and as a result the government discontinued its IMF program, even though two years later they reversed this decision. (Parfitt and Riley, 2010).

During early 1990s, the economy of Zambia's economy had severe problems such as significant depreciation in our exchange rate, prices of goods and services were extremely high, existence of high rates of corruption, and many other problems (Muuka, 1997; Seshamani, 1998). As a result, the government was changed (Larmer, 2016). Following the 1991 election, the new regime devoted the next decade to stabilise the economy stabilisation and also service the debt (Panter-Brick, 1994).

In 1991, the new government introduced capitalism. The then current government implemented the Economic Reform Program (ERP), which consequently led to privatization of the bulk of parastatals, the sustenance of real interest rates that are above zero, the abolition of regulated exchange rates to acceptance of market forces regulated ones. Domestic debt increased as the government accumulated domestic arrears and absorbed backlogs created by privatized parastatals. The government owed heavily to retrenched workers. Due to debt crisis, the MMD government enacted enormous improvements in the financial sector. Between 1990 and 2000, the slow economic growth was exacerbated in part by low copper prices. Therefore, the decade from 1991 to 2001 in Zambia can be said to be the most squandered period as regards socioeconomic change (Chikalipah, 2019).

Despite having the new government in office in 1991, Zambia's sovereign debt steadily increased from US$ 8000 million (244% of Gross Domestic Product) in 1990 to approximately US$ 9100 million in 2000. 2005 saw Zambia become eligible for her debt to be forgiven using the heavily indebted poor countries and Multilateral Debt Relief Initiative programs which saw Zambia’s US$ 6600 million debt called off (Smith et al., 2017). This debt which was written-off public debt mainly belonged to IMF, Paris Club and the World. Following that, debt accumulation continued steadily, rising to approximately US$ 5100 million (23% of Gross Domestic Product) in 2011 from about US$ 3200 million (25% of GDP) in 2006 (IMF, 2017).

1.1.2. The High-Income, Low-Poverty Era

The MMD administration produced a strict budget in 2004 and 2005, wage freeze as well as raising many levies, putting an end to the rising expenditure pattern. Zambia in the end in April 2005 the completion point for the HIPC was reached, resulting in external debt excess of 80% being cancelled. Consequently, domestic borrowing decreased, as interest payments on external debt were eliminated. Additionally, both the copper that was being produced and its prices were moderately high, resulting in an increase in the country's tax revenue. International financial institutions, the majority of which have called off Zambia's debt, have enacted strict measures to protect the country.

In 2011 the new Patriotic Front (PF) government took over power from the MMD and this coincided with a reintroduction of a debt-financed infrastructure development policy (Goldring and Wahman, 2016; Fraser, 2017). It didn't take long, public debt increased from US$ 5100 million when the PF took over government in 2011 to approximately US$ 14910 million in December of 2018. The total public debt of US$ 14910 million consisted of the following. Firstly, about US$ 10050 million was owed externally, where US$ 3000 million was sourced from Euro bonds. Secondly, the remaining US$ 4900 million domestically owed. The current amount of public debt is no more than the updated debt threshold that Parliament sanctioned in the month of February in 2016. External debt is currently capped at K0.16 trillion (US$ 14100 million) and combined domestic debt has been capped at K0.07 trillion (US$ 6200 million), and this comprises K0.04 trillion (US$ 3500 million) government bonds and K0.03 trillion (US$ 2700 million) treasury bills (Ministry of Finance and National Planning, 2017).

According to the International Monetary Fund report of 2017, Zambia is in risk of defaulting on its debts, indicating increased susceptibility accompanying public debt. As can be seen from the 2019 national budget, about one-third of total spending by then government went towards servicing of debt (Ministry of Finance and National Planning, 2018). The World Bank and International Monetary Fund projects that public debt in Zambia is likely to increase significantly in the coming years due to more than US$ 7000 million debt that is on the way due in 2022, primarily to be used for infrastructure development which are carried out by contractors run by China. Further, the terms and conditions have not disclosed of Chinese loans, and they are referred to as 'borrowed funds' and often utilised as compensation for the contractors that are managed by the Chinese government (Chikalipah, 2021). More than 66% of Zambia's contemporaneous debt is for infrastructure development, including schools,

airports, roads, and hospitals. Additionally, from 2012 to 2018 the government used more than US$ 5000 million to construct a truck road (Smith et al., 2017).

The effect of a fiscal deficit on investments demonstrates the link uniting economic performance and debt. The consequences of 'debt overhang' and 'crowding out' can account for this. Theoretically, a significant fiscal deficit forces the government to borrow more, limiting available resources as well as driving interest rate up which represent the price of capital. In addition, if it is projected that the nation's debt would exceed its capability to repay it, the anticipated costs of debt service will discourage new investment from both local and international sources (Krugman, 1988). A high debt burden not only encourages capital flight but also introduces worries about devaluation, both of which are necessary to safeguard the "actual" value of financial assets. The loss of domestic savings and investment due to capital flight brings about a reduction in the country's tax base and puts the government's ability to pay down its debt at risk (Alberto and Tabellini, 1989).

1.2. PROBLEM STATEMENT

Borrowing, by governments and private entities alike, is a critical mechanism to enable funding of critical investment necessary for attaining development that is sustainable, at the same time addressing revenue and expenditure imbalances in the short-term. Borrowing by the government can also enable fiscal policy to act as a countercyclical force during economic downturns. High debt levels, on the other hand, can stymie growth and sustainable development. Both public and private debt must be responsibly managed.

Due to the high cost of debt servicing resulting from high borrowing, the Zambian Government has been unable to meet its domestic obligations to businesses and contractors, leading to payment arrears significantly accumulating. These payment defaults have impacted the cash flows of numerous businesses and reduced market liquidity, as evidenced by the undersubscription of government securities, indicating that investors have less appetite for financial securities. The Government's high levels of domestic borrowing have also made it extra burdensome for businesses to access investment financing, crowding out the private sector and stunting its growth. The country's debt burden may also constrain the government's ability to finance development projects, resulting in exchange rate depreciation and increased

inflation. Increased debt servicing costs have resulted in a reduction in funds available to deliver public services, which are primarily used by low-income consumers of public goods and services.

Literature shows that few studies have been undertaken to examine Zambia's public debt situation on economic growth (Chongo, 2013 and Chikalipah, 2021). Additionally, we also find studies focusing on effects on domestic debt on economic growth (Ochieng et al., 2015; Njoroge, 2015 and Ssempala et al., 2020). Some of these studies focused on total public debt (Chongo, 2013; Chiakalipah, 2021 and Njoroge, 2015). These studies either merely observed correlations between domestic debt and economic growth (Njoroge, 2015) or evaluated the effect of domestic debt for a group of countries (Ochieng, 2015). Additionally, a study by Chikalipah (2021) merely looks at the tipping point by focus on the variation between growth and the level of indebtedness without focusing on causation. Our study therefore departs from these studies by being the most recent, differing methodology and being country specific. Our study therefore investigates the effect of Zambia's domestic debt on its economic growth.

1.3. OBJECTIVES OF THE STUDY

To investigate whether Zambia's domestic debt has an impact on economic growth. The specific objectives for the study are:

i. To investigate both the short and long run effect of domestic debt on economic growth.
ii. To investigate the effect of other macroeconomic variables on economic growth.

1.4. RESEARCH HYPOTHESES

The following hypotheses were tested.

i. Zambia's domestic debt has no short- or long-term impact on economic growth.
ii. Other macroeconomic variables do not influence economic growth.

1.5. SIGNIFICANCE OF THE STUDY

As is well known, country-specific studies are critical because they consider the economy's unique characteristics (heterogeneity), as opposed to studies that make strong homogeneity assumptions across countries (Chikalipah, 2019). There exist grounds for Zambia to be ideal for studying the nexus between domestic debt and economic growth. As previously stated, Zambia's exuberant rate of public debt accumulation is regarded as troublesome and influences long-run growth, necessitating systematic empirical studies. In this respect, a complete empirical study of Zambia's domestic debt stock's influence on economic growth would serve as the underpinning for development of policy targeted at executing a management of debt plan successfully that contributes to the country's long-term economic progress. The review of the literature reveals that very few studies have been conducted in this area, with the majority focusing on public external debt. As a result, this study aims to close a knowledge gap.

1.6. DEFINITION OF DOMESTIC DEBT

The public domestic debt is operationally defined as the entire debt owed by the government to domestic firms. This total debt includes all outstanding payments for Treasury Bills and Government Securities.

1.7. THESIS OUTLINE

Thus, the thesis structure is set out as follows:

The first chapter gives an overview of Zambia's governmental debt management system, as well as the evolution of both external and domestic debt. This section focuses on the study's research subject, aims, and importance.

The theoretical roots of public debt and economic growth are explored in the second chapter. Additionally, the chapter also looks at empirical investigations undertaken in Zambia and throughout the world. The goal of an empirical literature review is to learn about the methodologies employed in comparable research to assess various variables.

The technique that will be employed throughout the study is described in Chapter 3 based on the findings of the literature review. Furthermore, explanations for the approach choice have been presented.

Econometric and empirical analysis of data is presented in Chapter 4. The short- and long-run dynamics of model variables are examined using a Vector Error Correction approach, and cointegration is done on stationary data. In addition, utilizing the Granger non-causality test based on the VEC, the chapter explores the causal link between the variables utilized in the research.

Based on the estimation results, Chapter 5 provides conclusions and policy suggestions concerning the Zambian public debt situation. Furthermore, challenges faced throughout the study process are highlighted, as well as justifications for future research to fill the vacuum in the literature in this area.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

A review of literature is critical to guiding the formulation of hypotheses, determining the best methodology, and comprehending the estimation of variables in this type of analysis. This chapter examines both the theoretical basis inherent in the effects of growth on domestic debt and empirical research in this area. This chapter also examined the various methodologies used to evaluate domestic debt and economic growth.

2.2. Overview of Debt and Economic Growth in Zambia

2.2.1. The Growth of Zambia's National Debt

Acquiring of debt by the Zambian government, both within and outside the country, has remained a critical component of resource mobilization to close the budget's financing gap. Government borrowing was limited to 2% of GDP at some point when borrowing abroad as well as domestically was put at 3% of Gross Domestic Product (Government of the Republic of Zambia, 2010). The government uses external financing to fund budgetary initiatives and capital projects in the nation. When the government borrows from the domestic market it is to fund fiscal activities.

According to an analysis of Zambia's economic record, the country was quite rich at the time of independence. Zambia was designated as a middle-income nation by the World Bank in 2000 due to its strong economic growth rate, which averaged 6% between 1964 and 1974 (Anderson et al., 2000). However, the global economic crisis of the 1970s, characterized by rising oil prices and lower terms of trade, shattered this hopeful view, leading to serious balance of payments (BOP) problems and widening budget deficits (Chongo, 2013). In the 1980s, the economy continued to struggle, calling on the government to seek foreign aid, first from the IMF and then from other multilateral and bilateral institutions. The stock of government debt in 1980 was estimated to be K3700 million, or 123.3 percent of Gross Domestic Product. External debt accounted for 85% of the total.

The chart below illustrates the trends in public debt as a percentage of GDP.

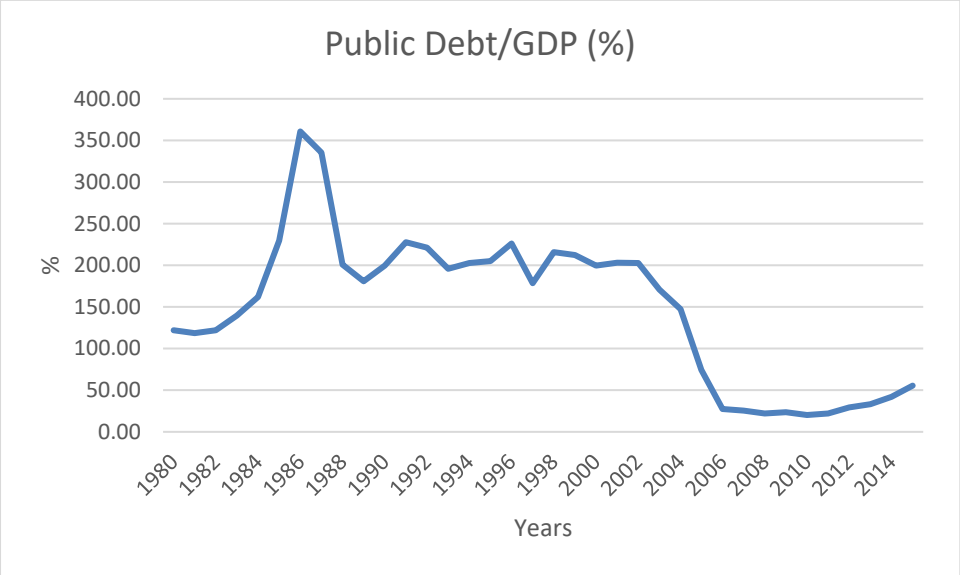

Figure 1: Evolution in public debt-to-GDP ratio: 1980-2015.
Source: Derived from BOZ and MOF data

As shown in Figure 1, public debt exceeded GDP between 1980 and 2004. The ratio of national debt to Gross Domestic Product hit a record high between 1984 and 1988, with GDP growth equivalent to 250%. The increase in public debt was primarily due to an increase in delinquency charges of approximately US$ 3 billion because of the government's cancellation of the IMF-backed economic program (GRZ, 2005). The large amount of GRZ borrowing in the domestic market by issuing bridge loans to cover the excess of government spending over revenue and repay government debt was another factor contributing to the growth of the public debt-to-GDP ratio (CYMA, 2006). At this point, high inflation rates above 100% are exacerbating public debt (World Bank, 2010). As the proportion of the government's external debt increased, so did the inventories of domestic debt as the government lost access to external resources due to severe financial difficulties.

