Effect of debt-to-GDP ratio on economic stability in Kenya

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ABSTRACT

Kenya's rising debt-to-Gross Domestic Product ratio poses a significant threat to its economic stability. Since surpassing the International Monetary Fund's 50% sustainability threshold in 2015, the ratio has continued to climb, reaching 70% by mid-2024. This trend, driven by growing borrowing costs, external shocks, and constrained fiscal space, has weakened investor confidence and increased refinancing risks. This study therefore sought to examine the effect of debt-to-Gross Domestic Product ratio on economic stability in Kenya. The study was anchored on sustainable debt theory. The study adopted a causal research design. Secondary time-series data was used in the present study and was collected by use of a data collection checklist. Data on debt-to-Gross Domestic Product ratio and economic stability was obtained from the Central Bank of Kenya, Kenya National Bureau of Statistics (KNBS) and The World Bank. Analysis of the quantitative data was based on descriptive and inferential statistics. Descriptive statistics focused on computation of mean, percentage, standard deviation and frequencies. Inferential statistics included correlation analysis and multivariate regression analysis. Diagnostic tests were performed to test for the regression model assumptions before carrying out regression analysis. The regression analysis indicates that the model explains approximately 72.40% of the variation in Kenya's economic stability, with an F-statistic of 11.7121 (p=0.0408), confirming its overall significance. The results reveal a significant negative relationship between debt-to-Gross Domestic Product ratio and economic stability, with a coefficient of -1.64891 (p=0.014), suggesting that a one-unit increase in debt-to-Gross Domestic Product ratio reduces economic stability by about 1.65 units. These findings support the hypothesis that higher debt levels adversely affect economic stability in Kenya. Therefore, the study recommends strengthening fiscal management, enhancing domestic revenue collection, maintaining a sustainable debt threshold, and prioritizing investments in high-return sectors such as infrastructure, healthcare, education, agriculture, and manufacturing.

Keywords: Debt-to-GDP Ratio, Economic Stability, Gross Domestic Product, Public Debt

I. INTRODUCTION

Sustainable development is based on the main pillar of economic stability that indicates the skills of the country to keep stable economic growth, low inflation, and the minimal volatility of finance. It is one of the major indicators of macroeconomic well-being, and it has a direct impact on the investment, employment, consumer trust, and general quality of living (Grytsenko, 2022). With a stable economy, the environment that both public and private sectors operate in is certain, and as such, they can operate, reducing uncertainty and having long-term planning. Such stability is usually attained by developed countries due to good fiscal and monetary policies, strong financial systems, and economies where one economy is diversified (Banna & Alam, 2023). On the contrary, most developing nations such as Kenya experience poor economic shocks and vulnerabilities that jeopardize economic stability.

In most instances, governments rely on the act of borrowing publicly so as to finance infrastructure development, health, education among other essential services, especially where the national revenues cannot match the levels of expenditure. Even though borrowing is a potential initiator of economic development but borrowed efforts having inordinate and improperly structured debt can cost too much in financial or economic terms. A relatively common indicator is the debt-to-GDP ratio, which is one of the most popular ratios to check the state of debt in a country. The indicator is used to compare the total amount of public debt to the gross domestic product (GDP) of a country giving an understanding of how well the government is capable of facing and repaying the debt regarding the size of the economy (Mehrotra & Sergeyev, 2021). They are, in the majority of cases, an indicator of a poor fiscal flexibility, a heavier burden of debt servicing and a possible incidence of macroeconomic turbulence.

A high or an increasing debt to GDP ratio indicates that the rate of debt increase is outpacing the growth of the economy, and this could inhibit investments in the productive sectors, raise inflation predilections, and instigate the

increase of taxes. Otherwise, these effects compromise the response capabilities of a government to either domestic and external shocks. On the other hand, a sustainable debt-to-GDP ratio can ensure stability as governments can still be able to finance their critical services and programs without risking the fiscal status. Economic stability is being chosen as the dependent variable in the proposed study and the latter is a broad term that defines the state where an economy is in a steady growth, low inflation rates and where there are minimal changes in outputs, interest rates, and employment rates. The highly stable economies are in a better position to meet the fiscal obligations, investments, and protect its population against poverty and inequality. Yusuf and Mohd (2021) state that economic stability plays a significant role in establishing investor confidence as well as facilitating long-term economic planning. Factors on which this concept is measured include indicators like inflation rates, currency stability, fiscal balance and growth consistency among others.

This research is based on a theoretical framework of Sustainable Debt Theory according to which the debt is manageable and not disrupting economic stability when economic growth, measured as a rate, is more significant than a rate of interest on the debt (Yuan, 2023). The resultant effect of such circumstances is that a growing economy has enough revenue to cover its debt burden without resourcing to austerity measures, excessive taxation and reduction of vital publicly funded amenities. This theory points out at the quality and purpose of the debt and not the mere amount of debt that is to determine its long-run sustainability. Debt may aid not obstruct macroeconomic stability and growth when this debt is utilized to fund productive investments that increase capacity in the economy.

