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Determinants of Uganda's Debt Sustainability: The Public Debt Dynamics Model in Perspective

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Abstract: To investigate Uganda's debt sustainability determinants. The fundamental framework for this study is the public debt dynamics model, which looks at connections between changes in public debt and important macroeconomic factors such as real GDP, primary balance, currency rate, real interest rate, and trade openness. While acknowledging the significance of the primary variables identified by Mupunga and Le Roux, our empirical analysis of a country's debt dynamics extends beyond these factors. Additional considerations include the incorporation of controls such as the production gap and the non-interest current account balance. Tailored to Uganda's economic context, our comprehensive empirical model aims to provide a nuanced understanding of the diverse determinants influencing debt dynamics in the region. The major conclusions indicate that the Primary Balance, Real Interest Rate, and Real Effective Exchange Rate all positively and significantly affect the debt ratio, suggesting that fiscal surplus, low-interest rates, and currency appreciation are favorable to debt reduction and sustainability. The paper also finds that the debt ratio is negatively and significantly influenced by the Current Account Balance, indicating that trade surplus is beneficial for debt management. The paper further finds that the debt ratio is not significantly influenced by GDP growth, suggesting that economic growth may not have a strong effect on debt dynamics in Uganda. Given the significant impact of the "Primary Balance" on the "Debt-to-GDP ratio in the long run, policymakers should prioritize maintaining a fiscal surplus and prudent fiscal management. Implementing measures to enhance revenue generation, control government expenditures, and reduce budget deficits can contribute to reducing the debt burden and ensuring long-term debt sustainability. To keep the debt-to-GDP ratio in good shape, fiscal policies and long-term restraint are crucial.

Keywords: *Debt Sustainability, Public debt dynamics model, Uganda*

1. Introduction

Public debt is a key source of financing for many countries, especially for developing countries that face resource constraints and development challenges. Infrastructure and public capital projects that are necessary for social welfare and economic progress can be financed in part by public debt (Debrun et al., 2019). However, public debt can also pose serious risks for macroeconomic stability and long-term debt sustainability if it exceeds the country's ability to repay and service its obligations (Wyplosz, 2011). Therefore, for any government to design macroeconomic policies that are wise and effective, it is imperative to understand the factors that determine debt sustainability.

This study looks at Uganda's debt sustainability factors. Uganda is an African developing nation whose public debt has significantly increased recently. Under the Multilateral Debt Relief Initiative (MDRI), 36 low-income countries, including Uganda, had their external debt to international organizations eliminated in the 1990s and 2000s (Cirolia, 2020). However, because of increased borrowing from both local and foreign sources, Uganda's debt situation has gotten worse recently, raising questions about its sustainability and susceptibility to shocks from the outside world (Atta-Mensah & Ibrahim, 2020).

Uganda's external borrowing has been partly motivated by the need to attract foreign direct investment (FDI) to supplement its domestic resources and support its development agenda (Probst et al., 2021). FDI can provide foreign exchange and enhance the country's capacity to import and export goods, which can improve its balance of payments and economic growth (Bahmani & Mohammadian, 2017). However, FDI can also increase the country's exposure to exchange rate fluctuations and external debt servicing costs, which can worsen its debt situation and increase its vulnerability to external shocks.

This paper's primary research question is: What factors influence Uganda's debt sustainability? The long-term link between the debt-to-GDP ratio and the following five explanatory variables is examined in this study using a cointegration approach: primary balance, real interest rate, GDP growth, real effective exchange rate, and current account balance. Furthermore, the study uses a public debt dynamics model created by Mupunga and Le Roux (2016) to pinpoint the primary causes of variations in the debt-to-GDP ratio.

The study adds to the body of knowledge on debt sustainability by offering empirical support and recommendations for policy for Uganda, a nation that has not received enough attention in previous studies. Additionally, the study makes use of an extensive dataset that spans 1988 through 2021, making it possible to assess the impact of current policy shifts and economic developments. According to the report, Uganda's debt load grew by 11% from $5.3 billion in the 2019–2020 fiscal year to $5.9 billion in the 2020–2021 fiscal year (Bank of Uganda, 2022). It is expected to rise to 53.1 percent of GDP in the 2023–2024 fiscal year, surpassing the 50 percent threshold that the International Monetary Fund (IMF) recommends for developing nations (MOFPED, 2023). The study also shows how Uganda's debt dynamics are influenced by significant macroeconomic parameters such as economic openness, real GDP, real interest rate, real primary balance, and real currency rate.

The paper is formatted as follows: Section 2 reviews the pertinent literature on debt sustainability and its causes. Section 3 explains the data and methods used in the article. Section 4 presents and discusses the empirical results. A discussion of the consequences of policy finishes Section 5.

2. Literature review and hypothesis development

Empirical literature review

Debt sustainability: Bandiera and Tsiropoulos (2020) state that a nation's debt is sustainable if its government can fulfill all of its debt service obligations going forward without having to use accruals or debt rescheduling. According to this definition, debt sustainability is when debt service payments are consistently made by borrowers without significant changes to the borrower's income or spending patterns. According to Mohammadi et al. (2007), debt sustainability happens when a government can settle its debt and the intertemporal budget constraint is met. The debt to GDP ratio, debt to exports ratio, government debt to current fiscal revenue ratio, share of foreign debt to total debt stock, percentage of short-term debt to total debt stock, and share of concessional debt to total debt stock are among the first set of debt sustainability indicators (IMF, 2000). Debt service as a percentage of GDP, government debt service as a percentage of current fiscal revenue, and external debt service as a percentage of exports are included in the second category of measurements.

The second set of indicators is more useful for warning of potential debt service issues and drawing attention to the consequences of intertemporal trade-offs resulting from prior borrowing decisions, as they focus on the country's immediate need for cash to meet its debt service commitments. The third set of forward-looking indicators (Muhanji & Ojah, 2011) includes the average interest rate on outstanding debt as a percentage of nominal GDP growth, which shows how the debt load will change over time. By Ajayi's (1991) and Imimole et al.'s (2014) research, we assessed Uganda's debt sustainability using the debt-to-export ratio.

Primary balance and debt sustainability

When net interest payments on public debt are subtracted from the fiscal balance, we get the primary balance. Simply said, the primary balance is the total of a government's revenue minus its expenditures on public goods and services (capital & capital, 2019). The fiscal balance of a country is its ability to cover its expenses with tax receipts. It's a visual representation of the extent to which annual revenues are sufficient to meet annual expenditures. When government spending exceeds tax receipts, a fiscal deficit results, and vice versa when a budget surplus occurs (Zeb *et al*., 2022). The primary balance represents the government's finances after deducting net interest payments on the debt. (Shankar & Trivedi, 2023).

Stated differently, the primary balance is the total of a government's tax income and the expenses incurred in delivering public services. A primary deficit occurs when a country's outlays for essential public services exceed its tax receipts. The government will have to take out loans because of this (Wray, 2019).

As an illustration, by 2009, the average OECD country had a general government budget balance of -8.7% of GDP, all attributable to the Great Recession of 2007-2008. The deficits continued to shrink over the next few years, averaging -3.2 percent of GDP this year. Budget deficits increased in all 26 OECD member nations in 2020 compared to the previous year, and 18 of these countries had deficits bigger than -5% of GDP. Governments were able to raise spending substantially on healthcare, income support, and other programs to help individuals and businesses in the wake of the COVID-19 crisis because of the resulting budget deficits. The forcible closure of various economic operations led to a decline in economic activity and tax revenue, contributing to a widening deficit. To wit: (Dauti & Elezi, 2022). The United Kingdom had the largest fiscal deficit (-12.3% of GDP) in 2020 among the 26 OECD countries for which data was available, while Denmark had the smallest deficit (-1.1% of GDP). Denmark was able to provide significant fiscal help while keeping a minor deficit since it had the second-largest fiscal surplus in the OECD at the onset of the crisis. Norway had the largest budget surplus of any country when the crisis hit. For example, Canada's fiscal balance worsened by 11.2% of GDP while Sweden's was just -3.7% (Debaere, 2023) of GDP.

Long-term deficit spending leads to an increase in the national debt since interest payments on borrowed funds must be paid back with interest paid to the public (Reis, 2022). Prolonged fiscal deficits cause the government to borrow money regularly, which drives up the deficit. This is due to the company's commitment to making interest payments on its existing debt. If the government borrows more money than expected, it will have to pay more in interest, which could raise the budget deficit (Mwankemwa & Luvanda, 2022). Without special financial support or by default, a government with a persistent budget deficit is doomed to be unable to fulfill its debt in the long run (Deheri & Nag, 2022).