Between 1984 and 1986, Zambia received the first debt reduction package from the Paris Club. That's about US$ 3500 million, dramatically reducing national debt to about K5900 billion, or 143 percent of GDP. In 2003, debt relief granted under the first HIPC framework further reduced Zambia's public debt by US$ 3800 million (Chikuba, 2003). Currently, the total public debt is K30500 million, which is about 147.6% in Gross Domestic Product. Following the irrevocable leverage elimination by international and bilateral creditors under the MDRI and Enhanced HIPC Framework Initiative, Zambia's external debt component dropped

significantly from US$ 7.2 billion to US $ 1.1 billion in 2006. As a result, as shown in Figure 1, total public debt had decreased to K11.6 trillion, which is less than 40% of GDP.

Notwithstanding an average GDP growth rate of 6.3 percent between 2002 and 2010, the Government continued to face the problem of insufficient funds to attain the Vision 2030 as well as the Millennium Development Goals (MDGs). As a result, the government carried on borrowing domestically and externally. According to Zambia's 2010 Economic Report, the country's public debt stock was about K17.9 trillion, or US$4200 million, at the end of 2010. (Representing 23 percent of GDP). When compared to the K11.5 trillion public debt stock in 2005, this represents a 56 percent increase in the stock. From 1989 until 2004, ratio of government debt to GDP was above Gross Domestic Product, as seen in Figure 1. This pattern supports the argument that GRZ's massive public debt growth led to a debt overhang. The government acknowledged this fact in their budget address for 2004.

2.2.2. Evolution of Public Domestic Debt in Zambia

Figure 2 shows a graph showing changes in domestic government debt.

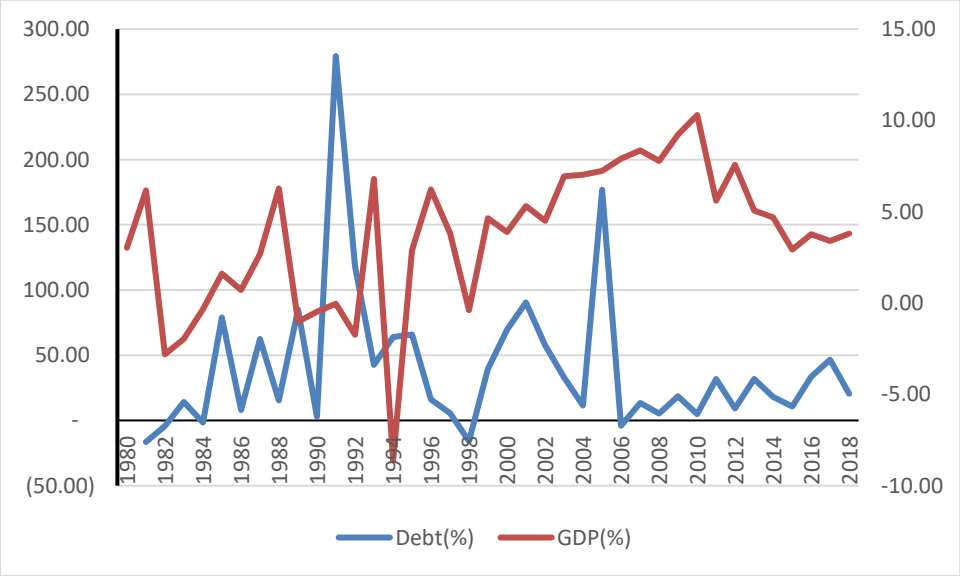

Figure 2: Movements in Domestic Debt in Zambia's for the period 1980-2018
Source: Derived from BOZ and MOF data

Evolution in the growth of domestic debt as shown in figure 2 shows that there have been fluctuations. A spike in a huge growth of domestic debt was observed in 1991. This was followed by a sharp decline in the growth of domestic debt for the years following till 1998. After 1998 domestic debt began to grow until there was a sharp decline in growth in 2006. This sharp decline can be explained the prevailing conditions in 2006.

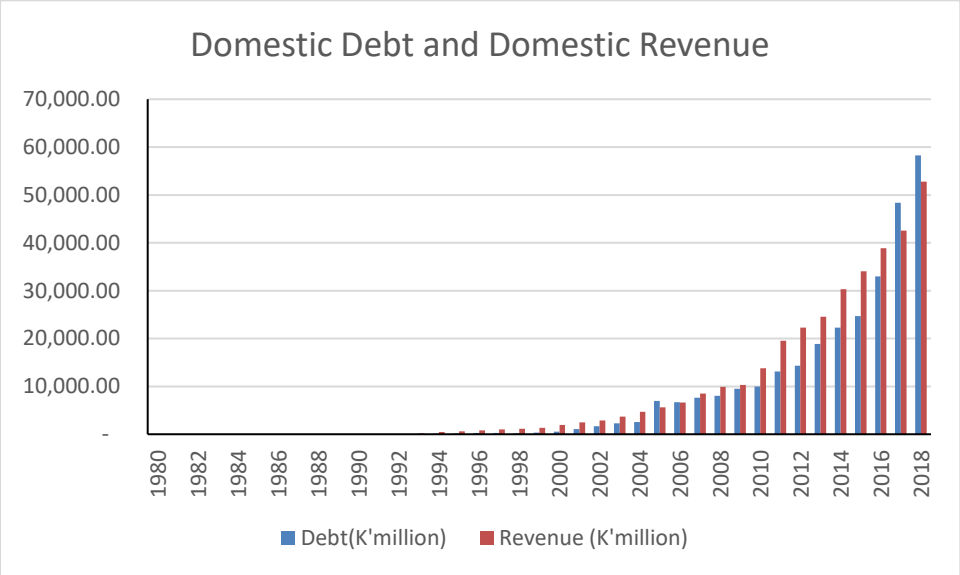

Figure 3: Domestic debt and revenue trends
Source: Derived from BOZ and MOF data

Domestic public debt amount rose mainly due to rollover policies that require financing both interests together with principal as well as escalated borrowing for foreign debt repayment commitments together with budget repayments (CYMA, 2006). Capitalization of principal and interest has been phased out in recent years, as interest payments are now budgeted for separately from principal repayments (Chongo, 2013).

By 2002, the value of national debt had reached K4,900 million rising from K4100 million. As indicated by Figure 3, national debt had increased to K6.2 trillion by the end of 2003, an increase of 28.6 percent from 2002. Due to the external debt trap that existed between 1990 and 2004, domestic debt was the only other option for conserving resources. The increase in domestic borrowing to make up for fiscal imbalances was an amplification effect of the significant increase in government external debt. After debt cuts in 2005, domestic public debt as a percentage of total debt was still excessive standing at 70% and as a percentage of GDP it was standing at 27%.

National Debt Stock Shares have reached K8.0 trillion in 2008. This accounts for 15.0 percent of GDP. It is an increase in 15.13 percent on the bankruptcy of K6.9 trillion stockpiling at the end of 2006. GRZ (GRZ, 2008) Under public domestic domestic debt is K99.9 trillion yen, 57.6% GDP total utility debt. This increased 23.9% compared to 2008 (GRZ, 2010)

Credit creation has been hampered by the increase in national public debt. Treasury Bill yields climbed as high as 43 percent (1995), 55 percent (2001), 15 percent (2008), and 9 percent in some situations due to the government's dominance in the domestic financial market (2010). This limits savings build-up, pushing out investments and reducing economic growth (Anderson et al., 2000).

Additionally, figure 3 reviews that for the period under consideration, revenue has been less than domestic debt. That simply means that the government for most years has been dependent on domestic debt as a means of finance of budget deficits. This has been by the number of treasury bills and bonds that held by the private sector. The statistics show that the major holders of treasury bills are commercial banks standing at 68% of the total treasury bills issued by the government as at 4th Quarter of 2020 (MOF, 2020). For the bonds the non-bank public are in majority standing at 52%. This suggests that the government in an effort to cover its deficit is competing in the company the private sector firms. This occurrence curbs economic growth by limiting private sector access to credit while raising interest rates and the overall cost of doing business (crowding out effect) (Krugman, 1988).

2.3. Theoretical Literature

According to economic theory, proper borrowing by developing countries is expected to support economic growth. Developing countries have smaller capital pools and compared to developed countries they have higher chances to get investment chances with greater return. From a theoretical point of view, various schools have opposed the repercussions of government debt on growth of the economy. Debt overhangs, debt crowding out, and solow growth models all provide a solid foundation for this study.

2.3.1. Crowding in or out hypothesis

Depending on the crowding out theory of debt, the increase in debt payments can increase the budget deficit of the country and reduce the savings of the nation if there is no increase in private savings to balance the difference. As a result, interest rates can be increased for private investment or may delay economic development. If the government pays more money to pay higher costs or tax reductions, interest rates will rise and crowd out private sector investment. This sector is sensitive to higher amounts of interest rates, because of lower returns, they are almost surely going invested less. A decrease in corporate fixed investment adversely affects

long-term supply and future production growth or economic growth. Government expenditure affects demand for private sector products through multiplier effects, causing fixed investment through accelerated effects, reducing crowding out effects (Joy and Panda, 2020).

Higher wages, interest rates and lower disposable income, can result from funding government deficits through domestic and foreign borrowing, all of which reduce a company's profitability, and as a result reduce private sector investment. Consequently, private sector investment can be curtailed or congested, reducing the level of production in the economy (Spilioti and Vamvoukas, 2015). The Keynesians argued that fiscal growth increased aggregate demand (AD) for private sector products through the fiscal multiplier, thus driving the expansion of investment by the private sector (Yusuf and Mohd, 2021). Increasing spending by the government arising from debt reduces private sector savings. This is because of foremost factors: To begin, whilst financial coverage is expansionary, non-public savers purchase authorities' bonds, reducing the quantity of cash to be had to finance non-public zone funding. Increased authorities borrowing additionally tends to enhance hobby rates, which discourages non-public funding. Furthermore, borrowing stifles non-public funding with the aid of using shifting the tax burden to destiny generations (Gordon and Cosimo, 2018).

Classical economics argue that governmental debt is dangerous to the economy, whilst it undermines each the finances process` financial field and the non-public zone's get entry to to credit. This argument argued that repaying authorities debt, the majority of that is overseas, stifles financial boom with the aid of using discouraging non-public funding and repelling capacity overseas investors. According to Saungweme et al. (2019) the Ricardian equivalence hypothesis argues that the fiscal stabilization initiative has no effect on the growth of the economy. Changes in spending by the government and receipts are offset by private savings changes (Saungweme et al., 2019).

From the monetarist's point of view, an increase in spending by the government will contest the corresponding amount of private spending after a short temporary period. In the bond market, businesses compete with the government over a restricted supply of capital. Raising government spending unaccompanied by increasing the money supply raises demand for money in production, profits, and transactions (Ogunjimi, 2019). Interest rates rise in the presence of a stable money supply, higher demand for money transactions, and greater availability of bonds in the market. Rate hikes put pressure on businesses and, in some cases,

curb spending by the government. The result of the crowding out theory is that the expansion of the government sector will always sacrifice the growth of the private sector unless the money supply increases at the same time (Khan and Gil, 2014). The state's ability to influence the economy through fiscal measures is hampered by this mobility effect.

2.3.2. Debt overhang hypothesis

According to the concept of debt overhangs, excessive accruing of debt engineers greater levels of debt, debt traps, and slower economic development (Yusuf and Mohd, 2021). If a country's public debt is predicted to exceed its future repayment capabilities, the awaited debt repayment expenses would hinder future domestic and foreign investment, according to debt overhang theory (Ibid). Gordon and Cosimo (2018) argue that potential investors are less willing to participate in future production since the more they create the more taxes the government will levy to repay government debts. The amassed government debt acts like a tax on later production, reducing the motivation for savings and investment (Krugman, 1988). Specifically, the idea postulates that debt repayment reduces the funds available for investment and imposing contractual liquidity restrictions on debt further constrains investment and stagnates development. Both equity and government debt repayments impact growth by hindering private investment or changing the structure of spending by the government (Yusuf and Mohd, 2021). Debt repayment can be an obstacle to growth by constraining public resources for the development of infrastructure and human capital (Coccia, 2017). Moreover, according to this idea, government debt can have a non-linear impact on growth, either by way of capital amassing or growth in productivity.

According to Coccia (2017), the funds utilized to repay large amounts of government debt are resources that may have been invested in growth-critical sectors. The cost of paying off huge government debt consumes a larger percentage of limited government revenues, which can lead to distortions in emerging markets and lower development rates. Insolvency is key driver in impeding growth in the economy in a heavily indebted economy. Dealing with large amounts of public debt will reduce the country's ability to return to its growth path, even if it implements aggressive reform programs for underdeveloped countries (kos and István, 2019). Revenue will decrease if the country's debt exceeds the repayment ability. If a country's debt is more than the capacity to repay, predicted debt payment is likely to devour an increasing percentage of the country's future output (Krugman, 1988. Investments and expansion are hindered because

of adoption of high tax rates for local economic revenues available to current international credits.