In Kenya, the amount of money that the government owes to others in the form of debt has been on the rise in the last one decade thus raising the level of concern over its eternity and effects to the macro-economic stability. As indicated by the Kenya National Bureau of Statistics (2023), the debt-to-GDP ratio in the country has increased to 70 percent in 2023 as compared to 48 percent in 2013. This rapid rise has been powered by mass borrowing on infrastructure projects, budgetary support, and emergency action in response to the COVID-19 pandemic, and climate shocks. Although such outflow has immediate gains, increased debt service cost has impacted public resources, thus constraining investments to support other essential sectors, including healthcare and education (Njoroge, 2020). In addition, there is rising use of short-term, domestic borrowing and foreign debt in Kenya with susceptibility to an interest rate increase and exchange rates fluctuations. These developments create more fiscal risks and lower government capacity to use counter-cyclical policies when there is an economic recession. Consequently, the rising debts of the country can potentially jeopardise the economic stability of the nation.

Empirical literature represents both supporting and conflicting evidence on the issue of impact of the public debt on the stability of the economy. According to Reinhart and Rogoff (2010), there is a certain threshold (about 90percent) after which debt-to-GDP ratio affects growth and stability negatively. Brunnermeier and Sannikov (2020), however, point the relatively equal importance of debt structure, maturity, and use as its size in considering its impact on the economy. On the regional level, Chepkilot (2024) analyzed the influence of interests payable on external debt and discovered that the level of interest payment as a cost in the process of debt servicing devastatingly impairs the growth of the economy in Kenya, and this accumulates regarding the sustainability of the economy. Correspondingly, Mugo et al. (2021) evaluated the relationship between primary deficits in the budget and economic growth and stated that continuous fiscal deficits have detrimental impacts on the macroeconomic stability in Kenya. It is notable, though, that neither of the studies isolates the issue of the debt-to-GDP ratio on the specific impact of economic stability through modern data thus leaving their contributions confined to information of the larger fiscal environment. This paper aims at filling that gap by examining the issue of interest directly on the impact of debt-to-GDP ratio on the economic stability in Kenya.

As such, there is a gap in the literature with regard to the direct relationship that exists between a countries debt sustainability as shown by the debt-to-GDP ratio and economic stability in Kenya. Much of the literatures have been either addressing the issue of debt sustainability along the budget features, or addressed the issue of economic stability without incorporation of fiscal variables. Moreover, most of the studies done worldwide have failed to take into consideration some of the peculiarities of the developing economies like Kenya and their challenges of political risks, poor tax base as well as depending on concessional borrowing. This study sought to address this gap by empirically investigating how Kenya's rising debt-to-GDP ratio influences its overall economic stability. In the analysis, it used some economic indicators, and the relation was tested using regressions. This will offer policy relevant implications of whether the current level of borrowing in Kenya is sustainable or otherwise, and whether or not it leads to increased stability in the economy or macroeconomic instability.

1.1 Statement of the Problem

Kenya's economy has recorded impressive development in the last ten years but this development is being jeopardized by the presence of an ever-increasing fiscal instability associated with the growing debt to GDP ratio. The fiscal situation has been worsened by external shocks, which include the COVID-19 pandemic, the Russia-Ukraine conflict, inflationary pressures, and a depreciating currency (Central Bank of Kenya, 2023). The ratio of Kenya debt to GDP exceeded the 50 percent sustainability limit by the IMF in 2015, doubled to 56 percent in 2022, and rose to 70

percent in mid-2024 (Japan International Cooperation Agency, 2018; CBK, 2023). This trend is an upwards one with a decreasing investor confidence and worsening fiscal health. The debt burden has reduced the ability of the government to boost the economy, reduced the fiscal space, and exposed the nation to the high risks of refinancing. All these hamper the macroeconomic stability and the long run development of Kenya.

The rising debt-to-GDP ratio in Kenya also represents a shift in concessional borrowing to more costly commercial borrowing that exposes the economy to the risk of global interest rates as well as currency depreciation (Ndungu, 2023). This shift has increased the borrowing costs in Kenya and has exposed it to external shocks thereby reducing market confidence. Although fiscal reforms and revenue-generating measures have been put in place, they have not been adequate enough to offset the rising expenditure commitments and bulging debt. The potential effects of the growing ratio between the debt and GDP become even more threatening as bond yields are erratic and the availability of the capital markets is decreasing. In comparison, stable ratios have been achieved through the alignment of debt and productive investment and good financial governance by countries such as Rwanda and Botswana and fiscal crises in countries such as Zambia and Ghana have been caused by unsustainable debt pathways. Kenya is in the same position where the policy response is required to prevent the risk.

Although the level of debt to GDP ratio is crucial in determining the fiscal health, there is a little empirical evidence on how it directly influences the economic stability in Kenya particularly due to the recent economic shocks. Available literature tends to generalize public debt without decomposing the important measures like the debt-to-GDP ratio. As an example, Njoroge (2020) analyzed the public debt of Kenya through the use of the public debt-to-GDP ratio (GOVD) and the study period was between 1971 and 2018, therefore, failing to capture recent events like the COVID-19 crisis, volatility in exchange rate and borrowing patterns. Moreover, the paper failed to give a concentrated exploration of the effects of the increase in debt-to-GDP ratios on macroeconomic stability. Hence, this research paper will address this gap by looking at how the debt-to-GDP ratio has affected the Kenyan economy in terms of its stability during the period between 2014 and 2023, which has experienced unmatched fiscal and global economic shocks.