According to data comparing Sub-Saharan Africa's budget balance to GDP between 2017 and 2021, with predictions through 2027, the region's budget deficit in 2021 amounted to about 5.12% of GDP (Malla & Pathranarakul, 2022). Average growth in Africa's external debt was 4.3%, bringing the total stock to $591 billion, excluding South Africa's contribution. Senegal and Cote D'Ivoire are only two examples of countries whose external debt is expected to increase by double digits in the next years (Agyeman, Sakyi & Oteng-Abayie, 2022). Long-term economic growth has been negatively impacted by debt loads in many African countries, leading to slower GDP growth, lower assets from investment and profits or capital formation, and higher tax rates in the affected nations to raise more revenue to pay off the debts (Manasseh *et al*., 2022).

Recent analyses on debt sustainability from the IMF and the Ministry of Finance suggest that while Uganda's debt is currently sustainable, there is a slight chance that it will become unsustainable in the medium and long run (Mageto, 2022). Uganda's fiscal deficit increased from 9.9 trillion shillings in the fiscal year 2019–20 to 13.5 trillion shillings in the fiscal year 2020–21, while the country's current account balance (as a percentage of GDP) was -8.8% in 2021. Uganda's current account balance (as a percentage of GDP) decreased continuously from 2002 to 2021, reaching -8.8% in that year, despite notable changes in earlier years. Uganda's debt to GDP was 46.32% in 2020 (Mageto, 2022).

Real effective exchange rate and debt sustainability

The real effective exchange rate can be found by subtracting the price deflator or cost index from the nominal effective exchange rate. The nominal effective exchange rate is the value of a currency relative to a basket of other currencies (Thuy & Thuy, 2019). When the real effective exchange rate increases, trade competitiveness decreases since there are greater export costs and lower import costs as a result (Boubakri et al., 2019). A country must see a decline in import prices and an increase in export prices to become less trade competitive due to an increase in its real effective exchange rate (Tran, 2022).

Using a co-integration test and dynamic OLS, Greenidge et al. (2010) investigated the factors impacting external debt in the Caribbean Community. They found that export, foreign debt, and the real effective exchange rate (REER) were negatively correlated. Export and GDP indicate a positive correlation with debt sustainability, per Kiptoo's (2012) review of the factors influencing Kenya's foreign debt sustainability. The analysis also shows a significant inverse relationship between foreign debt and debt sustainability. Mahmood et al. (2009) investigated Pakistan's debt sustainability using a number of techniques, including the debt-to-export ratio. Their results suggest that interest rates have less of an impact than the fiscal deficit.

In the debt accumulation experiments carried out in Nigeria by Ajayi (2000) and Uganda by Barungi and Atingi (2000), external effects were investigated. The study's findings demonstrate that these countries' real effective exchange rate (REER) and terms of trade (TOT) significantly affect their foreign debt. Loser (2004) discovered that the relative economic efficiency ratio, total outstanding debt, interest rate, and fiscal deficit are all indications of how sustainable external debt is in low- and middle-income countries. The primary causes of external debt, according to Bader and Magableh's (2009) examination of the variables influencing Jordan's foreign debt buildup, were the budget deficit, the overall amount of external debt, and the saving gap. REER was the most important factor affecting the total amount of external debt.

The study conducted by Awan et al. (2011) investigated the correlation between the terms of trade, exchange rate, and fiscal deficit of Pakistan and its external debt. This analysis demonstrates that the previously mentioned explanatory variables and foreign debt have a strong long-term link. Similarly, trade openness, the nominal currency rate, and the budget deficit were found to be significant predictors of Pakistan's external debt in a recent study by Awan et al. (2015). According to Pyeman et al. (2014), Malaysia's foreign debt was significantly influenced by exports, GDP, and foreign direct investment. Co-integration analysis was utilized by Imimole et al. (2014) to investigate the factors that support and compromise Nigeria's ability to pay back its foreign debt. They found that while there is an inverse link between the total amount of external debt and the ratio of external debt to GDP, this relationship is not statistically significant. Ajayi's (1991) regression analysis shows a negative correlation between Nigeria's debt-to-export ratio, the state of the government's finances, the deceleration of income growth in developed countries, and the increase in real interest rates worldwide. Additionally, he found concrete evidence that Nigeria's falling terms of trade were the reason behind the country's rising debt-to-export ratio.

Real GDP and debt sustainability

Economic growth can be influenced by a wide range of circumstances, and the factors influencing national economies have been the subject of numerous studies (Batrancea et al., 2022; Alagidede & Ibrahim, 2017). On the other hand, a high level of indebtedness impedes economic progress (Herndon *et al*., 2014). Debt sustainability studies and analyses are plentiful, and the reasons that cause debt levels to fluctuate have been thoroughly researched. Piscetek (2019) finds that the main balance is a significant contributor to altering debt levels, whereas other drivers, such as interest-growth difference and currency rate, have a more muted effect. However, studies also demonstrate that financial limitations improve the micro-financial performance of businesses (Batrancea et al., 2021). This is nevertheless true even in cases where macroeconomic analysis shows that countries are becoming more indebted because of financial difficulties. Nonetheless, budgetary pressure also significantly affects publicly traded companies' short- and long-term financial health (Batrancea, 2021). Debt dynamics may be impacted by the production gap and the requirement for large stock-flow adjustments to finance social and political expenditures (Mupunga & Le Roux, 2016). D'Erasmo and Mendoza (2016) found that changes in the interest rate, currency rate, inflation, and economic growth rate characterized the debt dynamics in a panel analysis using data from 117 nations. The dynamics of debt in most African countries are significantly impacted by differences in interest rate growth (Ncube & Brixiová, 2015).

The first is able to calculate a country's debt-to-GDP ratio by dividing its total debt by its GDP. According to Thullah (2023), analysts use economic production as a substitute for the debt-to-GDP ratio when assessing a nation's ability to repay debt. A high ratio of national debt to GDP is undesirable since it increases the chance of default. According to World Bank research (Liu, 2023) economic development will be negatively impacted by an extended ratio greater than 77%. A high debt-to-GDP ratio, in Song and Zhou's opinion (2020), increases the possibility and risk of a country's default, which could destabilize domestic and international financial markets.

Due to persistent economic stagnation and demographic problems, Japan currently has the highest debt-to-GDP ratio in the world. The debt-to-GDP ratio was 221.32% at the start of 2023. It has been shown (Tsigaris *et al*., 2023), that.... In 2021, Japan's national government had a gross debt equal to 263% of GDP. Borrowing may appear affordable so long as the average return is close to zero, but this is no longer sustainable as Japan lags behind the rest of the globe in monetary tightening. Among African countries, Eritrea has the highest debt-to-GDP ratio, at 175.1% of GDP. Owusu-Nantwi, S., & Owusu-Nantwi, S. (2023). The deputy governor of the Bank of Uganda, Michael Atingi-Ego, reported to the parliament's Finance Committee in November 2022 that the

national debt had reached 80 trillion shillings by the end of September 2022, equal to about 50% of GDP. This is the year 2023 (Serumaga, 2023).

A rise in deficit expenditure that generates rapid near-term inflation is one long-term concern posed by a high debt percentage to GDP. It will be more difficult for the country to pay off its debts because of these variables leading to higher interest rates, slower revenue growth, and a minor but increased danger of a fiscal catastrophe (Liu, 2023).

Uganda's state debt is manageable in the medium term, with the impending execution of fiscal reduction measures and the winding down of crisis measures. Uganda faces a moderate danger of an external and general public debt crisis due to the country's limited ability to absorb shocks. However, stress testing highlights deviations from the norm for public debt and external debt load, especially in light of export shocks. Uganda, in particular, has limited buffer space because even a moderate shock could force the country to fail to meet its external debt servicing objectives. In 2023 (Bulime & Nakato), they predict. Therefore, GDP expansion in Uganda is required for debt-to-GDP reduction. According to the economic assessment, Uganda has the potential to generate up to 23% of GDP annually by implementing tax reforms to eliminate leakages, broadening the tax base by focusing on hard-to-reach economic activity, and increasing the effectiveness of its revenue administration systems. Additionally, by doing this, the debt-to-GDP ratio would decrease and become somewhat more manageable.

Trade openness and debt sustainability.

Increased economic and political relations between countries lead to the facilitation of cross-border commerce and economic activity, which is known as trade openness. These countries are linked by the free movement of labor and capital, as well as by global financial and economic exchanges (Igudia, 2004). The findings show that increased commerce opens opportunities for investment and growth. Two trade policies that impact economic growth are the real effective exchange rate and the average weighted tariff rate (Chhabra et al., 2023).