The uncertainty of debt surplus and the influence of insufficient incentives (Spilioti and Vamvoukas, 2015) are affected by the uncertainty. In addition, large debt burdens promote the need to increase taxation and the need to secure the true value of financial assets. Domestic savings and investments will be reduced because of capital fluid, growth, taxing, and debt. Madow et al. (2021) argues that redirection of foreign cash towards debt repayment constrains import size, comparative advantage, investment and constrains growth.

2.3.3. The Solow Model of Growth

This study adopts the Solow growth model following Chikapilah (2021). Prior to describing the estimation technique, this segment discusses the main theory, emphasizing the short-run and long-run consequences of an escalated locally contracted debt on the growth of the economy. Labor and land are supplied inelastically in a neoclassical (Solow) model.

Thus, economy $i's$ aggregate production function has constant returns to scale.

$$q_{it} = [A_{it}H_{it}]^{\alpha}K_{it}^{\beta}L_{it}^{1-\alpha-\beta} \quad (1)$$

Where $\alpha + \beta \leq 1, q_{it}$ symbolize the quantity of aggregated output produced in time t, K_{it} signify capital, L_{it} represents land availability, A_{it} is the augmented technological level also known as proficiency of labour, and H_{it} is the productive labour per unit and $H_{it} = h_{it}N_t$where N_t is entire population and h_t is the per person human capital. For the sake of simplicity while preserving the generality of the statement, normalize $L_{it} = L_i = 1$ for any t. As a result, we believe that a rise in government debt could boost production via a variety of avenues, as well as increased capital amassing (K_{it}) and a direct impact on total factor productivity (TFP). Finally, Equation (1) can be reduced to $Q = f(A, H, K, L, Debt)$, where Debt is a domestic debt-related variable.

2.4. Empirical Literature

Putunoi and Mutuku (2013) examined the influence of domestic debt on Kenya's economic growth from 2000 to 2010 using the Engel Granger Residual and Johannes VAR Cointegration Test. They concluded that domestic debt aided development. Increased domestic debt has a considerable long-term beneficial influence on economic development, according to the

researchers. These results are reinforced by Sheikh et al. (2010), who used the method of least squares to examine the effect of domestic debt on Pakistan's economic progress for the period 1972-2009. Domestic debt seems to contribute to GDP growth, according to their research. Long-term growth should be supported by both domestic and international debt. Another potential explanation for the positive relationship between domestic debt and Pakistan's economic development is the marketability of domestic debt.

Utilizing a modified Barro growth regression model, Maana et al. (2008) examined the impact of domestic debt on Kenya's economy from 1996 to 2007. According to the analysis, increased domestic debt slightly influences economic growth positively. Nevertheless, the study found that the theory of crowding out of the private sector was not observed.

In low-income and rising nations, Abbas and Christensen (2007) utilised the Granger causal regression model to find the optimum amount of saleable domestic debt as a proportion of GDP from 1975 to 2004. They observed that somewhat saleable domestic debt as a proportion of GDP boosted economic growth significantly. Furthermore, the research discovered that debt levels above 35% of entire deposits of a bank had a negative effect on economic growth.

Adoufu and Abula (2010) utilised an OLS technique to evaluate the impact of domestic debt on the Nigerian economy between 1986 and 2005. The findings revealed that Nigeria's internal debt is impeding the country's economic growth. As a consequence, the Nigerian government is advised to focus on addressing the remainder of the country's domestic debt. These results contradict to those by Umaru et al. (2013), who examined the effect of domestic debt on Nigerian economic development from 1970 to 2010. They employed the conventional least squares approach, the extended Dickey-Fuller method for assessing the unit root properties of the series, and the causal links between GDP, foreign debt, and domestic debt to establish a straightforward relationship between the variables studied. They used the Granger causality test to see if all variables in the model were stable based on the root of the result of unity, and the causal result revealed a bidirectional link between external debt and GDP, but no causal relationship between foreign debt and Gross Domestic Product, or no causal relationship between external debt and domestic debt. Furthermore, according to the OLS findings, foreign debt has a negative influence on economic growth, but domestic debt has a beneficial impact (GDP).

From 1990 to 2010, Ochieng et al. (2015) We investigated the impact of domestic debt on the economic development of the East African Community (EAC). To explain the debt, researchers used a modified version of the Thoreau growth model. The Levin-Lin-Chu test (LLC) was used to characterize the data in terms of unit roots. Using the Hausman specification test, we selected a panel fixed effects model with adjusted non-uniform variance. According to the data, domestic debt has a significant positive impact on EAC's GDP growth per capita. The implication of the policy is that sustainable domestic borrowing should be encouraged to boost growth.

Njoroge (2015) also looked at how domestic debt affects Kenya's economic development. In this investigation, a causal study design was adopted. Over an 11-year span, the research utilised real quarterly time series data from 2003 to 2013, totalling 44 observations. The Central Bank of Kenya, the Ministry of Finance, and the Kenya National Statistics Bureau produced data on private sector credit, GDP, interest rates and domestic debt. To capture the connections between variables, we used a cointegration regression model using time series data. Even though debt and growth have a negative association, data suggests that debt is not the driving factor behind economic progress.

Elom Obedetal. (2017) studied the connection between economic growth and the Nigerian government debt utilizing the Vector Error Correcting Model (VECM) and yearly data for the period 1980-2015. The variables in this analysis were external debt, RGDP, domestic personal savings, and domestic debt. External and domestic debt, according to the poll, have a considerable detrimental influence on Nigeria's economic development. Debt and growth have a negative link, according to the findings.

Thao (2018) studied the influence of public debt on the economic growth of six Asian nations between 1995 and 2015: the Philippines, Indonesia, Singapore, Malaysia, Thailand, and Vietnam. To analyse the influence of government debt indicators on economic growth, we employed a generalised method of moments (GMM) estimate strategy. Public debt, foreign direct investment, GFCF, and real effective exchange rates all had a positive and substantial influence on economic growth while population increase had a large negative impact on these nations' growth rates. There has been a lot of effort put in.

Using annual data from 1982 to 2017, Akhanolu et al. (2018) used a two-stage least square regression technique to analyse the influence of public debt on Nigeria's economic progress. GDP was computed as a function of domestic and international debt, savings, and capital expenditure in this research. External debt had a detrimental influence on growth, but internal debt had a positive impact.

Over a 36-year period, Bossou and Duke (2020) evaluated the influence of domestic debt on Nigeria's economic development. The investigator used a comparative causal analysis or post-study procedure (time series analysis). Exogenous variables in the model included domestic debt (DODT), external debt (EXDT), and interest rates (INTR), with real gross domestic product growth (RGDPG) serving as an endogenous variable for economic growth. Variables are combined at level I (1), the initial difference, while the real GDP growth rate is merged at level I (2). (0). Because it incorporates various levels of series, this supports the employment of ARDL. The results show that public debt is a major negative predictor of economic growth. The government, according to the study, should make sustainable deficit budgeting and optimal resource utilisation more accessible by establishing effective and efficient initiatives and programmes.

Yusuf and Mohd (2021) used yearly data from 1980 to 2018 and the Autoregressive Distributed Lag technique to investigate the influence of government debt on Nigeria's economic development. According to empirical evidence, domestic debt was beneficial to growth over the but detrimental to growth over the near term. The confirmation of the impact of debt overhang comes from the fact that debt service payments inhibited development both long and short term. The investigation concluded that in order to broaden the scope of the economy's industrial base, the government needed to take out loans. Because of this, long-term economic development will be boosted, the tax base will be widened, and the government's capacity to repay its current debts will be improved. The study's main contributions include fiscal measures that boost domestic resource mobilisation and debt management techniques that ensure economic progress.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

This chapter describes the approach that was used to analyse the implications of Zambia's public domestic debt on the country's economic development over the period 1980-2018. Aspects that are discussed include the research design, analysis of data techniques, and the empirical model.

3.2. Research design

Our research adopts a explanatory research design. Descriptive research is a systematic research design that attempts to 'paint a picture' of characteristics of an individual or a group, make specific predictions, and lay out facts about a phenomenon (Kothari, 2004). This design is more relevant and appropriate to research that seeks to assess the impact of one factor on another, or on a group of factors. In order to conduct statistical analysis, quantitative data will be required. Whereas qualitative analysis mainly uses interviews, focus group discussion, and observation, in order to gather in-depth or detailed information from respondents (Minichiello et al., 1990), quantitative analysis uses quantifiable data about specific phenomenon.

The research approach can also be deductive or inductive. According to Ali and Birley (1998), in deductive research, existing theory plays a key role in the development of hypotheses, variable identification and methods of measurement. Deductive research thus enables a researcher to formulate theory that can be tested. On the other hand, in an inductive approach, a theme or area of interest is identified, and theory is developed from observations made from the study. Therefore, as Burney (2008), explaines, deductive reasoning is from general to specific while inductive is from specific observations and generalization to a wider context. This study will thus use a quantitative deductive approach.

3.3. Model Specification;

The relationship between domestic debt and economic growth in our study is examined using the following model:

$$y_t = f(DD_t, \mathrm{RIR}_t, DR_t, REER_t, INF_t) \quad (2)$$

where DD is the natural log of the ratio of domestic debt-to-GDP, RIR represents real interest rate, DR is the natural log for the domestic revenue resource that is available in the country, REER is the natural log of effective exchange rate and INF is the natural log for the Inflation rate over the period under review.

3.4. Measurement and definition of variables

The empirical model used to conduct the empirical analysis makes use of one dependent factor, one factor of interest, and five control factors. All of the factors are transformed into natural logarithms.

3.4.1. Dependent Variable

Economic growth is measured by the growth of the real gross domestic product (GDP). GDP is simply the total value of all final goods and services produced in a country by both citizens and noncitizens in a calendar year (Begg et., 2010). Total consumer spending (consumption), investments, government spending, and net exports are all included (difference between exports and imports). Real GDP growth is calculated in percentages as a proxy for economic growth. The statistics on GDP came from the World Bank's database.

3.4.2. Independent Variables

Domestic debt (DD) is made up of government securities such as Treasury bills and bonds, loans from local commercial banks, arrears from government purchases of goods and services, and unpaid advanced repayments. Zambian Kwacha is used to quantify domestic debt. The Ministry of Finance and the Bank of Zambia provided the DD data. In this research, DD was divided by GDP to provide a debt metric that is commonly used in the literature.

3.4.3. Control Variables

The study constitutes of five control variables in addition to the dependent factor and the factor of interest, which were chosen based on the available research. The data for the control factors came from the World Bank's database. The first control factor is the real interest rate (RIR), which is included to measure the real cost of funds to a borrower by removing the effects of inflation. The second control factor is domestic government revenue generated from tax and non-tax sources (DR), which is included to capture the liquidity ratio. The third control factor is the inflation rate (IR), which is included to measure policy stability. The fourth control factor was the real effective exchange rate (REER) as a estimate of the competitiveness of the country’s export sector.

3.5. Estimation Approach

3.5.1. Unit Root Testing

Before conducting any empirical analysis, the data is tested for level stationarity I(0) or difference stationarity, I(d). Unit root testing is used to examine the stationarity properties of time series data, which is important so as avoid spurious regression difficulties when including non-stationary data and to check if the variables have a deterministic trend (Engle and Granger, 1987; Granger and Newbold, 1974). Time series data is said to be stationary if a change in time does not bring about change in shape of a distribution (Stephanie, 2016; Libanio, 2005). For this reason, this study will use the Augmented-Dickey-Fuller (ADF) (Dickey and Fuller, 1979; 1981) and Philips-Perron (Philips and Perron, 1988) unit root tests. In cases where the ADF and PP tests provided contradictory results, the Kwiatkowski Philips Schmidt – Shin (KPSS) stationarity test (1992) will be used to resolve the disparity.

The ADF test equation is specified as follows:

$$Y_t = \beta^i D_t + \phi_{y_t-1} + \sum_{j=1}^{p} \psi_j \triangle_{y_t-j} + \varepsilon_t \quad (3)$$

where Dt is a vector of deterministic terms, p is the lagged difference terms, Δy_{t-j} are the approximate ARMA structure of the errors where p is set so that the error ε_t is serially uncorrelated.

Unfortunatley the ADF test can be negatively affected by serial correlation, and thus the Philips - Perron (1988) (PP) unit root test is used in addition to the ADF test. The PP equation is as follows:

$$\triangle Y_t = \emptyset Y_{t-1} + \alpha + \beta t + u_t \quad (4)$$

where u_t is a stationary process and can also be heteroscedastic.

When the ADF and PP unit root tests provide contradictory findings, the KPSS stationarity test is employed to reconcile the differences (Greene, 1989 ; Gujarati, 2003). The KPSS uses the following equation to determine if a series is stationary:

$$\text{KPSS} = \left(\frac{1}{\text{T}^2}\sum_{\text{t=1}}^{\text{T}} \text{S}_\text{t}^2\right) / \lambda^2 \quad (5)$$

where $S_t = \sum_{j-1}^{t} u_{j,}\ u_t$ is a residual of a regression Y_t on t and λ_t^2. If the respective KPSS statistic is greater than the asymptotic critical value, the null hypothesis for stationary is rejected and the series is deeemed to be non-stationary.