Kim (2011) shows that whereas developing countries suffer from trade openness, industrialized nations gain from it in terms of real income growth and economic expansion. The real impact of trade is also influenced by inflation and the degree of financial growth. Trade liberalization has a detrimental effect on economic growth in countries with poor financial systems and minimal effect on countries with strong financial systems. Trade openness encourages economic growth in nations with low inflation; it does not affect those with high inflation. Kim, Lin, and Suen (2012) claim that whereas trade has the opposite effect in countries with these attributes, it promotes economic growth in those with high incomes, low rates of inflation, and little to no agricultural exports.

The European Union (EU) is one of the most trade-friendly regions of the globe because of its relatively low import levies. In 2019, over 63% of EU imports were duty-free, according to Eurostat research. As of 2023, the European Union (EU) had signed 29 FTAs with a total of 40 countries and territories (Mtar & Belazreg). The average level of trade openness among African countries in 2018 was 74%, based on data from 49 different nations. Sudan had the lowest percentage, at 1.3%, while Djibouti had the highest at 300.4%. Kelbore (2015), and Namahoro *et al*., (2023). From what we can tell, Uganda's trade openness peaked at 41.92% in 2021 (Esaku, 2021). More trade openness will increase economic activity and raise GDP, which will lower and more manageably raise the percentage of debt compared to GDP (Biemudo et al., 2022).

Debt sustainability analysis has been the subject of a number of research in addition to the literature on debt dynamics (Ghosh *et al*., 2013). Most of these studies use a stochastic analysis of debt and the fiscal reaction function. Pakistan's debt is extensively assessed, however most of the research to date has focused on either the causes of debt growth or its long-term viability. Various major components are identified in the available research as causes of debt increase or reduction.

The primary deficit and ER fluctuations were determined to be the main factors of debt accumulation in Pakistan by Bilquees (2003) and Chandia and Javid (2013). Awan *et al*., (2011), provide additional evidence in support of these results. However, the authors of this study indicate that Pakistan's trade openness has an additional effect on the country's debt load. In contrast, Akram's (2011) studies suggest that economic growth

and stability have a favorable impact on lowering debt levels. Pakistan's debt levels are generally considered to be unsustainable or poorly sustainable in the research on debt sustainability that makes use of the fiscal reaction function (Chandia *et al*., 2019). While these studies don't focus on predicting or forecasting the sustainability of public debt, Naveed and Islam (2022) do and they find that Pakistan's debt is unsustainable for the 2019–2025 projection period.

Some research has indicated a negative association between trade openness and debt sustainability (Babatunde, 2017; Eris & Ulasan, 2013), even though there is empirical evidence of a favorable relationship between the two. Increased levels of trade openness, say Solomon and Tukur, (2019)), may be detrimental to economic growth due to the uncertainty it introduces into the economy and the accompanying fluctuations in the exchange rate and inflation. Malefane and Odhiambo (2019) researched the impact of increased commerce on Lesotho's debt-servicing capacity. Regardless of the trade openness proxy used, trade has no discernible effect on debt sustainability over the long run, according to the scholars cited above.

Real effective interest rate and debt sustainability

As assessed by the GDP deflator, the real interest rate is the lending interest rate adjusted for inflation. However, comparing lending rates between countries is difficult because of the varying terms and circumstances that come with them. To calculate the GDP deflator, the International Monetary Fund (IMF) uses data from the World Bank. According to Reis,(2022), a real interest rate is an interest rate that more accurately represents the cost of borrowing and lending money by considering the effects of inflation on the value of money.

As reported in an IMF working paper (2020), many nations have experienced a negative difference between the implicit interest rate on government debt and nominal GDP growth since the 2008 financial crisis. In light of the recent dramatic increases in interest rates seen in many countries, the results suggested that it may become increasingly difficult for less developed nations to repay their obligations without also increasing the amount of principal owed on such loans.

The existing body of empirical evidence analysis has generally indicated that rising real interest rates on borrowed funds in emerging nations have an adverse effect on the sustainability of debt. (Ahmed & Maarouf, 2021) examined the process via which debt negatively affects this industry and verified how real interest rates affect the sustainability of debt for a sample of 99 developing countries. They were able to do this by figuring out that interest rates had three different ways of transmitting their influence on debt sustainability. These include the interest rate's impact on a debt's repayment capacity, the cost of debt servicing, and the debt's indirect impact on public spending and deficits. The study's conclusions suggest that both economic growth and the sustainability of debt are negatively impacted by rising interest rates. In a related study, published in 2004, Patillo et al. used a growth accounting model on a sample of 61 developing countries and discovered that lending rates, physical capital per capita, and total factor productivity all slowed down by almost one percentage point as the average level of external debt increased.

3. Methodology

Research Design; A hybrid research design, which incorporates aspects of both longitudinal and causal connection research designs, is used in this study. Time series data have been created by compiling Uganda's annual statistics from 1988 to 2022. Time series data regression techniques have been used to analyze these data sets.

Data Type and Data Sources: Secondary data from the Uganda Bureau of Statistics is used in this study. Because the data is set up in a time series format, time series data analysis methods can be applied to the analysis. The significance of analyzing time series data is crucial, as it serves a fundamental role in extracting valuable insights from temporal information (Lim et al., 2021).

Model specification, data and estimation procedures

Theoretical framework

In this study, the public debt dynamics model developed by Mupunga and Le Roux (2016) provides the theoretical framework for analyzing the variables connected to Uganda's debt sustainability. The model links changes in real GDP, real effective interest rate, real GDP, real exchange rate, and economic openness, among other important macroeconomic variables, to changes in the total public debt as a proportion of GDP. According to the model, these variables include the primary determinants of a nation's debt dynamics, including exchange rate risk, fiscal health, borrowing costs, and trade performance.
The model can be expressed as follows:

$DSt = \beta 0 + \beta 1\ PBt + \beta 2\ REERt + \beta 3\ RGDPt + \beta 4\ EXRt + \beta 5\ OPENt + \varepsilon t$ ……………. (1)

where RGDPt represents real GDP, REERt stands for real effective interest rate, PBt stands for primary balance, DSt stands for a shift in the overall national debt relative to gross domestic product, and OPENt stands for transparency of the economy.

Description of the variables and model estimation

The government's financial situation is gauged by the primary balance, which does not include interest payments on outstanding debt. A fiscal surplus is indicated by a positive primary balance, and a fiscal deficit is indicated by a negative primary balance. While a fiscal deficit can raise it, a fiscal surplus can lower the percentage of debt on a nation's growth. Therefore, the expected sign of β1 is negative.

The actual effective interest rate, which takes inflation and fluctuating currency rates into account, is what the government must pay to borrow money. Growing real effective interest rates imply higher debt servicing costs, which could push up the percentage of debt on a nation's growth. Therefore, the expected sign of β2 is positive. The country's economic growth is gauged by the real GDP, which has two ways of influencing the debt-to-GDP ratio. On the one hand, faster economic development can lower the percentage of debt on a nation's growth by raising government revenue and lowering the demand for borrowing. Higher economic growth, however, may also result in a greater demand for public goods and services as well as increased pressure on the government to spend more money, which could increase the debt-to-GDP ratio. Therefore, the expected sign of β3 is ambiguous.

The relative costs of local and imported commodities are determined by the actual exchange rate, which has two possible effects on the percentage of debt on a nation's growth. By raising the value of the external debt to local currency, a decline in the real exchange rate may influence the percentage of debt on a nation's growth. A decline in the real exchange rate can lower the percentage of debt on a nation's growth while simultaneously making local exporters more competitive and lowering the trade deficit. Therefore, the expected sign of β4 is ambiguous.

An economy's level of integration with the global market is gauged by its level of openness, which can affect the percentage of debt on a nation's growth in two ways. Increasing transparency can help reduce the debt-to-GDP ratio by making it easier to get outside funding and foreign currency. Openness, however, can also make a country more vulnerable to external shocks and increase the volatility of capital flows, which could increase the debt-to-GDP ratio. Therefore, the expected sign of β5 is ambiguous.