3.5.2. Cointegration testing

Having tested for stationarity, we proceed to test cointegration in order to establish the existence of a long–run equilibrium association between the different stationary variables. Cointegration testing is important because it makes it possible to identify the extent to which two variables are sensitive to another variable over a specific period of time and it refers to a linear combination of non – stationary variables. This means that it is possible that a non – linear relationship exists for integrated variables in the long - run. The two common methods used to test for cointegration are the Johansen (1988, 1991) Maximum Likelihood Estimation procedure and the Engle - Granger (1987) single equation approach. This study uses the Johansen (1988, 1991) tests as it is more suitable for multivariate models. The Johansen approach makes use of two test statistics: the trace test statistic and the maximum-eigen value test statistic. The trace statistic is the likelihood test ratio for the null hypothesis that there are at r cointegrating vectors as follows:

$$J_{trace} = -\text{T}\sum_{i=r+1}^{n} In(1-\lambda_i) \quad (6)$$

where T is the sample size and λ_i is the i^{th} biggest acceptable correlation. The trace test statistic tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors. If r = 0 then there is no cointegration whereas if r > 0 then the variables are deemed to be cointegrated (Hjalmarsson and Österholm, 2007).

In addition to the trace test, the Johansen approach also makes use of the max-eigen test, which has the null hypothesis that there are exactly r cointegrating vectors:

$$J_{max} = -\mathrm{T}\, In(1 - \lambda_i). \quad (7)$$

3.5.3. Optimal lag length selection

It is necessary to identify the appropriate lag before estimating the empirical model. The Bayes information criterion (BIC), Akaike information criterion (AIC), and Schwartz information criteria are the three most frequent lag selection criteria (SIC). The BIC and the AIC are obtained from different viewpoints, although they are closely linked. The distinction is that the BIC takes into account the amount of observations, whilst the AIC does not (Profillidis and Botzoris, 2019). Furthermore, when there is a fixed, finite-dimensional genuine model, the BIC is favoured, and the AIC is favoured when the real model is too complicated to estimate parametrically. The AIC is asymptotically efficient in mean squared error of estimate if the number of parameters in the true model is infinite, or rises with increasing number of observations, or if the genuine model is not in the candidate model set (Vrieze, 2012). A weakness of both of these criteria however is that they tend to identify the maximum number of lags and thus can lead to over-identification estimation errors. Hence, a common alternative is to use the Schwartz information criteria (SIC). For this study however we employed the AIC as our criterion for lag selection.

3.6. Vector Autoregressive (VAR) and Vector Error Correction Model (VECM)

In the event that no evidence of cointegration is found, it will be possible to proceed with the study using a vector autoregression model (VAR). The basic from of the multivariate unrestricted vector autoregression approach (VAR) is as follows (Green, 1989):

$$x_t = A_1 x_{t-1} + A_1 x_{t-1} \ldots + A_p x_{t-p} + \mu_t \quad (8)$$

where x_t is a vector of k potentially endogenous variables, the number of lags is represented by p, A_i is a (k x k) matrix and μ_t is the error term. However, when cointegration is identified between the factors, the VAR needs to be expanded into a vector error correction model (VECM) so as to take account of the short-run deviations and the long-run adjustment mechanism back to equilibrium (Johansen, 1988). The form of a VECM is as follows:

$$\Delta x_t = \Pi x_{t-1} + \Gamma_1 \Delta x_{t-1} + \ldots\ldots + \Gamma_{p-1} \Delta x_{t-p+1} + \mu_t \quad (9)$$

Where Π = -($I_k - A_1 - \ldots\ldots - A_p$) and $\Gamma_i = -(A_{1+1} + \ldots + A_p)$ for i = 1, . . ., p − 1.

As can be seen, by rearranging and subtracting y_{t-1} from both sides in the VAR eq (6), it is possible to derive the VECM in Eq. (7). Since the variables are no more than I(1), only Πy_{t-1} contains the I(1) variables, implying that Πy_{t-1} contains the cointegrating relationships since it is I(0) (Lütkepohl and Krätzig, 2004). Hence Γ is the short–run relationship and Πy_{t-1} is the long-run relationship (Gujarati, 2004).

The functional form of the VAR and VECM used to run the analysis in this study is as follows:

$$\Delta GDP_t = \alpha_1 + \sum_{j=1}^{p} \beta_{1j} \Delta DD_{t-j} + \sum_{j=1}^{p} \beta_{2j} \Delta RIR_{t-j} + \sum_{j=1}^{p} \beta_{3j} \Delta DR_{t-j} + \sum_{j=1}^{p} \beta_{5j} \Delta INF_{t-j} + \sum_{j=1}^{p} \beta_{6j} \Delta REER_{t-j} + u_t \quad (10)$$

The dynamic effects of the VECM are investigated using three analyses:

i. Impulse response analysis, which pinpoints the effects of a shock on a single variable by following its path through a system.
ii. Variance decomposition analysis, which separates the variance that each variable contributes to the system.
iii. Block Granger analysis, which investigates the possible causal association between the factors.

3.7. Diagnostic tests

To ensure that the empirical model is stable and correctly specified, the analysis makes use of a range of diagnostic tests prior to discussing the results.

3.7.1. Residual Normality

A joint chi-square statistic of the model skewness, kurtosis and Jarque–Bera are used to assess the normality of the residuals.

3.7.2. Heteroskedasticity

The second diagnostic test determines if the residuals are heteroscedastic. Greene (1989) defined heteroscedasticity as an event in which the variability of the dependent variable is uneven over the range of values of the independent variable, and hence the error terms of the

variables do not have a constant variance. The Breusch-Pagan test is used to determine heteroscedasticity in this investigation (Gujarati, 2003).

When heteroscedasticity is present, it means that the estimate is inefficient and lacks the minimal variance. The Breusch – Pagan test's null hypothesis is that all error variances are identical, whereas the alternative hypothesis is that error variances are a multiplicative function of one or more factors (William 2015:4). The Breusch-Pagan test depends on the critical values of chi-squared (χ^2) to detect heteroscedasticity, and this is done using the formula below:

$$\hat{\sigma}^2 = \frac{\sum e^i}{n} \quad (11)$$

where e^i represents the residuals squred, and n is the number of observations.

3.7.3. Residual Autocorrelation Test

When consecutive error terms are interconnected, autocorrelation arises, resulting in inefficient estimators. The Breusch Godfrey series correlation for Lagrange multiplier (LM) was employed to test this. It is thought that the errors are uncorrelated; however, they are autocorrelated, which means that they are serially connected. As a result, a test of this assumption is required to avoid type I errors.

3.7.4. Impulse Response Analysis

After specifying the VECM and ensuring that the results are stable, the next step is to conduct impulse response analysis (IR). IRs are used to explain how the different variables in a model respond to a shock to one or more variables within the model and thus IRs are used to understand a model's dynamic behaviour (Gujarati, 2003). The equation for the forecast error impulse responses are as follows (Greene, 2012):

$$y_{t+n} = \sum_{i=0}^{\infty} \Psi_i \in_{t+n-i} \quad (12)$$

where $\{\Psi_n\}_{i,j} = \frac{\partial y_{it}+n}{\partial \in_{jt}}$, $\{\Psi_n\}_{i,j}$ depict the response that $y_{i,t+n}$ would have to a one-time impulse in $y_{j,t}$ when all variables dated t or earlier are held constant.

3.7.5. Variance decomposition analysis

Variables in a VAR model affect the dependent variable by different amounts. Variance decomposition analysis (VD) determines the magnitude of variability in the dependent variable that is attributed to the dependent variable's own variance and the variance of the other components. The main difference between IR and VD is that IR is a process that assesses

responses between the factors while variance decompositions assess the role that each factor plays in the system.

3.7.6. Block Exogeneity Wald test (Block Granger)

To assess the causative linkages among the variables in a VECM model, run Granger causality/block exogeneity Wald tests as the last step in the study. The test is used to see whether, in addition to the explanatory abilities of the lagged variables, including the lagged value of a variable is helpful in explaining the dynamics of other variables in a multivariate framework. The test generates chi–squared coefficients for the lagged endogenous variable, which are used to analyse the regressors' statistical significance. This kind of causality analysis is used to determine the direction of causation between variables in the short and long term.

CHAPTER 4: PRESENTATION OF RESULTS

4.1. Introduction

The data in this chapter is subjected to the methodologies and processes mentioned in the previous chapter. In parts 4.2 and 4.3, the descriptive statistics and stationarity test results are presented. In part 4.4 the results used to ascertain the existence of a long-run relationship among variables are presented and this is followed by Section 4.5's estimate and presentation of the Vector Error Correction model. The chapter finishes with diagnostic tests to assess the statistical soundness of the reported data.

4.2. Descriptive statistics

The statistical description of variables for all the variables that were utilised in the study have been displayed in Table 2. The data series contain 39 observations, and the Jarque-Bera test statistic for normality confirms that most variables are normally distributed individually. Additionally, the logarithm of debt, the logarithm of domestic revenue, the logarithm of real effective exchange rate and the logarithm of inflation are normally distributed. Further, we see that the logarithm of debt, the logarithm of domestic revenue, the logarithm of real effective exchange rate and the logarithm of inflation are fat tailed, whereas real GDP growth and real interest rate have long tails. This is because the logarithm of debt, the logarithm of domestic revenue, the logarithm of real effective exchange rate and the logarithm of inflation have Kurtosis values less than 3, while the remaining variables have the greater than 3 (Gujarati, 2004). While skewness (non-normality) of some individual variables has no bearing on times series estimation, the stochastic error term used in the model does (Fox, 2016; McDonald and Michelfelder, 2017).

Table 1: Descriptive statistics of variables

	RGDPG	LDEBT	RIR	LREV	LREER	L_INF
Mean	3.66	-2.13	-0.17	19.99	4.28	3.05
Median	3.90	-2.07	4.66	21.00	4.22	2.89
Maximum	10.30	-0.97	23.67	24.69	4.72	5.11
Minimum	-8.63	-3.31	-41.79	13.55	3.85	1.62
Std. Dev.	3.90	0.56	16.53	3.79	0.28	0.94
Skewness	-0.84	-0.23	-0.94	-0.53	0.03	0.58
Kurtosis	3.85	2.52	3.13	1.82	1.48	2.45
Jarque-Bera	5.73	0.72	5.78	4.12	3.01	2.71
Probability	0.06	0.70	0.06	0.13	0.22	0.26
Observations	39.00	39.00	39.00	39.00	39.00	39.00

Note: RGDPG = Real GDP Growth; LDEBT = Domestic Debt; RIR = Real Interest Rate; LREV = Revenue; LREER = Real Effective Exchange Rate; L_INF = Inflation Rate

Figure 4 shows the movements in each of the variables used in the study.

Figure 4: Trend analysis of variables

Over the years, we see that real gross domestic product growth (RGDPG) exhibits periods of upward and downward movements with no specific trend. Zambia's domestic debt (LDEBT) has been more variable than the economy's actual GDP growth, according to a visual assessment. From 1980 to 1998, Zambia's domestic debt ratio to GDP was falling. However, since 1999 Zambia's domestic debt's ratio to GDP has been on the rise. In addition, real interest rate (RIR) has also shown downward and upward movements with no specific trend. The graphs also show that the logarithm of domestic revenue (LREV) and real effective exchange rate have mirrored each other. These variables both have an upward trend. Finally, previous to

1993, the logarithm of inflation was on an increasing trend, after which it started to fall dramatically for the remainder of the time.

4.3. Stationarity tests

Modelling time series data necessitates a pre-estimation of stationarity test to establish the variables' stationarity, as indicated before in the technique. This helps to avoid falling into the trap of providing incorrect findings. Table 3 gives the results of the unit root tests. The Augmented Dickey-Fuller (ADF) approach was used to create the unit root test findings, which has the benefit of accounting for serial correlations between residuals, if any exist (Brooks, 2008). In order to compare the findings obtained from the ADF, same tests were also carried out using the Phillip Perron test (P-P test) of stationarity. The test was carried out on every single variable based on the premise that one and all variables do not begin at zero and that some series have a trend while others do not. Visual inspection of the variables provided in the previous section confirmed these assumptions.

Table 2: Stationarity test results-ADF

	ADF					
	Level	P-value	1st Diff.	P-value	Lag (AIC based)	Assumption
RGDPG	-0.865	0.334	-7.688	0.000	0	None
LDEBT	-0.194	0.610	-6.886	0.000	0	None
RIR	-2.11	0.524	-5.244	0.001	9	T&C
LREV	-2.02	0.569	-5.957	0.000	8	T&C
LREER	-2.118	0.516	-6.196	0.000	0	T&C
L_INF	-0.52	0.485	-6.308	0.000	0	None

Note that the null hypothesis for the Augmented Diskey Fuller is as follows: H_0: The data series is not stationary.

Table 3: Stationarity test results-P-P test

P-P						
	Level	P-value	1st Diff.	P-value	Band width	Assumption
RGDPG	-2.499	0.014	-15.23	0.000	7	None
LDEBT	-0.16	0.622	-6.871	0.000	2	None
RIR	-2.215	0.468	-6.88	0.000	3	T&C
LREV	-0.713	0.964	-3.73	0.032	1	T&C
LREER	-2.077	0.537	-6.18	0.000	5	T&C
L_INF	-0.487	0.499	-6.312	0.000	3	None

Note: RGDPG = Real GDP Growth; LDEBT = Domestic Debt; RIR = Real Interest Rate; LREV = Revenue; LREER = Real Effective Exchange Rate; L_INF = Inflation Rate. Assumption refers to the deterministic terms included where C = constant and T = liner trend. The asterisks *, **, and *** imply significance at 10%, 5% and 1% levels respectively: Note that the null hypothesis for the Phillips – Perron Test is as follows:
H_0: The data series is not stationary.