Model estimation

In addition, the model was further extended by additional openness of the economy as suggested by Bandiera and Tsiropoulos (2020) and now the model is specified as;

$nDS_t = \beta_0 + \beta_1 InPB_t + \beta_2 InREER_t + \beta_3 InRGDP_t + \beta_4 InEXR_t + \beta_5 InOPEN_t + \varepsilon_t$ ………………………………. (2)

Whereby;
It represents the natural log
B_0 represents the constant
B_1 to B_5 represent the parameters of the independent variables
OPE is the openness of the economy

Model 3 was estimated in ARDL form as

$$\Delta DS_t = \beta_0 + \beta_1 DS_{t-1} + \beta_2 PB_{t-1} + \beta_3 REER_{t-1} + \beta_4 RGDP_{t-1} + \beta_5 EXR_{t-1} + \beta_6 OPEN_{t-1} \sum_{P=0}^{n1} \theta 1\ \Delta DS_{t-p} + \sum_{P=1}^{n2} \theta 2\ \Delta PB_{t-p} + \sum_{P=0}^{n3} \theta 3\ \Delta REER_{t-p} + \sum_{P=0}^{n4} \theta 4\ \Delta RGDP_{t-p} + \sum_{P=0}^{n5} \theta 5\ \Delta EXR_{t-p} + \sum_{P=0}^{n6} \theta 6\ \Delta OPEN_{t-p} + \varepsilon_1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (3)$$

Table 1: Data type and source

Variable	Definition	Source
Debt sustainability	The total amount of state debt relative to GDP	Bank of Uganda
Primary balance as a percentage of GDP	The primary balance refers to the discrepancy between the government's revenue collection and its outlays for public goods and services.	Bank of Uganda
Real GDP	A macroeconomic metric that accounts for inflation and assesses the worth of the products and services generated by an economy over a given time frame	World Bank
Real effective interest rates	The real interest rate is the loan rate after inflation is taken into account and the GDP deflator is used to calculate it.	Bank of Uganda
Real effective exchange rate	A price deflator or cost index can be used to divide the real effective exchange rate, which determines a currency's worth in reference to a weighted average of many foreign currencies.	IMF
Openness of the economy	The extent to which imports and exports, or nondomestic transactions, occur and impact a country's economy's size and growth	World Bank

4. Empirical Results and Discussion

Descriptive analysis

The study employed data from the period in which there were no missing values. A general description of the data's properties was given through the summarization of descriptive statistics. By doing this, it was possible to guarantee that the data was suitable for estimation and would not yield inaccurate findings. To be more specific, a calculation was done to compile the mean, minimum, maximum, and standard deviation values.

Table 2: Summary of study variables

Variable	Mean	Standard Deviation	Minimum	Maximum
DEBT	46.4326	27.95301	14.79281	141.1539
Primary Balance	.0976023	3.649355	-5.223994	13.40504
Real Interest Rate	5.112639	21.04402	-53.44	23
GDP growth rate	6.085	2.403918	.39	11.52
Real Effective Exchange Rate	153.7923	108.6067	91.73405	511.0456
Current Account Balance	-885,000,000	997,000,000	-3,550,000,000	49,200,000

Observations for all variables = 36. Source: Researcher's computation using secondary data

The analysis presents descriptive statistics for six variables—DEBT, PB, REER, GDP, REXR, and CAB—that are associated with Uganda's debt sustainability. The variables' varying averages, standard deviations, minimums, and maximums, which represent the various degrees of data variability and dispersion, are shown by the findings. The variable DEBT exhibits the greatest mean and biggest range, indicating a high and heterogeneous degree of debt in Uganda. The variable PB has the lowest mean and a wide range, implying a low and variable level of fiscal surplus in Uganda. The variable REER has a moderate mean and a relatively narrow range, indicating a moderate and stable level of borrowing cost in Uganda. The variable GDP has a high mean and a reasonable range, suggesting a high and well-behaved level of economic growth in Uganda. The variable REXR

has a high mean and a large range, indicating a high and diverse level of exchange rate risk in Uganda. The variable CAB has a negative mean and a large range, implying a negative and dispersed level of trade balance in Uganda. The results also show that the variables were log-transformed to deal with outliers. A general observation that can be derived from these statistics is that Uganda faces significant challenges and risks for its debt sustainability and stability, as it has a high and increasing percentage of debt on a nation's growth, a low and variable fiscal surplus, a high and diverse exchange rate risk, and a negative and dispersed trade balance.

Pre estimation diagnostics

Unit Root Tests

The Augmented Dickey-Fuller (ADF) test, one of the stationarity tests most frequently used in academic literature, was employed in the study's subsequent stationarity tests on model variables. By testing the null hypothesis, the ADF test seeks to ascertain if a unit root exists in a given time series sample. If the test statistic (t-statistic) within the ADF is smaller than the corresponding crucial value at the 5% significance level, the null hypothesis cannot be rejected. Throughout the investigation, both the original discrepancies and the variable's unit roots were looked for.

Table 3: ADF test results

	ADF		
Variables	**Levels**	**First difference**	**Integration**
DEBT	-2.451	-3.089**	I(1)
Primary Balance	-0.212	-6.651***	I(1)
Real Interest Rate	-3.172**	-	I(0)
GDP growth rate	-7.847***	-	I(0)
Real Effective Exchange Rate	-4.471***	-	I(0)
Current Account Balance	-4.873***	-	I(0)

Source: Researcher's computation using secondary data

According to the above table's unit root test results, the levels of debt and main balance are non-stationary. As a result, one-time differencing must be used to change them into stationary values. The other variables are in a state of hovering stationary. According to the results, there are varying degrees of stationarity among the variables that should be included in the model.

Cointegration test

Given that some of the study variables were discovered to be non-stationary at levels but became stationary only after differencing them one time, it indicates that they could possess long-run relationships. The characteristic of variables having a long-run relationship is known as cointegration. Therefore, the presence of cointegration among the study variables needs to be confirmed. To find this long-term association, the study used the limits test for cointegration within the Auto Regressive Distributed Lag framework.

The null hypothesis, which asserts that there is no cointegration between the variables, is investigated using the limits test. The null hypothesis is rejected if the computed F and t-statistics are greater than the tabulated critical values at the upper and lower limits at all significance levels; if not, it cannot be rejected. The results of the test are displayed in Table 4 below.

Table 4: ARDL bounds test results

Wald statistics: F = 7.814. t = -4.140

	10%		5%		1%		P-values	
	I(0)	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**	**I(0)**	**I(1)**
F	2.525	3.930	3.094	4.719	4.516	6.671	0.000	**0.004**
t	-2.482	-3.792	-2.866	-4.259	-3.664	-5.230	0.004	**0.060**
Decision	r		.		.			

H0: no level relationship. Source: Researcher's computation using secondary data

The results of the cointegration test using the Pesaran, Shin and Smith (2001) bounds test in the table reveal that the calculated Wald statistics, with F = 7.814 and t = -4.140, were compared against critical values at different levels of significance (10%, 5%, and 1%). The F-test produced a noteworthy outcome, as the computed F-statistic exceeded all critical values, and the associated p-value was 0.000, providing compelling evidence to reject the null hypothesis of no cointegration (I(0)). Conversely, the t-test exhibited mixed outcomes, with the t-statistic falling below the critical values at the 1% and 5% significance levels but surpassing the critical value at the 10% level. At the 1% significance level, the null hypothesis—that there is no cointegration—was further refuted by the p-value of 0.004. As a result, the research concluded that cointegration between the variables occurs at the 10% significance level, indicating a sustained association between them.

The test for multicollinearity

When an independent variable in a multiple regression equation has a strong correlation with one or more other independent variables, it presents an econometric challenge known as multicollinearity. A model's ability to account for multicollinearity weakens the impacted variables' statistical significance. This study evaluated the variance inflation factor (VIF) for each independent variable after creating a correlation matrix between them to test for multicollinearity. The following is an indication of the outcomes;

Table 5: Test for multicollinearity

	1	2	3	4	5	6
DEBT (1)	1.0000					
Primary Balance (2)	0.2865	1.0000				
Real Interest Rate (3)	-0.2621	0.0119	1.0000			
GDP growth rate (4)	0.0393	-0.2335	0.2987	1.0000		
Real Effective Exchange Rate (5)	0.4275*	0.0019	**-0.8060***	-0.2654	1.0000	
Current Account Balance (6)	0.1271	-0.1024	0.0336	0.0353	0.0013	1.0000

* Indicates significance at 0.05 level. All variables are in log form. Source: Researcher's computation using secondary data

The correlation analysis was conducted as a preliminary step toward testing for multicollinearity among the variables in the dataset. The results show generally weak correlations among most variables, which is reassuring as it suggests that multicollinearity may not be a significant concern in the regression model. Nonetheless, the Real Effective Exchange Rate and the Real Interest Rate have a significant negative connection (-0.8060). This implies that the two variables have a strong linear relationship. Further research is required because higher multicollinearity between the Real Effective Exchange Rate and the Real Interest Rate may have an impact on the precision and consistency of the model's coefficient computations. The Variance Inflation Factor (VIF) analysis was used to make sure the regression model was stable and comprehensible as well as to give a more thorough knowledge of the relationships between the variables. This allowed for a thorough assessment of the presence and impact of multicollinearity.

Table 6: VIF Results

Variable	VIF	1/VIF
Real Interest Rate	2.94	0.340054
Real Effective Exchange Rate	2.87	0.348715
GDP growth rate	1.17	0.853153
Primary Balance	1.08	0.928673
Current Account Balance	1.01	0.985791
Mean VIF	**1.81**	

All variables are logged. Source: Researcher's computation using secondary data

The Variance Inflation Factor (VIF) results show that all independent variables in the model have VIF values below 5. This suggests that the variables do not significantly exhibit multicollinearity. Generally, VIF values above 10 are considered indicative of severe multicollinearity, but in this case, all variables have VIF values

well below these thresholds. The mean VIF value of 1.81 further supports the observation of minimal multicollinearity. As a result, the regression model is not adversely affected by multicollinearity, and the coefficient estimates for the independent variables can be reliably interpreted. The relatively low VIF values imply that the independent variables contribute independently to explaining the variance in the dependent variable, and the model can be considered stable for further analysis and inference.

Model estimation

Given the mixed nature of stationarity of the model variables and the short time series that this study used, the ARDL model was identified as the best estimation technique because it is very prominent in scenarios of small samples where data is characteristic of mixed orders of integration. Enkoro (2016) claims that the main benefit of the ARDL approach is that, with the right augmentation, it can overcome endogeneity and serial correlation issues. For the model variables, two lags were the ideal lag duration. Before creating the final ARDL model's error correction form, this was established using the ARDL framework. The table below displays the ARDL model's results in error correction form.

Table 7: Results of the estimated ARDL model

Dependent Variable: **D.(Debt to GDP)**			
Independent Variables	**Coefficient.**	**Std. Error**	**P>|t|**
ADJ $Debt_{L1}$	-0.2046304***	.0494267	0.000
	Long Run		
Primary Balance	0.155486*	0.0787306	0.062
Real Interest Rate	0.29198***	0.1007568	0.009
GDP growth	0.251906	0.2977203	0.407
Real Effective Exchange Rate	1.949161***	0.4930953	0.001
Current Account Balance	-0.0772669**	0.034031	0.034
	Short run		
$Debt_{t-1}$	0.3946573***	0.1084379	0.002
D(Real interest rate)	-0.0162872	0.0152704	0.298
Real interest $rate_{t-1}$	-0.0317295**	0.0115002	0.012
D(Real Effective Exchange Rate)	-0.5245274**	0.2256006	0.030
D(Current Account Balance)	0.0169105***	0.0038951	0.000
Current Account $Balance_{-1}$	0.0099788***	0.0028474	0.002
Constant	-1.679549***	0.4635137	0.002
R-squared = 0.8677			
Adj R-squared = 0.7920			
Root MSE = 0.0958			
A number of obs. = 34			
Log-likelihood = 39.695046			
Sample: 1988 - 2021			
ARDL(2,0,2,0,1,2) regression			

Notes: D = First difference in variable. ***, **, * At the 1%, 5%, and 10% levels, respectively, indicate significance. Source: ARDL computation by the researcher utilizing secondary data

The ARDL findings presented in the table above reveal that, in the short run, the debt-to-GDP ratio from the previous year positively impacts the current debt level. Specifically, a percentage increase in debt from the previous year results in a 0.39 percentage increase in the current debt, and vice versa, all else being constant. This effect is significant at the 1% level, indicating strong evidence of persistence in the percentage of debt to a country's growth.

On the other hand, although this benefit only becomes noticeable after a year, the real interest rate has a short-term negative effect on debt. The amount of debt decreases by precisely 0.03 percentage points for every percentage increase in the real interest rate over a year. A percentage increase in the real interest rate is

correlated with a 0.29 percentage increase in the quantity of debt, but with time, this effect grows and turns positive.

The data also demonstrate that, when all other factors are held constant, the actual effective exchange rate has a short-term negative influence on debt, with an average 0.52 percentage decrease in debt for every percentage increase in the exchange rate. Over time, though, this effect increases and becomes positive; a one percent increase in the exchange rate corresponds to a 1.95 percent increase in debt.

There is a positive short-term correlation between debt and current account balance: for every percentage increase in current account balance, debt for the current period increases by 0.169 percentage points. A percentage increase in the current account balance after a year causes the debt to increase by 0.0099788 percentage points. The fact that a percentage rise in the current balance lowers the debt level by 0.77 causes this initially beneficial influence to gradually turn negative.

Furthermore, the findings show that the primary balance has a positive long-term impact on debt levels; for example, a percentage increase in the primary balance results in a 0.155 percentage increase in debt. At a 10% level, this effect is marginally significant. In contrast, GDP growth is only found to positively impact debt in a non-significant way over the long term. The constant term in the model (-1.679549) is negative and significant, signifying that the debt level in Uganda would be negative in the absence of the specified independent variables.

Post-estimation diagnostic tests

After estimating the model, the study proceeded to carry out further diagnostic tests to determine that there were no common econometric problems.

Serial correlation test

The Breusch-Godfrey LM test for serial correlation was used in the investigation. *There is no serial correlation*, which is the null hypothesis for this test. The null hypothesis is rejected if the corresponding chi-square value is not significant at the 5% threshold of significance. The study found that the B-Godfrey test's chi-square value (0.462) was not significant at the 5% level. Therefore, it was not possible to rule out the null hypothesis. Consequently, the analysis concluded that serial correlation did not pose a problem for the model. The results are presented in 4.8 below

Heteroscedasticity test

The Breusch-Pagan test was used in the study to determine whether heteroscedasticity was present. In this test, the absence of heteroscedasticity is the null hypothesis. The null hypothesis cannot be rejected if the test's chi-square result is not significant at the 5% level of significance; if it is, it is. The chi-square value (0.30) in this investigation was found to be non-significant at the 5% level. Thus, the null hypothesis of the test could not be rejected. The research concluded that the computed model did not exhibit heteroscedasticity. The results are displayed in Table 8 below.

Table 8: Serial correlation and Heteroscedasticity test results

Test	lags(p)	Chi(2)	df	Prob.
B-Godfrey test	1	0.462	1	0.4966
Breusch-Pagan		0.30		0.5835

Source: Researcher's computation using secondary data

Test for Normality of Residuals

The Skewness and kurtosis test for Normality was utilized in the study to verify if the residuals in the model had a normal distribution. *Normalcy is the test's null hypothesis.* The null hypothesis cannot be rejected if the chi-square value, skewness, and kurtosis values are not significant at the 5% significance level. If not, it is rejected. The outcomes are shown in Table 9 below.

Table 9: Skewness & Kurtosis tests for Normality results

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
r	36	0.0694	0.6840	3.74	0.1539

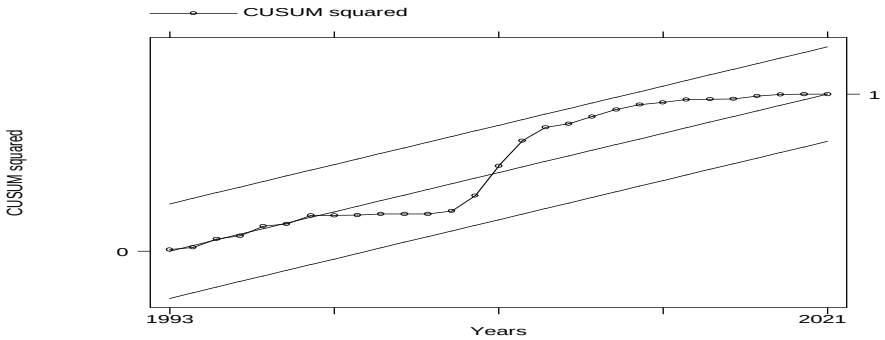
Ho: Normality. Source: Researcher's computation using secondary data

The results indicate both the skewness and kurtosis tests for the residuals suggest that the data is approximately normally distributed. The non-significant p-values for both tests indicate that the data's skewness and kurtosis are not significantly different from those of a normal distribution. As a result, these tests do not provide compelling evidence to refute the model's residuals' assumption of normalcy.

Test for Model Stability

The study tested to confirm whether the estimated model was stable. The Cumulative Sum (CUSUM) test was used. This test is based on recursive regression residuals plotted against possible break points in the model within critical bounds of 5% significance. The model is stable if the CUSUM of residuals falls within the 5% critical bounds. The test results are represented in the form of a graph in the figure below

Figure 1: The CUSUM graph



The CUSUM graph indicates that the dotted line (the cumulative sum of residuals) entirely falls within the upper and lower critical bounds over the tested study period (1993-2021). The study thus concluded that the estimated model is stable.