The findings in tables 3 and 4 reveal that at level all the variables are not stationary. The variables, on the other hand, became stationary when they were treated to a first order difference. As seen in the third and sixth columns of the results table, these variables are said to be $I(1)$.The ADF and P-P tests get the same findings.

4.4. Cointegration analysis

After determining that the variables of interest are I(1), we went further to conduct a cointegration test known as the Johansen test. As indicated in the appendices, the Akaike Information Criterion was utilised to determine an ideal number of lags of three before using the Johansen test of co-integration.

Table 4 shows the test findings indicating the presence of a long-run link between economic growth and the independent variables. With the premise of a linear deterministic trend, we utilized the Maximum Eigenvalue as well as the Trace Statistic techniques. Both experiments show that the real GDP growth and its ostensibly independent determinants have two cointegrating (long run) relationships. Even though the Johansen cointegration test identifies two integrating connections, only one of them satisfies the economic theory. As a result, we'll just need one integrating equation.

Table 4: Johansen Cointegration test results

	TRACE	MAX
None	143.77***	66.957***
At most 1	76.82**	35.32**
At most 2	41.50	23.23

Notes: The asterisks *, ** and *** imply significance at 10%, 5% and 1% levels respectively. Note that the null hypothesis for the Johansen Cointegration Test is as follows: H_0: There are no cointegration equations

We now shift to addressing the key objectives of the study on the influence of domestic debt on Zambia's economic development, having completed all the necessary statistical processes. One variable's impact on another might occur in the short-run only, long-run only, or even both. This research aims to determine if domestic debt has a short – or long - term impact on economic growth. As a result, we used the vector error correction framework to estimate our model, which incorporates together the short-run and long-run changing of interactions amongst the variables.

4.5. Long Run Estimates

The existence of cointegrating relationship among variables allows for the estimation of the model with non-stationary level variables without worrying of spurious estimates (Gujarati, 2004). Before the long run model was estimated, a lag selection test based on the unrestricted Vector Autoregressive (VAR) model was conducted. The AIC was used in the selection of the lag leading to optimal lag value of 2 as indicated in the Appendix.

The Vector Error Correction (VEC) model's long run model results were then calculated, and the long run model results are displayed in Table 5. A negative and substantial impact of domestic debt on economic growth shows that a 1% rise (reduction) in domestic debt resulted in a 0.988 percent decline (increase) in economic growth, all other variables being equal. This impact may be ascribed to the debt-induced crowding out of private investment, which stifles economic development. According to Spillioti and Vamvoukas (2015), if the government deficit is funded by domestic borrowing, higher interest rates, reduced disposable income, and higher wages would all diminish corporate profitability and, as a consequence, private investment. As a result, private investment may be discouraged or crowded out, decreasing an economy's output level.

Furthermore, excessive levels of domestic debt obstruct financial depth, institutional, and international engagement, slowing economic progress. The ideal size of domestic debt is influenced by the quality and breadth of the domestic loan market. Domestic debt that is not disseminated in the form of saleable securities, carries positive real interest rates, and is sold to investors outside the banking system cannot be maintained without stifling growth.

Another explanation for the apparent link between domestic debt and economic growth is that higher governmental expenditure backed by borrowing causes a drop in private sector savings. To begin with, when fiscal policy is expansionary, private savers buy government bonds, limiting the amount of money available to finance investment by the private sector. Increased debt contraction by the government has a tendency to boost interest rates, which discourages private investment. Furthermore, Gordon and Cosimo (2018) suggest that by transferring the tax burden to future generations, current borrowing discourages private investment.

Finally, the government has argued for a long time that Zambia should rely significantly on domestic finance for investment. The government's use of debt as a replacement for the gap in

tax income and surpluses created by the public sector, on the other hand, suggests that it has been employed for economic or political objectives. Therefore, growing domestic debt has been utilised as a weapon to divert financial resources to meet rising current government expenditures rather than being undertaken primarily for investment purposes. Domestic debt has a negative influence on Zambia's economic development as a consequence.

The results of a negative association between debt and economic growth are consistent with Njoroge's (2015) findings of a negative relationship between domestic debt and economic growth. The results that debt has a negative effect on economic growth contradicts Elom-Obed et al. (2017), who showed that domestic debt has a substantial negative impact on Nigerian economic development. Domestic debt has a detrimental influence on economic growth, contrary to the findings of Ochieng et al. (2015) and Yusuf and Mohd (2021), who concluded that it had a considerable beneficial impact on long-term growth.

Furthermore, there is a negative correlation between economic growth and interest rates. Holding all other things equal, the findings suggest that a 1% rise in the real interest rate would result in a 0.269 percent decline in economic growth. This is in accordance with our predictions based on theory. Interest rates have a negative impact on economic development in Zambia because they represent a cost of doing business, and so a high interest rate would stifle investment growth and, as a result, economic growth. Our findings are comparable to those of Kimolo and Onono (2017), who found that the real interest rate had a negative influence on economic growth, but the difference was statistically insignificant.

The study's results on domestic revenue reveal that it is statistically significant in the long term and has a beneficial impact on Zambia's economic development. This is in accordance with our predictions based on theory. Keeping all other parameters unchanged, a 1% rise in domestic revenue resulted in a 0.988 percent increase (reduction) in economic growth in the long term. The finding that domestic revenue has a positively affects economic growth could be attributed to the fact that revenue eases liquidity constraints on the government which would have otherwise constrained government spending. An increase in government revenue lowers or eliminates budget deficits and hence government can spend without crowding out investment and hence economic growth. Our study findings are similar to those of Joseph and Omodero (2020) who found that revenue had a statistically positive significant influence on economic growth.

Further, findings indicate that, real effective exchange have a negative effect on economic growth in the long run. On the other hand, in the long run the study findings show that a 10% depreciation (appreciation) in real effective exchange rate led to a decrease (increase) of 19.22% in economic growth, holding all other factors constant. This means that a depreciation in Zambia's real effective exchange rate deters growth. This finding contradicts theory as a depreciated is expected to stimulate exports and consequently economic growth. Ideally, a depreciation would stimulate exports but in this it implies that Zambia could be an import dependent country which does not export much. Our findings affirm those of Yu (2017) and Kairat who found that an appreciation was expansionary. The findings contradict Khondker et al. (2012) and Koirala (2018) an increase in real effective exchange rate which is the depreciation of the currency promotes economic growth through enhancing the international competitiveness.

Finally, leaving all other variables equal, a 1% rise (reduction) in inflation rate resulted in a 0.197 basis point decline (increase) in economic growth in the long term. Furthermore, the data show that, although having a negative sign in the near term, inflation is statistically significant. The absence of an established bond market in most developing nations, including Zambia, necessitates the financing of budget deficits via money creation and borrowing, which has a detrimental impact on economic development. Significantly high amounts of debt, in principle, promote inflation, which may have a negative impact on economy. The results of our research on the detrimental impact of inflation on economic growth are comparable to those of Chikapilah (2021).

Table 5: VECM Long run results

Variable	Coefficient	Standard errors	t-statistics	P-value
LDEBT	-0.988**	0.355	-2.783	0.011
RIR	-0.269***	0.017	-15.536	0.000
LREV	1.18***	0.18	6.307	0.000
LREER	-19.22***	1.22	-15.671	0.000
L_INF	-1.97***	0.648	-3.041	0.006

Note: LDEBT = Domestic Debt; RIR = Real Interest Rate; LREV = Revenue; LREER = Real Effective Exchange Rate; L_INF = Inflation Rate. The asterisks *** and ** denotes significance at 5% and 1% levels respectively, Source: Candidates estimates from research data

4.6 Short run model estimates

Table 6 shows the results for the short run model and to ensure that the standard errors are heteroscedastic-robust, the estimation is done with the Newey-West HAC option. To ensure adequacy of the model, diagnostic tests of serial correlation, normality and heteroscedasticity were conducted.

Table 6: ECM results adjusted by Newey–West HAC standard errors and covariance

Variable	Coefficient	Std. Error	t-Statistic	P-value
ECT	-0.527	0.681	-0.774	0.452
D(RGDPG(-1))	-0.483	0.555	-0.870	0.399
D(RGDPG(-2))	-0.295	0.253	-1.165	0.264
D(LDEBT(-1))	4.114	2.627	1.566	0.140
D(LDEBT(-2))	2.691	2.152	1.251	0.232
D(RIR(-1))	-0.204	0.100	-2.032	0.062
D(RIR(-2))	0.000	0.121	-0.003	0.998
D(LREV(-1))	8.401	4.274	1.966	0.070
D(LREV(-2))	-1.304	4.876	-0.267	0.793
D(LREER(-1))	-2.734	10.487	-0.261	0.798
D(LREER(-2))	-4.934	6.378	-0.774	0.452
D(L_INF(-1))	-4.406	3.082	-1.430	0.175
D(L_INF(-2))	-2.811	2.935	-0.958	0.354
C	-2.123	1.599	-1.328	0.206

Note: RGDPG = Real GDP Growth; LDEBT = Domestic Debt; RIR = Real Interest Rate; LREV = Revenue; LREER = Real Effective Exchange Rate; L_INF = Inflation Rate, Assumption refers to the deterministic terms included where C = constant. Source: Candidates estimates from research data

The error correction term (ECT) has the right sign of negative and a substantially greater coefficient of -0.527, as predicted. When there is a disruption in the long-run equilibrium between economic growth and its macroeconomic causes, the error correction term of roughly -0.527 shows that it corrects back at a pace of about 52.7 percent per year or in 22 months. The

error correction term, on the other hand, is statistically negligible, implying that it does not assist to explain economic growth variances. As a consequence, the relationship between domestic debt and economic development is unidirectional.

One-period lag and two-period lag real GDP, one-period lag real interest rate, two-period lag domestic revenue, one-period lag and two-period lag real effective exchange rate, and one-period lag and two-period lag inflation all have a negative impact on economic growth in the short run, according to the study. However, the findings clearly reveal that only one-period lag real interest rate has a substantial negative influence on economic growth in the short term at a 10% level of significance, whereas the others are not. Domestic debt with a one-period and two-period lag has a beneficial influence on economic growth in the near term. Furthermore, we can show that a one-period lag in domestic income has a beneficial impact on Zambian economic development. Despite the fact that domestic debt has a beneficial short-run influence on Zambian economic development, it is not statistically significant. Domestic revenue, on the other hand, was determined to have a substantial beneficial influence on Zambia's economic development in the short run at a 10% level of significance.

Domestic debt was judged to be minimal in the near term. Furthermore, the findings demonstrate that interest rates have a considerable negative impact on Zambia's economic development in the near term. In the near term, a 1% rise in the real interest rate will result in a 0.02 percent loss (increase) in economic growth. In the near term, a 1% increase (reduction) in domestic revenue will result in an increase in economic growth of 8.4%. Furthermore, the results of the analysis show that real effective exchange has a negative impact on economic growth in both the short and long term, but the short run effect is statistically insignificant. Furthermore, the data show that, although having a negative sign in the near term, inflation is statistically insignificant. In the near term, the conclusion of no impact of inflation contradicts that of Ssempala et al. (2020), who observed a considerable effect.

4.7. Diagnostic and Stability Tests

4.7.1. Post estimation diagnostic tests

Besides the unit root tests that have been conducted and presented in table 3 that ensure that spurious regression is avoided it is imperative also that the validity of the estimated model be established through post model estimation diagnostic tests. The post estimation diagnostic tests

were conducted to ensure that the estimated model results are robust and valid to be used for policy formulation. Table 8 shows the diagnostic tests that were conducted, and this include model significance, heteroskedasticity, autocorrelation, goodness of fit and normality. The F-test, Breusch-Pagan-Godfrey test (BPG), BG, R-squared and Jarque-Bera (J-B) tests are used as diagnostic tests respectively. The tables below present various diagnostic test results. We first present the null hypothesis for each test as they appear in the tables;

Table 7: Model diagnostic tests for long-run model

Test	Diagnostic test	Test statistic	P-value	Conclusion
Model significance	F-test	F=3.285	0.000	Model is significant
Heteroskedasticity	White	Chi-square	0.222	No heteroskedasticity
Autocorrelation	BG LM	F-test	0.834	No autocorrelation
Goodness of fit	R-squared	$R^2 = 0.7531$		Model fits data well
Normality	J-B	J-B=12	0.6499	Residuals are normal

Note: Conclusions are made at 1% percent level of significance. Null hypothesis for the model significance test (H_0) the econometric model specified is statistically insignificant; Null hypothesis for the white's test of Heteroskedasticity (H_0) the variance of the error terms in the model are homoscedastic; Null hypothesis for the BG - LM test; (H_0) there is no autocorrelation among the error terms in the model; Null hypothesis for model fit (H_0): the R^2 is above 0.70; Null hypothesis for Normality test (H_0) the residuals are normal

Table 8: Model diagnostic tests for short-run model

Test	Diagnostic test	Test statistic	P-value	Conclusion
Model significance	F-test	F=3.285	0.000	Model is significant
Heteroskedasticity	B-P-G	F-test	0.766	No heteroskedasticity
Autocorrelation	BG LM	F-test	0.815	No autocorrelation
Goodness of fit	R-squared	$R^2 = 0.7531$		Model fits data well
Normality	J-B	J-B=12	0.4284	Residuals are normal

Note: Conclusions are made at 1% percent level of significance. Null hypothesis for the model significance test (H_0) the econometric model specified is statistically insignificant; Null hypothesis for the white's test of Heteroskedasticity (H_0) the variance of the error terms in the model are homoscedastic; Null hypothesis for the BG - LM test; (H_0) there is no autocorrelation among the error terms in the model; Null hypothesis for model fit (H_0): the R^2 is above 0.70; Null hypothesis for Normality test (H_0) the residuals are normal

Based on the diagnostic tests presented in table 8, our model passes all the tests. The model was found to be significant, free from heteroscedasticity and autocorrelation, has high level of goodness of fit and its residuals are normally distributed.

4.7.2. Short-run model stability test

The CUSUM and CUSUM Square tests developed by Brown, Durbin and Evans (1975) were utilized to examine the stability of our economic growth model. Figure 6 and figure 7 shows the results. The results of the CUSUM and CUSUM of Squares show that the red line is within the 5 percent level of significance. Therefore, our model is stable.

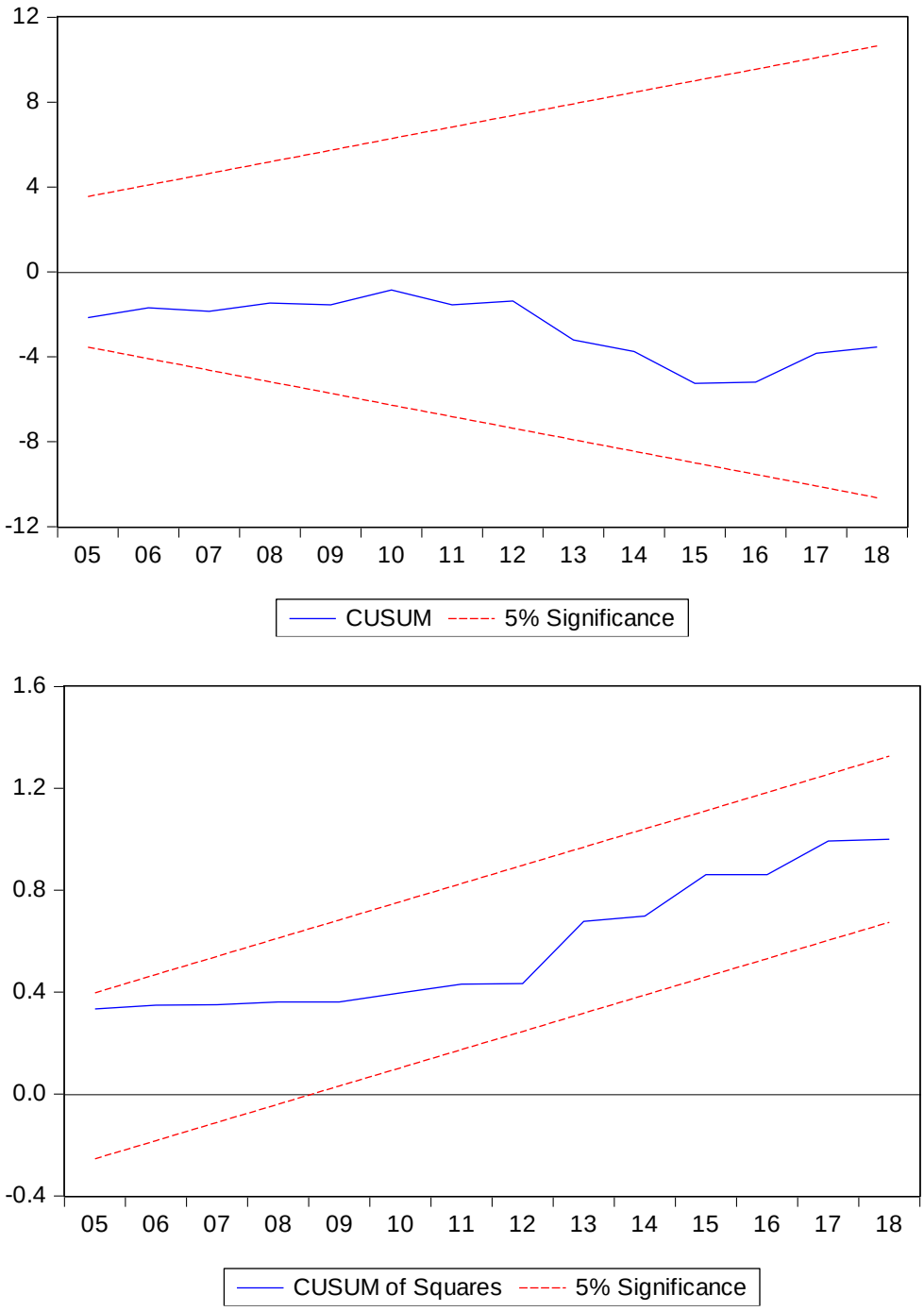

Figure 5: CUSUM Test

4.8: Granger Causality

To determine whether economic growth was sensitive to past changes in domestic debt, real interest rate, domestic revenue, real effective exchange rate and inflation rate, granger causality tests were conducted using the ward coefficient restriction test. The Granger causality test results are presented in Table 9.

Table 9: Results of the Granger causality

Null Hypothesis	Test statistic	P-value
Debt to GDP ratio does not granger-cause economic growth	2.804	0.246
Real interest rates do not granger-cause economic growth	1.432	0.489
Domestic revenue does not granger-cause economic growth	3.153	0.207
Real effective exchange rate does not granger-cause economic growth	0.347	0.841
Inflation does not granger-cause economic growth	3.221	0.200
All variables do not granger-cause real exchange rates jointly	16.308	0.091

Note: RGDPG = Real GDP Growth; LDEBT = Domestic Debt; RIR = Real Interest Rate; LREV = Revenue; LREER = Real Effective Exchange Rate; L_INF = Inflation Rate. Source: Candidates estimates from research data

The results show that changes in domestic debt, real interest rate, domestic revenue, real effective exchange rate and inflation rate individually do not indicate any unidirectional causality from each variable to economic growth. However, they are sensitive also to joint past changes in all the variables. The long-run and short-run models were drawn from the fact that our variables were integrated of order one and subsequently showed an existence of a long-run relationship. The short-run and long-run models helped us understand the relationships between the real economic growth and the macroeconomic variables in these periods. We therefore adopt both models in our study.

4.9. Dynamic Causality Models

4.9.1. Variance Decomposition Analysis

To determine the robustness of our empirical findings, we can used variance decomposition analysis (VDC). Because Granger causality can only be tested within the sample period, we utilised variance decomposition analysis (VDC) as an out-of-sample causality test and as a robust analysis of the ECM. Variance decompositions (VDCs) and impulse response functions are generally used to analyse the dynamic interactions between variables in the post-sample period (IRFs). The VDC value indicates how much detail each variable adds to the other variables in the autoregression. It calculates the actual contribution of real interest rate to economic growth or the contribution of economic growth to real interest rate (Akinlo, 2009). For this study we will concentrate on the variance decomposition of real domestic product growth.

Our findings from the VDC and ECM terms are consistent both in the short and long run. The variance decomposition of real GDP growth (RGDPG) and domestic debt (LDEBT), as well

as the real interest rate (RIR), domestic revenue (LREV), real effective exchange rate (LREER), and inflation rate, is shown in Figure 5. In the long run, shocks or impulses to domestic debt account for less than 20% of real GDP growth fluctuations. Additionally, in the long run, an innovation in real interest rates explains less than 5% of the variation in real economic growth. Within a year, an increase in domestic revenue has no effect on real GDP growth. Similarly, a shock to the real effective exchange rate does not appear to account for variation in real GDP growth in the short run and accounts for approximately 3.5 percent of variation in economic growth over the long run. Additionally, inflation appears to account for approximately 3% of the variation in economic growth over the long run. As a result of the VDC, it can be concluded that all explanatory variables contribute less to economic growth. This is consistent with our Granger causality results, which indicate a one-way relationship between macroeconomic variables in the model and economic growth. That is, evidence indicates a causal relationship between macroeconomic variables in the model and long-run economic growth in this dynamic model. This implies that the long-run and short-run effects of increased domestic debt are less pronounced.

The results of the VECM are consistent with those of the framework for out of sample causality testing. Domestic debt, the VDC indicates, contributes more to economic growth than economic growth does to domestic debt in the long run. To ensure continuity in the economy's overall expansion, anything impeding a sustained and higher rate of economic growth should be eliminated. The framework for out-of-sample causality testing supports the notion that high domestic debt has a long-run negative effect on economic growth. Keeping other variables constant, the VDCs forecast that a shock to domestic debt contributes more than 18% of variation in economic growth over a 10-year period, while economic growth contributes about 2% to domestic debt. Zambia, therefore, requires a debt management strategy to avert further deterioration of the economy's fundamentals.

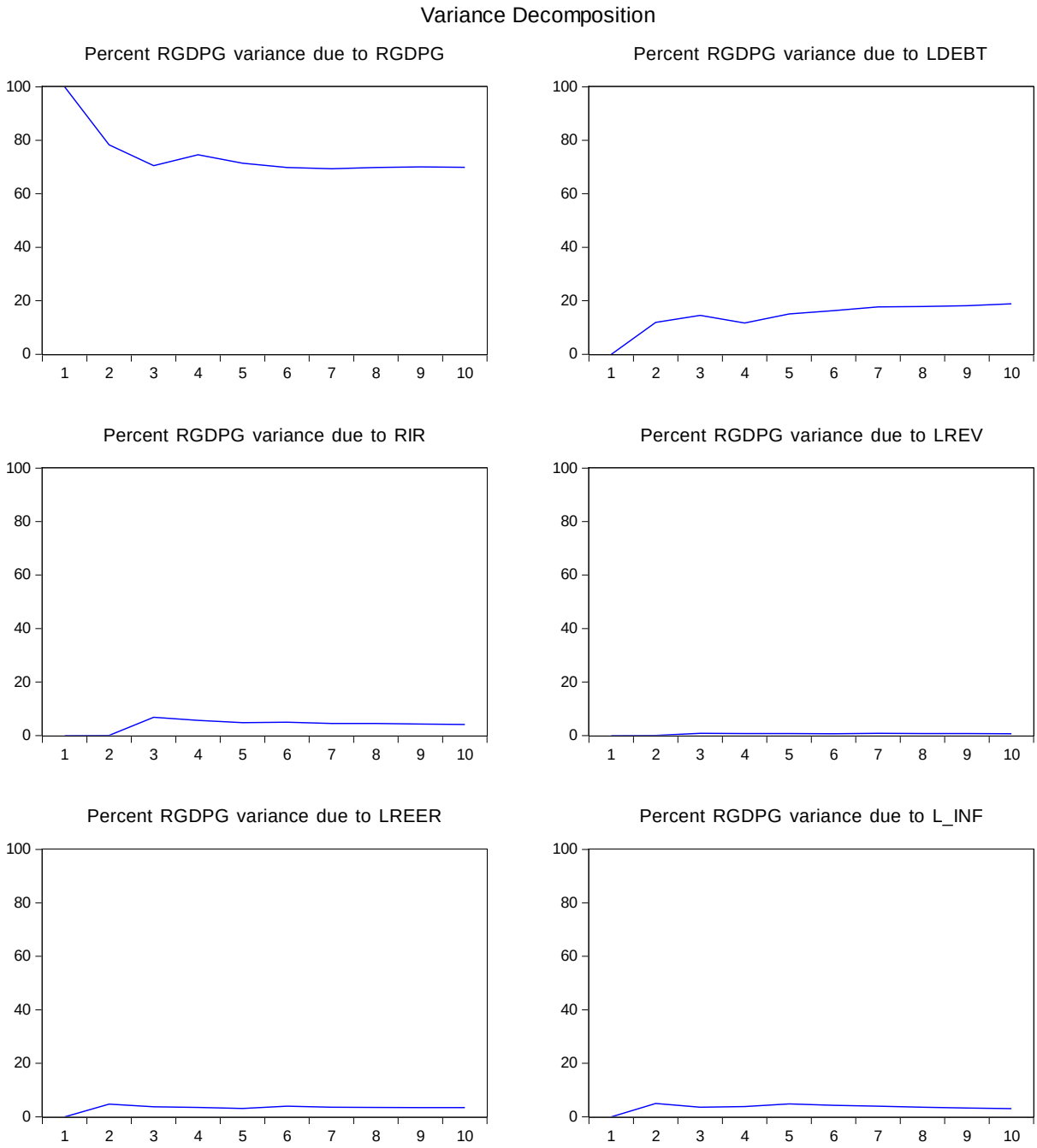

Figure 6: Variance Decomposition Analysis

4.9.2. Impulse Response Functions (IRFs)

An impulse response function plots the dependent variable's response to shocks in the error terms of a VAR system. In other words, it examines the effect of a single shock to one of the innovations on the current and future values of endogenous variables (Polemis & Dagoumos, 2013). Figure 6 illustrates the IRF derived from the VECM. This diagram depicts the VECM's real GDP growth variable's response to its own and other variables' innovations.