Discussion

Effect of primary balance on debt in Uganda

The hypothesis posits a positive relationship, and the ARDL model results support this, revealing a positive coefficient of 0.1554868 in the long run. This shows that, under the assumption that other variables stay constant, an increase in "Primary Balance" causes a corresponding rise in "Debt to GDP," and vice versa. The results indicate a correlation between an elevated percentage of debt on a country's growth and a larger primary balance, which indicates government revenue exceeding expenditures. Conversely, a negative primary balance (deficit) signals excessive government spending relative to revenue, resulting in higher borrowing and, consequently, a heightened percentage of debt on a country's growth.

In the Ugandan context, the positive relationship is attributed to persistent budget deficits, reliance on a few sectors vulnerable to global shocks, and the need for substantial funding for economic growth and development initiatives. Additionally, inefficiencies in public financial management and weak revenue mobilization further contribute to challenges in maintaining fiscal sustainability and managing public debt dynamics effectively.

Effect of real interest rate on debt in Uganda

The second objective of the study is to look at the relationship—if any—between real interest rates and Uganda's debt sustainability, assuming that one is negatively correlated. The ARDL model's long-term results, however, show a positive coefficient of 0.2919845, indicating a positive correlation between "Real Interest Rate" and "Debt to GDP." Put another, the "Debt to GDP" ratio rises by roughly 0.292 units for every unit increase in the "Real Interest Rate," assuming no other variables change. The reasons behind the observed

positive connection can be explained by the mechanisms of debt financing in Uganda. The government will pay more to repay its debt if the "Real Interest Rate" rises. As borrowing costs rise, the government must pay more interest on its outstanding debt, which means a bigger portion of the GDP is now going toward debt repayment. As a result, an increase in the "Real Interest Rate" is accompanied by a larger "Debt to GDP" ratio.

There is further nuance in the relationship between "Real Interest Rate" and "Debt to GDP" due to macroeconomic factors and monetary policy. Whether in response to inflation or to attract foreign investment, central banks' hikes in interest rates can impact changes in the "Debt to GDP" ratio and the cost of borrowing for the government. The analysis indicates that over the long run, a larger "Debt to GDP" ratio is associated with a higher "Real Interest Rate". This is because greater debt payment expenses accumulate over time and short-term interest rate changes immediately impact the situation.

Effect of GDP growth rate on debt in Uganda

The third objective of the research was to determine how Uganda's GDP growth affected its debt, with the corresponding hypothesis being that GDP growth improves Uganda's ability to sustain its debt. As per the findings of the ARDL model, the non-significant coefficient implies that there is no statistically significant correlation between "Debt to GDP" and "GDP Growth Rate" over an extended period. In particular, the coefficient value of 0.2519068 indicates that, under the assumption that all other independent variables remain constant, an increase of one unit in the "GDP Growth Rate" is linked to an increase of roughly 0.252 units in the "Debt-to-GDP ratio. Likewise, a one-unit decline in the "GDP Growth Rate" corresponds to a 0.252-unit decline in the "Debt-to-GDP ratio.

The lack of statistical significance suggests that "The GDP Growth Rate" may not be a major long-term predictor of changes in the "Debt-to-GDP ratio in the Ugandan context. The non-significant coefficient implies that variables other than the "GDP Growth Rate" may be more important in determining Uganda's debt levels, including borrowing decisions, fiscal policies, and external economic shocks.

Effect of real effective exchange rate on debt in Uganda

The fourth goal of the study was to ascertain how Uganda's debt was impacted by GDP growth, with the underlying hypothesis being that GDP growth increases the nation's capacity to service its debt. The ARDL model results show that there is a positive long-term correlation between "Debt to GDP" and "Real Effective Exchange Rate". An increase in the "Real Effective Exchange Rate" is linked to a significant increase in the "Debt-to-GDP ratio, while a decrease in the exchange rate is linked to a significant decrease in the debt ratio, according to the coefficient of 1.949161, which is statistically significant at the 1% level (p-value = 0.001). The long-run effect emphasizes how the dynamics of the country's debt are still influenced by the real effective exchange rate.

A negative coefficient indicates that short-term changes in the real effective exchange rate have a negative influence on the "Debt to GDP" ratio in the present period while all other variables are held constant. Put otherwise, for every unit increase in the short-term shift of the real effective exchange rate, the "Debt to GDP" ratio falls, and vice versa.

The findings suggest that changes in the real effective exchange rate are influenced by the dynamics of the country's debt in both the short and long term. With time, a higher debt-to-GDP ratio is associated with a higher real effective exchange rate. This relationship may be caused by a number of factors, including decreased export competitiveness or currency appreciation that results in higher debt obligations denominated in foreign currencies. In the short run, fluctuations in the exchange rate can exert immediate downward pressure on the debt ratio, potentially affecting debt repayment and financial stability in the short term.

Effect of openness on debt in Uganda

The study's fifth objective was to determine how GDP growth affected Uganda's debt, and its related hypothesis was that *openness has a positive effect on Uganda's debt sustainability*. The economic openness was measured using the current account balance.

The negative coefficient in the ARDL model results indicates an inverse association between the "Current Account Balance" and the "Debt to GDP" ratio. More specifically, for every unit rise in the current account balance, the "Debt to GDP" ratio decreases by approximately 0.077 when all other variables are unchanged. On the other hand, the debt ratio increases by about 0.077 for every unit decrease in the current account balance. This inverse association suggests that a current account surplus—which happens when a country's exports exceed its imports—is associated with a lower debt-to-GDP ratio. Conversely, a higher debt-to-GDP ratio is linked to a current account deficit, which happens when imports are higher than exports. This pattern can be explained by the way that a nation's net trade position and capacity to fund its expenses and investments are reflected in its current account balance.

A current account surplus provides additional financial resources to the country, which can be used to repay existing debt, invest in productive activities, or build reserves. This, in turn, contributes to a lower debt-to-GDP ratio. On the other hand, a current account deficit implies a need for external financing to cover the shortfall, which may lead to increased borrowing and higher debt levels relative to the size of the economy, resulting in a higher debt-to-GDP ratio.

We observe a shift in the direction of the link between the debt-to-GDP ratio and the current account balance when comparing the long- and short-term effects. Both historically and currently, it has been shown that there is a short-term association between a higher current account balance and a higher debt-to-GDP ratio. On the other hand, consistent current account surpluses are linked to debt levels that gradually decline in GDP. This shift in the relationship between the short- and long-term effects implies that while sustained improvements in the trade balance over time can contribute to a more significant reduction in the debt burden, short-term fluctuations in the current account balance may have temporary implications for the debt dynamics.

5. Conclusions from the study

Primary Balance demonstrates a statistically significant and positive coefficient in the long run. This finding suggests that maintaining a fiscal surplus and sound fiscal management can contribute to reducing the "Debt to GDP" ratio, indicating the crucial role of prudent fiscal policies in managing debt levels over time.

The "Real Interest Rate" exhibits a highly significant and positive coefficient in the long run and therefore reveals that higher real interest rates are associated with increased indebtedness relative to GDP. Policymakers should be mindful of the impact of rising interest costs on government debt, which can escalate the debt burden and hinder long-term debt sustainability.

While "GDP growth" shows a positive effect in the long run, it is not statistically significant suggesting that GDP growth may not have a substantial impact on the "Debt to GDP" ratio in the context of Uganda. In the long run, the "Real Effective Exchange Rate" shows a highly significant and positive coefficient, suggesting a correlation between increased debt about GDP and a decline in the real effective exchange rate. Exchange rate swings have an impact on debt payment costs and overall debt sustainability, which policymakers need to take into account. In the long run, the "Current Account Balance" shows a statistically significant and negative coefficient that emphasizes the role that trade balances play in determining the dynamics of debt. Long-term current account deficits may result in greater debt, although sustained surpluses might help lower the "Debt to GDP" ratio.

Policy Recommendations

Given the significant impact of the "Primary Balance" on the "Debt-to-GDP ratio in the long run, policymakers should prioritize maintaining a fiscal surplus and prudent fiscal management. Implementing measures to enhance revenue generation, control government expenditures, and reduce budget deficits can contribute to reducing the debt burden and ensuring long-term debt sustainability. Long-term fiscal discipline and responsible fiscal policies are essential for maintaining a healthy debt-to-GDP ratio.