In contrast to our findings, the existing literature has established a one-way causal relationship between domestic debt and economic growth. This prevalent belief contradicts our research

findings in both the short- and long-run using a framework for testing within-sample causality, the VECM. Thus, the findings may not be surprising, given that our study period focused exclusively on one aspect of debt. This implies that our findings do not adequately reflect the country's current insufficiently retarded growth. To overcome this constraint, we used an out-of-sample causality testing framework comprised of Variance Decomposition Analysis (VDC) and Impulse Response Functions (IRFs).

As illustrated in Figure 7, real GDP growth responds positively to its own innovation for the first year, but then declines until year 2, after which it increases and remains positive in the long run. Real GDP growth responds positively to a one-standard deviation shock to domestic debt. Similarly, real GDP growth responds positively to a one standard deviation real shock. On the other hand, the response of real GDP growth to a standard deviation shock in domestic revenue is initially zero before turning negative in year two. It then recovers in year 5 and then oscillates back into the negative until year 6 when it remains positive. That is, after an increase in domestic revenue, it takes approximately six years for real GDP growth to normalize. Domestic revenue collection would increase as a result of higher taxes, resulting in a decrease in disposable income and thus growth. Real GDP growth responds positively to a one standard deviation change in the real effective exchange rate. Finally, the response of real GDP growth to a one-standard deviation inflation rate shock is initially negative but then positive after year three. The oscillations between positive and negative values, however, continue.

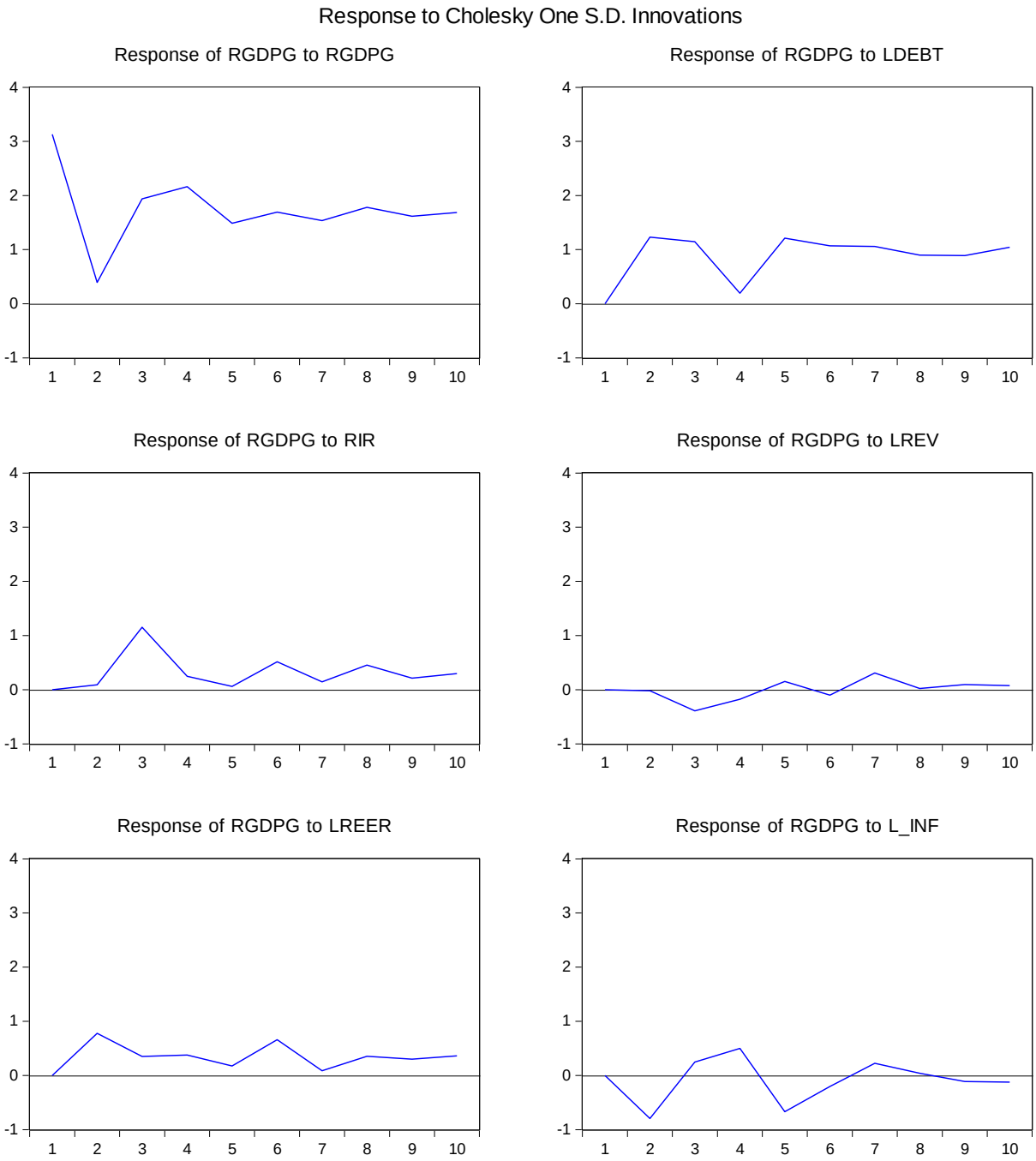

Figure 7: Impulse Response Functions

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

The impact of domestic debt on Zambian economic development was explored in the previous chapter. This chapter summarizes the study's overall findings based on the goals. Section 5.2 contains the conclusions. In sections 5.3, it discusses the study's shortcomings as well as the policy implications of the results.

5.2. Summary and Conclusions of the Study

The goal of the research was to see whether domestic debt explains Zambia's economic development from 1980 to 2018. The empirical analysis in our research started with determining if the variables of interest were stationary. The null hypothesis of a unit root in the series at level cannot be rejected at a 5% level of significance, and all variables become stationary after the first difference, according to the findings. The Johansen Maximum Likelihood Procedure was used to determine the existence of co-integration after determining an order of integration of a unit for both series, I(1). The Akaike Information Criterion (AIC) recommended that the Johansen testing process use a one-lag period. The existence of one cointegrating equation was shown via the Johansen cointegration test. This revealed that there is a long-term association between real GDP growth and the macroeconomic factors studied. Because of the existence of cointegration, determining the direction of causation required estimating the VECM. The short-run and long-run causal relationships were demonstrated at various significant levels within the VECM.

Every country's primary objective is to generate economic development that is sustainable. As a result, the study's goal was to look at the impact of domestic debt on Zambia's economic development. The World Bank's World Development Index website, as well as the Ministry of Finance and Bank of Zambia websites, were used to compile time series data for the research. The vector error correction model was used as an econometric method to investigate the impact of domestic debt on Zambia's economic development.

According to the results, real interest rate and domestic income are the most important factors of economic development in Zambia in the short run, whereas domestic debt, real effective exchange rate, and inflation are unimportant. Domestic debt, real interest rate, domestic

revenue, inflation rate, and real effective exchange rate are further elements that impact economic growth in the long term. Domestic debt, real interest rates, real effective exchange rates, and inflation all have a detrimental impact on economic growth, according to the research. Domestic revenue, on the other hand, was proven to have a beneficial impact on economic growth.

Furthermore, the model is not stable due to the negative sign of the error correction component originating from the short run cointegrating form of the model. Finally, the results of the stability tests contradict the evidence of the estimated economic growth model's stability. The findings show that there is a long-run unidirectional or one-way causation between domestic debt, real interest rate, domestic revenue, real effective exchange rate, and inflation and economic growth, according to the vector error correction model. In the near term, however, only domestic income and the rate of inflation have a substantial influence on economic growth.

To reflect the influence of domestic debt on the economy, an out of sample causality testing methodology was applied. In other words, according to the Variance Decomposition Analysis, a shock to domestic debt seems to explain more than 18 percent of the variance in economic growth across time. Furthermore, given a ten-year timeframe, an increase in domestic debt in the current year results in a decline in economic growth in the fourth year and gradually normalises in the sixth year, according to the Impulse Response Function. These findings back with the crowding out theory, which claims that domestic debt is a barrier to economic development.

5.3. Policy Recommendations

The report provides the following suggestions based on the research results. First and foremost, Zambia's government should strive for lower levels of domestic borrowing that may be put to constructive and effective use. Domestic debt, on the other hand, is usually excessively costly and should be avoided at all costs owing to its macroeconomic consequences. If the interest rate on Treasury notes rises and banks cease lending to borrowers, both interest rates and inflation rise.

Second, to promote quicker development, the real interest rate should be steady, and the real effective exchange rate may be improved by increasing manufacturing, which leads to higher exports. An export promotion plan that results in greater export profits might be used to augment this. Governments should also promote food stability to prevent food importation, which is widespread in Zambia.

Governments might also privatize certain public assets to decrease massive public spending while raising income, supporting economic development. Non-growth spending should not be exceeded on a recurring basis. To guarantee that government income fosters growth, corruption and leakages in tax and other revenue collection should be eliminated.

5.4. Avenues for future research

The major limitation to this study was data limitations. The study would have covered a longer period but was constrained to the specified period because of missing observations on some variables. Therefore, for further study we propose the use of monthly data.

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APPENDICES

Vector Error Correction Estimates
Date: 01/27/22 Time: 14:08
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
RGDPG(-1)	1.000000
LDEBT(-1)	-0.988140 (0.35502) [-2.78332]
RIR(-1)	-0.269217 (0.01733) [-15.5357]
LREV(-1)	1.180211 (0.18712) [6.30734]
LREER(-1)	-19.22056 (1.22648) [-15.6713]
L_INF(-1)	-1.969835 (0.64786) [-3.04054]
C	56.93864

Error Correction:	D(RGDPG)	D(LDEBT)	D(RIR)	D(LREV)	D(LREER)	D(L_INF)
CointEq1	-0.526920 (0.75965) [-0.69363]	-0.085767 (0.06761) [-1.26850]	0.504270 (2.02208) [0.24938]	0.027936 (0.03135) [0.89121]	0.048909 (0.02733) [1.78960]	0.082676 (0.09809) [0.84287]
D(RGDPG(-1))	-0.482655 (0.55701) [-0.86652]	0.015483 (0.04958) [0.31231]	-1.633866 (1.48266) [-1.10198]	-0.000667 (0.02298) [-0.02902]	-0.016275 (0.02004) [-0.81215]	-0.001090 (0.07192) [-0.01516]
D(RGDPG(-2))	-0.295223 (0.28985) [-1.01854]	-0.007283 (0.02580) [-0.28230]	-1.345185 (0.77153) [-1.74352]	0.000396 (0.01196) [0.03315]	-0.001237 (0.01043) [-0.11859]	0.011999 (0.03743) [0.32061]
D(LDEBT(-1))	4.113910 (3.06377) [1.34276]	-0.079613 (0.27269) [-0.29195]	-5.362100 (8.15526) [-0.65750]	0.179121 (0.12642) [1.41684]	0.066425 (0.11022) [0.60264]	0.271983 (0.39560) [0.68751]

D(LDEBT(-2))	2.691394	0.171458	13.90154	-0.112597	-0.030094	-0.295640
	(2.95766)	(0.26325)	(7.87280)	(0.12204)	(0.10640)	(0.38190)
	[0.90997]	[0.65133]	[1.76577]	[-0.92259]	[-0.28283]	[-0.77413]
D(RIR(-1))	-0.204211	0.010341	0.208002	-0.000869	0.000966	-0.002187
	(0.18030)	(0.01605)	(0.47994)	(0.00744)	(0.00649)	(0.02328)
	[-1.13260]	[0.64441]	[0.43340]	[-0.11685]	[0.14896]	[-0.09392]
D(RIR(-2))	-0.000328	-0.003635	0.307251	-0.002113	0.001589	-0.009334
	(0.13677)	(0.01217)	(0.36406)	(0.00564)	(0.00492)	(0.01766)
	[-0.00240]	[-0.29860]	[0.84395]	[-0.37440]	[0.32285]	[-0.52851]
D(LREV(-1))	8.401496	0.170714	11.47333	0.364094	-0.118735	-0.539568
	(4.89664)	(0.43582)	(13.0340)	(0.20205)	(0.17616)	(0.63227)
	[1.71577]	[0.39170]	[0.88026]	[1.80197]	[-0.67401]	[-0.85338]
D(LREV(-2))	-1.303575	-0.088627	2.159848	0.291344	-0.099701	-0.230434
	(5.43236)	(0.48351)	(14.4601)	(0.22416)	(0.19544)	(0.70144)
	[-0.23996]	[-0.18330]	[0.14937]	[1.29971]	[-0.51015]	[-0.32851]
D(LREER(-1))	-2.734488	-0.656788	31.19659	-0.030040	0.281953	-1.637626
	(9.70180)	(0.86350)	(25.8246)	(0.40033)	(0.34903)	(1.25273)
	[-0.28185]	[-0.76061]	[1.20802]	[-0.07504]	[0.80781]	[-1.30725]
D(LREER(-2))	-4.933579	-0.084129	4.675236	0.175899	0.246002	0.167577
	(8.55184)	(0.76115)	(22.7636)	(0.35288)	(0.30766)	(1.10424)
	[-0.57690]	[-0.11053]	[0.20538]	[0.49846]	[0.79959]	[0.15176]
D(L_INF(-1))	-4.406261	0.384979	3.271927	0.052493	-0.055620	-0.282526
	(2.79262)	(0.24856)	(7.43351)	(0.11523)	(0.10047)	(0.36059)
	[-1.57782]	[1.54886]	[0.44016]	[0.45554]	[-0.55361]	[-0.78350]
D(L_INF(-2))	-2.811137	0.105054	0.198271	-0.088226	-0.032459	-0.230935
	(2.65665)	(0.23645)	(7.07156)	(0.10962)	(0.09558)	(0.34303)
	[-1.05815]	[0.44429]	[0.02804]	[-0.80481]	[-0.33961]	[-0.67321]
C	-2.123096	0.044450	-3.600653	0.067706	0.073145	0.152524
	(1.74127)	(0.15498)	(4.63497)	(0.07185)	(0.06264)	(0.22484)
	[-1.21928]	[0.28681]	[-0.77684]	[0.94231]	[1.16762]	[0.67837]
R-squared	0.753121	0.458349	0.610785	0.817095	0.405786	0.542919
Adj. R-squared	0.523876	-0.044612	0.249370	0.647254	-0.145983	0.118488
Sum sq. resids	137.1208	1.086245	971.5514	0.233476	0.177473	2.286188
S.E. equation	3.129591	0.278548	8.330458	0.129139	0.112590	0.404103
F-statistic	3.285223	0.911301	1.689984	4.810956	0.735427	1.279167
Log likelihood	-61.97148	5.762406	-89.38393	27.28606	31.12574	-4.655815
Akaike AIC	5.426535	0.588400	7.384567	-0.949004	-1.223267	1.332558
Schwarz SC	6.092637	1.254502	8.050669	-0.282902	-0.557165	1.998660
Mean dependent	0.152717	0.042303	1.248644	0.276386	0.018091	-0.086928

S.D. dependent	4.535524	0.272535	9.615148	0.217433	0.105175	0.430405

Determinant resid covariance (dof adj.)	7.45E-05
Determinant resid covariance	1.16E-06
Log likelihood	-47.09485
Akaike information criterion	9.792489
Schwarz criterion	14.07458

Normality
VEC Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 01/27/22 Time: 14:17
Sample: 1980 2018
Included observations: 28

Component	Skewness	Chi-sq	df	Prob.
1	-0.518373	1.253981	1	0.2628
2	0.747652	2.608590	1	0.1063
3	0.596740	1.661792	1	0.1974
4	0.264445	0.326346	1	0.5678
5	0.342954	0.548881	1	0.4588
6	-0.096321	0.043296	1	0.8352
Joint		6.442886	6	0.3754

Component	Kurtosis	Chi-sq	df	Prob.
1	2.385016	0.441239	1	0.5065
2	3.329810	0.126904	1	0.7217
3	2.545282	0.241230	1	0.6233
4	1.581430	2.347730	1	0.1255
5	3.074788	0.006526	1	0.9356
6	3.073758	0.006347	1	0.9365
Joint		3.169974	6	0.7872

Component	Jarque-Bera	df	Prob.
1	1.695220	2	0.4284
2	2.735493	2	0.2547
3	1.903022	2	0.3862
4	2.674076	2	0.2626
5	0.555407	2	0.7575
6	0.049643	2	0.9755

Joint	9.612861	12	0.6499

Autocorrelation

VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 01/27/22 Time: 14:18
Sample: 1980 2018
Included observations: 28

Lags	LM-Stat	Prob
1	27.81975	0.8336
2	32.87185	0.6182

Probs from chi-square with 36 df.

Heteroscedasticity

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)
Date: 01/27/22 Time: 14:19
Sample: 1980 2018
Included observations: 28

Joint test:

Chi-sq	df	Prob.
570.9889	546	0.2221

Individual components:

Dependent	R-squared	F(26,1)	Prob.	Chi-sq(26)	Prob.
res1*res1	0.996521	11.01784	0.2344	27.90260	0.3633
res2*res2	0.974832	1.489744	0.5799	27.29530	0.3940
res3*res3	0.973039	1.388104	0.5962	27.24509	0.3966
res4*res4	0.969054	1.204388	0.6294	27.13350	0.4024
res5*res5	0.979266	1.816497	0.5352	27.41944	0.3876
res6*res6	0.972390	1.354588	0.6019	27.22693	0.3975
res2*res1	0.935890	0.561464	0.8064	26.20491	0.4519
res3*res1	0.997732	16.91639	0.1902	27.93648	0.3616
res3*res2	0.999803	195.3835	0.0565	27.99449	0.3587
res4*res1	0.992833	5.328103	0.3316	27.79933	0.3684
res4*res2	0.988925	3.434385	0.4059	27.68990	0.3739
res4*res3	0.998360	23.41188	0.1621	27.95408	0.3607

res5*res1	0.999979	1868.218	0.0183	27.99942	0.3585
res5*res2	0.943448	0.641643	0.7770	26.41653	0.4404
res5*res3	0.999000	38.41520	0.1269	27.97199	0.3598
res5*res4	0.926806	0.487011	0.8362	25.95056	0.4658
res6*res1	0.991810	4.657485	0.3530	27.77067	0.3698
res6*res2	0.994958	7.589685	0.2804	27.85882	0.3654
res6*res3	0.973738	1.426075	0.5900	27.26467	0.3956
res6*res4	0.998010	19.29162	0.1783	27.94429	0.3612
res6*res5	0.999404	64.45806	0.0982	27.98330	0.3593

VAR Lag Order Selection Criteria
Endogenous variables: RGDPG LDEBT RIR LREV LREER L_INF
Exogenous variables: C
Date: 01/27/22 Time: 14:22
Sample: 1980 2018
Included observations: 28

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-231.0098	NA	0.906825	16.92927	17.21475	17.01655
1	-71.87547	238.7016*	0.000147*	8.133962	10.13227*	8.744864*
2	-39.60438	34.57617	0.000284	8.400313	12.11145	9.534845
3	5.429880	28.95059	0.000554	7.755009*	13.17898	9.413172

* 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

Dependent Variable: D(RGDPG)
Method: Least Squares (Gauss-Newton / Marquardt steps)
Date: 01/28/22 Time: 02:46
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed
bandwidth = 4.0000)
D(RGDPG) = C(1)*(RGDPG(-1) - 0.988139716375*LDEBT(-1) -
0.269216758103*RIR(-1) + 1.18021074686*LREV(-1) -
19.2205612043*LREER(-1) - 1.96983499743*L_INF(-1) +
56.9386398914) + C(2)*D(RGDPG(-1)) + C(3)*D(RGDPG(-2)) +
C(4)*D(LDEBT(-1)) + C(5)*D(LDEBT(-2)) + C(6)*D(RIR(-1)) + C(7)
*D(RIR(-2)) + C(8)*D(LREV(-1)) + C(9)*D(LREV(-2)) + C(10)
*D(LREER(-1)) + C(11)*D(LREER(-2)) + C(12)*D(L_INF(-1)) + C(13)
*D(L_INF(-2)) + C(14)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.526920	0.680576	-0.774227	0.4517
C(2)	-0.482655	0.555021	-0.869616	0.3992
C(3)	-0.295223	0.253412	-1.164991	0.2635
C(4)	4.113910	2.626881	1.566082	0.1396
C(5)	2.691394	2.151973	1.250664	0.2316
C(6)	-0.204211	0.100481	-2.032343	0.0615
C(7)	-0.000328	0.120776	-0.002714	0.9979
C(8)	8.401496	4.273797	1.965815	0.0695
C(9)	-1.303575	4.875507	-0.267372	0.7931
C(10)	-2.734488	10.48694	-0.260752	0.7981
C(11)	-4.933579	6.378167	-0.773511	0.4521
C(12)	-4.406261	3.082255	-1.429558	0.1748
C(13)	-2.811137	2.934582	-0.957934	0.3543
C(14)	-2.123096	1.599296	-1.327519	0.2056

R-squared	0.753121	Mean dependent var	0.152717
Adjusted R-squared	0.523876	S.D. dependent var	4.535524
S.E. of regression	3.129591	Akaike info criterion	5.426535
Sum squared resid	137.1208	Schwarz criterion	6.092637
Log likelihood	-61.97148	Hannan-Quinn criter.	5.630169
F-statistic	3.285223	Durbin-Watson stat	2.113266
Prob(F-statistic)	0.017554	Wald F-statistic	27.54662
Prob(Wald F-statistic)	0.000000		

VEC Granger Causality/Block Exogeneity Wald Tests
Date: 01/28/22 Time: 03:06
Sample: 1980 2018
Included observations: 28

Dependent variable: D(RGDPG)

Excluded	Chi-sq	df	Prob.
D(LDEBT)	2.804018	2	0.2461
D(RIR)	1.432488	2	0.4886
D(LREV)	3.152853	2	0.2067
D(LREER)	0.346626	2	0.8409
D(L_INF)	3.221305	2	0.1998
All	16.30783	10	0.0912

Dependent variable: D(LDEBT)

Excluded	Chi-sq	df	Prob.
D(RGDPG)	0.862975	2	0.6495
D(RIR)	0.703996	2	0.7033
D(LREV)	0.154652	2	0.9256
D(LREER)	0.592495	2	0.7436
D(L_INF)	2.456539	2	0.2928
All	9.122339	10	0.5205

Dependent variable: D(RIR)

Excluded	Chi-sq	df	Prob.
D(RGDPG)	3.259552	2	0.1960
D(LDEBT)	3.412221	2	0.1816
D(LREV)	1.055614	2	0.5899
D(LREER)	1.483804	2	0.4762
D(L_INF)	0.194696	2	0.9072
All	19.97034	10	0.0295

Dependent variable: D(LREV)

Excluded	Chi-sq	df	Prob.
D(RGDPG)	0.009437	2	0.9953

D(LDEBT)	2.698244	2	0.2595
D(RIR)	0.140200	2	0.9323
D(LREER)	0.302172	2	0.8598
D(L_INF)	0.970229	2	0.6156
All	5.641819	10	0.8444

Dependent variable: D(LREER)

Excluded	Chi-sq	df	Prob.
D(RGDPG)	1.415045	2	0.4929
D(LDEBT)	0.422568	2	0.8095
D(RIR)	0.106396	2	0.9482
D(LREV)	1.150988	2	0.5624
D(L_INF)	0.378418	2	0.8276
All	5.321074	10	0.8687

Dependent variable: D(L_INF)

Excluded	Chi-sq	df	Prob.
D(RGDPG)	0.301087	2	0.8602
D(LDEBT)	1.006255	2	0.6046
D(RIR)	0.286111	2	0.8667
D(LREV)	1.236351	2	0.5389
D(LREER)	2.023234	2	0.3636
All	11.28049	10	0.3361

VEC Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)
Date: 01/28/22 Time: 14:42
Sample: 1980 2018
Included observations: 28

Joint test:

Chi-sq	df	Prob.
570.9889	546	0.2221

Individual components:

Dependent	R-squared	F(26,1)	Prob.	Chi-sq(26)	Prob.

res1*res1	0.996521	11.01784	0.2344	27.90260	0.3633
res2*res2	0.974832	1.489744	0.5799	27.29530	0.3940
res3*res3	0.973039	1.388104	0.5962	27.24509	0.3966
res4*res4	0.969054	1.204388	0.6294	27.13350	0.4024
res5*res5	0.979266	1.816497	0.5352	27.41944	0.3876
res6*res6	0.972390	1.354588	0.6019	27.22693	0.3975
res2*res1	0.935890	0.561464	0.8064	26.20491	0.4519
res3*res1	0.997732	16.91639	0.1902	27.93648	0.3616
res3*res2	0.999803	195.3835	0.0565	27.99449	0.3587
res4*res1	0.992833	5.328103	0.3316	27.79933	0.3684
res4*res2	0.988925	3.434385	0.4059	27.68990	0.3739
res4*res3	0.998360	23.41188	0.1621	27.95408	0.3607
res5*res1	0.999979	1868.218	0.0183	27.99942	0.3585
res5*res2	0.943448	0.641643	0.7770	26.41653	0.4404
res5*res3	0.999000	38.41520	0.1269	27.97199	0.3598
res5*res4	0.926806	0.487011	0.8362	25.95056	0.4658
res6*res1	0.991810	4.657485	0.3530	27.77067	0.3698
res6*res2	0.994958	7.589685	0.2804	27.85882	0.3654
res6*res3	0.973738	1.426075	0.5900	27.26467	0.3956
res6*res4	0.998010	19.29162	0.1783	27.94429	0.3612
res6*res5	0.999404	64.45806	0.0982	27.98330	0.3593

VEC Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Date: 01/28/22 Time: 14:45
Sample: 1980 2018
Included observations: 28

Lags	LM-Stat	Prob
1	27.81975	0.8336
2	32.87185	0.6182
3	25.23157	0.9103

Probs from chi-square with 36 df.

Component	Kurtosis	Chi-sq	df	Prob.
1	2.385016	0.441239	1	0.5065
2	3.329810	0.126904	1	0.7217
3	2.545282	0.241230	1	0.6233
4	1.581430	2.347730	1	0.1255
5	3.074788	0.006526	1	0.9356
6	3.073758	0.006347	1	0.9365

Joint	3.169974	6	0.7872

Component	Jarque-Bera	df	Prob.
1	1.695220	2	0.4284
2	2.735493	2	0.2547
3	1.903022	2	0.3862
4	2.674076	2	0.2626
5	0.555407	2	0.7575
6	0.049643	2	0.9755
Joint	9.612861	12	0.6499