The substantial effect of the "Real Interest Rate" on the debt dynamics highlights the importance of interest rate management in debt sustainability. Policymakers should carefully monitor and manage interest rates to avoid significant increases in borrowing costs. Implementing measures to stabilize interest rates and promote

monetary policies that strike a balance between economic growth and inflation control can help mitigate the negative impact of high-interest rates on government debt.

Although "GDP growth" does not show a statistically significant effect on the "Debt to GDP" ratio, it remains a critical factor for overall economic development. Policymakers should continue to prioritize policies that stimulate economic growth and productivity. Sustained efforts to improve the business environment, enhance infrastructure, and invest in human capital can foster economic expansion, which indirectly contributes to debt sustainability by increasing the capacity to service debt.

The observation that rising debt levels relative to GDP are associated with a drop in the "Real Effective Exchange Rate" should be noted by policymakers. To mitigate the effects of exchange rate volatility on debt levels, it is prudent to practice conservative foreign exchange management and exchange rate stability. One way to lessen the risks associated with exchange rate volatility is to diversify your sources of income and reduce your reliance on debt denominated in foreign currencies.

The importance of trade balances in debt sustainability is highlighted by the "Current Account Balance" major impact on debt dynamics. Policymakers should strive to achieve and maintain current account surpluses, as they contribute to reducing the "Debt to GDP" ratio over time. Encouraging export-led growth strategies, promoting domestic industries, and implementing policies that enhance competitiveness in international markets can all support efforts to achieve sustainable trade balances.

Limitations and areas recommended for further research

Sample Size and Period: The findings' generalizability may be constrained by the study's dependence on a comparatively small sample size of 34 observations spanning the years 1988 to 2021. An extended period and a more extensive dataset may offer a more thorough comprehension of the connections between the variables and the dynamics of debt. Additionally, the inclusion of more recent data may capture the effects of recent economic events and policy changes.

Endogeneity and Omitted Variables: The ARDL regression approach assumes that the independent variables are exogenous, but in reality, there may be endogeneity issues where the variables affect each other. Omitted variables that are not accounted for in the model could also bias the results. Future studies could address endogeneity issues and find potential missing variables that could affect debt dynamics by utilizing sophisticated econometric techniques like panel data models or instrumental variable estimates.

Country-Specific Context: The study's analysis is based on data from a specific country (not mentioned in the provided table). As a result, the findings may be influenced by the unique economic, political, and institutional characteristics of that country. Therefore, caution should be exercised when applying the results to other countries or regions. Comparative studies across multiple countries could provide valuable insights into the generalizability of the observed relationships.

References

Agyeman, G., Sakyi, D., & Oteng-Abayie, E. F. (2022). External debt and economic growth in selected sub-Saharan African countries: The role of capital flight. *Research in Globalization*, *5*, 100091.https://halshs.archives-ouvertes.fr/halshs-03280083/document

Ahmed, O., & Maarouf, A. (2021). La dette publique extérieure de Djibouti: Soutenabilité et impact sur la croissance économique.

Ajayi, S and Khan,J (2000), External debt and capital flight in sub-Saharan Africa, pp: 93–2

Ajayi, S. (1991). Macroeconomic Approach to External Debt: The Case of Nigeria. AERC Paper, No. 8.

Akram, N. (2011). Impact of Public Debt on the economic growth of Pakistan. The Pakistan Development Review, 599-615.

Alagidede, P., & Ibrahim, M. (2017). On the causes and effects of exchange rate volatility on economic growth: Evidence from Ghana. *Journal of African Business*, *18*(2), 169-193.

Atta-Mensah, J., & Ibrahim, M. (2020). Explaining Africa's debt: The journey so far and the arithmetic of the policymaker. Theoretical Economics Letters, 10(2), 409-441.

Awan, A., Asghar, N., & Rehman, H. (2011). The impact of the exchange rate, fiscal deficit and terms of trade on the external debt of Pakistan. Australian Journal of Business and Management Research, 1(3), 10-24.

Awan, R., Anjum, A., Rahim, S. (2015). An econometric analysis of determinants of external debt in Pakistan. British Journal of Economics, Management and Trade, 5(4), 382391.

Babatunde, M. A. (2017). Trade openness and inflation in Nigeria: A nonlinear ARDL analysis. *Journal of economics and sustainable development*, *8*(24), 129-148.

Bader, M. & Magableh, K. (2009). An inquiry into the main determinants of public debt in Jordan: An econometric study. Dirasat Administrative Sciences, Vol. 36(1), 181-190.

Bahmani-Oskooee M, Mohammadian A (2017) Asymmetry effects of exchange rate changes on domestic production in Japan. Int Rev Appl Econ 31(6):774–790

Bank of Uganda. (2022). Annual Report 2020/2021

Barungi, B., & Atingi, M. (2000). Growth and foreign debt: The Ugandan experience. In Ajayi, & Khan (Eds.), External debt and capital flight in sub-Saharan Africa, pp: 93–127.

Batrancea, L. (2021). An econometric approach regarding the impact of fiscal pressure on equilibrium: Evidence from electricity, gas and oil companies listed on the New York Stock Exchange. Mathematics, 9(6), 630.

Batrancea, L., Rathnaswamy, M. K., & Batrancea, I. (2022). A panel data analysis on determinants of economic growth in seven non-BCBS Countries. Journal of the Knowledge Economy, 13(2), 1651-1665.

Batrancea, L., Rathnaswamy, M. M., & Batrancea, I. (2021). A panel data analysis of economic growth determinants in 34 African countries. *Journal of Risk and Financial Management*, *14*(6), 260.

Biemudo, K., Antonio, R., & Agustin, N. A. J. (2022). An empirical analysis of the impact of international trade on Philippine economic growth. Journal of Economics, Finance and Accounting Studies, 4(1), 607-628.

Bilquees, F. (2003). An analysis of budget deficits, debt accumulation, and debt instability. The Pakistan Development Review, 177-195.

Boubakri, S., Guillaumin, C., & Silanine, A. (2019). Non-linear relationship between real commodity price volatility and real effective exchange rate: The case of commodity-exporting countries. Journal of Macroeconomics, 60, 212-228.

Bulime, E. W., & Nakato, L. (2023). Fiscal rules: challenges and lessons during the COVID-19 crisis in Uganda.

Capital, E., & Capital, E. (2019). Barbados. Exotix Developing Markets Guide: Debt and Risk across the Frontier, 103-119.

Chandia, K. E., & Javid, A. Y. (2013). An analysis of debt sustainability in the economy of Pakistan. Procedia Economics and Finance, 5, 133-142.

Chandia, K. E., Riaz, S., Javid, A. Y., Iqbal, M. B., Azam, M., & Gul, I. (2019). Assessment of public and external debt sustainability using debt dynamics equation approach: a comparative study of Pakistan and India. Millennial Asia, 10(1), 25-55.

Chhabra, M., Giri, A. K., & Kumar, A. (2023). What Shapes Economic Growth in BRICS? Exploring the Role of Institutional Quality and Trade Openness. Economic Papers: A journal of applied economics and policy.

Cirolia, L. R. (2020). Fractured fiscal authority and fragmented infrastructures: Financing sustainable urban development in Sub-Saharan Africa. Habitat International, 104, 102233

Das, S. (2023). Fiscal consolidation. In Elgar Encyclopaedia of Post-Keynesian Economics (pp. 177-179). Edward Elgar Publishing Limited.

Dauti, B., & Elezi, S. (2022). Economic growth in the Central East European Union and the Western Balkan countries in the course of the Stability and Growth Pact and COVID-19. Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu, 40(1), 29-61.

Debaere., P. (2023) The European Union and the Coronavirus: What Did it Learn from the Great Recession?

Debrun, X., Ostry, J. D., Willems, T., & Wyplosz, C. (2019). Debt Sustainability. Sovereign debt: A guide for economists and practitioners, 151.

Deheri, A., & Nag, A. (2022). Assessing the Long-Run Sustainability of Public Debt and Fiscal Deficit in India. Global Journal of Emerging Market Economies, 09749101221113881.

D'Erasmo, P., & Mendoza, E. G. (2016). *Optimal domestic (and external) sovereign default* (No. w22509). National Bureau of Economic Research.

Eriș, M. N., & Ulașan, B. (2013). Trade openness and economic growth: Bayesian model averaging estimate of cross-country growth regressions. *Economic Modelling*, *33*, 867-883.

Esaku, S. (2021). The long-and short-run relationship between the shadow economy and trade openness in Uganda. Cogent Economics & Finance, 9(1), 1930886.

Ghosh, A. R., Kim, J. I., Mendoza, E. G., Ostry, J. D., & Qureshi, M. S. (2013). Fiscal fatigue, fiscal space and debt sustainability in advanced economies. The Economic Journal, 123(566), F4-F30.

Greenidge, K., Drakes, L., & Craigwell, R. (2010). The external public debt in the Caribbean community. Journal of Policy Modelling, Vol (32), 418-431.

Herndon, T., Ash, M., & Pollin, R. (2014). Does high public debt consistently stifle economic growth? A critique of Reinhart and Rogoff. Cambridge journal of economics, 38(2), 257-279.

Igudia, P. O. (2004). Trade openness, investment and economic growth in Nigeria. African Economic and Business Review, 2(1), 1-15.

IMF (2000). Debt and reserve-related indicators of external vulnerability. IMF policy department paper, Washington DC: IMF.

IMF (2020). Consultation-Debt sustainability analysis. Available

Imimole, B., Ehikioya, L., & Okhuese, M. (2014). Determinants and Sustainability of External Debt in a Deregulated Economy: A Cointegration Analysis from Nigeria (1986-2010). American International Journal of Contemporary Research, Vol. 4(6), 201-214.

International Monetary Fund Annual Report (2018). Building a Shared Future.

International Monetary Fund (IMF) working paper (2020).

Kelbore, Z. G. (2015). Trade openness, structural transformation, and poverty reduction: empirical evidence from Africa.

Kim, D. H. (2011). Trade, growth and income. *The Journal of International Trade & Economic Development*, *20*(5), 677-709.

Kim, D. H., Lin, S. C., & Suen, Y. B. (2012). The simultaneous evolution of economic growth, financial development, and trade openness. *The Journal of International Trade & Economic Development*, *21*(4), 513-537.

Kiptoo, Ch. (2012). The Determinants of Kenya's External Debt Sustainability. A Management Research Project submitted in partial fulfilment of the requirement for the award of the Degree of Masters in Business Administration (MBA), School of Business, University of Nairobi, Kenya.

Lim, B., Arık, S. Ö., Loeff, N., & Pfister, T. (2021). Temporal fusion transformers for interpretable multi-horizon time series forecasting. *International Journal of Forecasting*, *37*(4), 1748-1764.

Liu, Y. (2023). Government debt and risk premia. Journal of Monetary Economics.

Loser, C. M. (2004). *External debt sustainability: guidelines for low-and middle-income countries* (Vol. 26). UN.

Mageto, W. K. (2022). Resolving The Debt Sustainability Issues from A Legal and Institutional Perspective: A Focus On East Africa. Financing For Development, 1(4).

Mahmood, T., Rauf, S. A., & Ahmad, H. K. (2009). Public and external debt sustainability in Pakistan (1970s—2000s). *Pakistan Economic and Social Review*, 243-267.Malefane, M. R., & Odhiambo, N. M. (2021). Trade openness and economic growth: empirical evidence from Lesotho. *Global Business Review*, *22*(5), 1103-1119.

Malla, M. H., & Pathranarakul, P. (2022). The Fiscal and Institutional Effects on Income Inequality: An Empirical Analysis (Doctoral Dissertation, National Institute of Development Administration).

Manasseh, C. O., Abada, F. C., Okiche, E. L., Okanya, O., Nwakoby, I. C., Offu, P., ... & Nwonye, N. G. (2022). External debt and economic growth in Sub-Saharan Africa: Does governance matter? Plos one, 17(3), e0264082.

Ministry of Finance, Planning and Economic Development Annual Report (2022)

Ministry of Finance, Planning and Economic Development Annual Report (2022).

Mohammadi , L., & Tsiropoulos, V. (2020). A framework to assess debt sustainability under the Belt and Road Initiative. Journal of Development Economics, 146, 102495.

Mohammadi, H, Çak, M, & Çak, D. (2007). Capital Mobility and Foreign Debt Sustainability:

Mtar, K., & Belazreg, W. (2023). On the nexus of innovation, trade openness, financial development and economic growth in European countries: New perspective from a GMM panel VAR approach. International Journal of Finance & Economics, 28(1), 766-791.

Muhanji, S. & Ojah, K. (2011). Management and sustainability of external debt: A focus on the emerging economies of Africa. Review of Development Finance, 1, 184–206.

Mupunga, N., & Le Roux, P. (2016). Analyzing the theoretical and empirical foundations of public debt dynamics in Zimbabwe. Studies in Economics and Econometrics, 40(1), 95-118.

Mwankemwa, L. P., & Luvanda, E. (2022). Fiscal Deficit and its Threshold Effects on Inflation in Tanzania. African Journal of Economic Review, 10(1), 191-208.

Namahoro, J. P., Qiaosheng, W., & Hui, S. (2023). Economic growth, natural resource rents, and business openness nexus in regions and income levels of Africa: evidence from recent panel estimators. Mineral Economics, 1-16.

Naveed, S., & Islam, T. U. (2022). An empirical investigation of determinants & sustainability of public debt in Pakistan. Plos one, 17(9), e0275266.

Ncube, M., & Brixiová, Z. (2015). Public debt sustainability in Africa: Building resilience and challenges ahead. Development Policy Review, 33(5), 555-580.

Owusu-Nantwi, V., & Owusu-Nantwi, G. (2023). Public debt, corruption and shadow economy in Africa: an empirical analysis. Journal of Economic and Administrative Sciences, 39(1), 184-

Pattillo, C. A., Poirson, H., & Ricci, L. A. (2004). What are the channels through which external debt affects growth?

Pesaran M. Shin Y. 1999 An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis, Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium. Chapter 11, Cambridge University Press, Cambridge. https://doi:10.12691/jfe-4-6-4

Piscetek, M. (2019). Public debt dynamics in New Zealand (No. 19/01). New Zealand Treasury Working Paper.

Probst, B., Westermann, L., Anadón, L. D., & Kontoleon, A. (2021). Leveraging private investment to expand renewable power generation: Evidence on financial additionality and productivity gains from Uganda. World Development, 140, 105347.

Pyeman, J., Noor, N., Mohamad, W., & Yahya, A. (2014). Factors Affecting External Debt in Malaysia: An Empirical Investigation. Proceedings of the first AAGBS International Conference on Business Management; 2014.

Reis, R. (2022). Debt Revenue and the Sustainability of Public Debt. *Journal of Economic Perspectives*, 36(4), 103-24.

Reis, R. (2022). Steady Prices, Sustainable Debt. *Finance and Development*, *59*(1), 16-19.

Serumaga, M. (2023). The case for repudiation of Uganda's public debt–CADTM.202.

Shankar, S., & Trivedi, P. (2023). Assessing India's fiscal sustainability considering debt–deficit and financing dynamics. *Indian Economic Review*, 1-30.

Solomon, O. I., & Tukur, M. U. (2019). Trade openness and economic growth in the developing countries: evidence from Nigeria. *International Journal of Academic Research in Economics and Management Sciences*, *8*(3), 30-42.

Song, L., & Zhou, Y. (2020). The COVID-19 pandemic and its impact on the global economy: what does it take to turn crisis into opportunity? China & World Economy, 28(4), 1-25.

Thullah, J. A. (2023). Rising Debt Burden and Its Impact on the Implementation of Three (3) Sustainable Development Goals in the Commonwealth African Member Countries (2016-2022). *Journal of World Economic Research*, *12*(1), 1-18.

Thuy, V. N. T., & Thuy, D. T. T. (2019). The impact of exchange rate volatility on exports in Vietnam: A bounds testing approach. Journal of Risk and Financial Management, 12(1), 6.

Tran, V. (2022). Examine the effects of real effective exchange rates on export growth: A closer look into Asian Developing Economies. In Proceedings of the Jepson Undergraduate Conference on International Economics (Vol. 4, No. 1, p. 2).

Tsigaris, P., Teixeira da Silva, J. A., & Honma, M. (2023). The impact of COVID-19 on Japan's economic outlook. Available at SSRN 4372146.

World Bank. (2020). *Poverty and shared prosperity 2020: Reversals of fortune*. The World Bank.

Wray, L. R. (2019). Alternative paths to modern money theory. real-world economics review, 89(1), 5-22.

Wyplosz, C. (2011). Debt sustainability assessment: Mission impossible. Review of Economics and Institutions, 2(3), 37.

Zeb, B. Z. B., Devi, A. D. D. A., & Soomro, J. A. S. J. A. (2022). The Nexus between Fiscal Deficit, Exchange Rate, Export & Economic Growth: A study on Pakistan's Economic perspective. *Periodicals of Management* Studies, 2(2), 25-43.