1.1 Research Objective

The objective of the study was to examine the effect of debt-to-Gross Domestic Product ratio on economic stability in Kenya.

II. LITERATURE REVIEW

2.1 Theoretical Review

The study was anchored on sustainable debt theory, which was developed by Evsey Domar in 1944. This theory posits that a government's debt can be considered sustainable as long as the economy grows at a rate that allows for manageable debt servicing without destabilizing the economy. According to Domar (1944), for debt to be sustainable, the growth rate of a country's Gross Domestic Product (GDP) should exceed the interest rate on its debt, ensuring that the economy's growth can keep pace with, or surpass, the costs associated with debt obligations (Yuan, 2023). This balance helps prevent excessive debt accumulation, supporting economic stability and long-term fiscal health (Brunnermeier & Sannikov, 2020). The theory underlines that sustainable debt policies require careful management of both public spending and revenue to foster growth while avoiding an unsustainable debt burden that could lead to fiscal crises.

The Sustainable Debt Theory assumes that a government can borrow without economic instability if certain conditions are met, including stable economic growth higher than the interest rate on debt, optimal public spending, and revenue generation. It also presupposes minimal external factors, like inflation or exchange rate fluctuations, affecting debt sustainability (Mehrotra & Sergeyev, 2021). Additionally, it assumes financial market confidence in fiscal management, ensuring affordable credit access. Critics argue that the theory oversimplifies the relationship between public debt and economic stability, particularly in developing economies like Kenya, where factors such as inflation, political instability, and global economic conditions are more pronounced (Yuan, 2023). Moreover, critics highlight the theory's neglect of the potential benefits of borrowing, such as financing infrastructure and fostering economic growth, which could improve debt management over time.

Sustainable debt theory was employed to explain the effect of the debt-to-GDP ratio on economic stability in Kenya. This theory posits that a government's debt is sustainable when it can meet its current and future debt service obligations without requiring debt relief, accumulating arrears, or compromising long-term economic growth. A manageable debt-to-GDP ratio reflects a country's ability to generate sufficient economic output to support its debt obligations, thus promoting macroeconomic stability, investor confidence, and fiscal space for development (Brunnermeier & Sannikov, 2020). Conversely, a high and rising debt-to-GDP ratio signals growing fiscal vulnerabilities, reduces investor trust, and increases the likelihood of default or reliance on expensive borrowing. In

Kenya's case, a sustained increase in the debt-to-GDP ratio threatens economic stability by straining public finances and limiting the government's capacity to respond to economic shocks.

2.1.1 Debt-To-GDP Ratio

The debt-to-GDP ratio measures the level of a country's public debt relative to its Gross Domestic Product (GDP). It is a critical indicator of public debt sustainability, as it provides insight into the country's ability to repay its debt without compromising economic growth (Fetai et al., 2020). A lower debt-to-GDP ratio suggests that a country has a manageable level of debt relative to its economic output, whereas a high ratio may indicate excessive debt levels, which could strain financial resources and limit the government's capacity to respond to economic challenges (Hu & Wong, 2021). A debt-to-GDP ratio is also used to assess the risk of debt distress, as it shows how easily a government can fulfill its debt obligations with its current economic productivity (Onyele & Nwadike, 2021).

For public debt sustainability, the debt-to-GDP ratio is particularly important because it helps determine the likelihood of debt repayment and future borrowing capacity (Ahmad et al., 2024). When the ratio rises above a certain threshold, the country may face increased borrowing costs, potentially affecting economic growth and financial stability. According to IMF guidelines, sustainability often depends on keeping the debt-to-GDP ratio within acceptable limits, typically adjusted according to a country's level of development and economic stability (Getinet & Ersumo, 2020). For example, a high debt-to-GDP ratio in developing economies may indicate vulnerability, as such economies have limited fiscal space and may face challenges in meeting debt obligations without sacrificing essential investments in public services and infrastructure.

2.1.2 Economic Stability

For a long duration of time, Kenya's economic growth has been inconsistent. Since 1960s there has been changes in economic growth, over the 1960s Kenya noticed increased rate of growth before the decline which took place in early 1970s and the mid-1970. The cut of the multilateral aid due to poor management between 1985 and 1992 resulted to decline in GDP together with agricultural problem (The World Bank, 2024). According to World Bank (2024), the average growth in GDP was 4 percent per annum from 1994 to 1996. Nevertheless, before the general elections in the year 1997; the economic growth became stagnant as a result of minimal economic activity and adverse weather conditions. In the year 1997, the IMF gave a three year suspension of lending to the government of Kenya due to the countries failure to meet the earlier commitment concerning governance reforms. Further structural adjustment credit worth $90million was put on hold by the World Bank (World Bank, 2024).

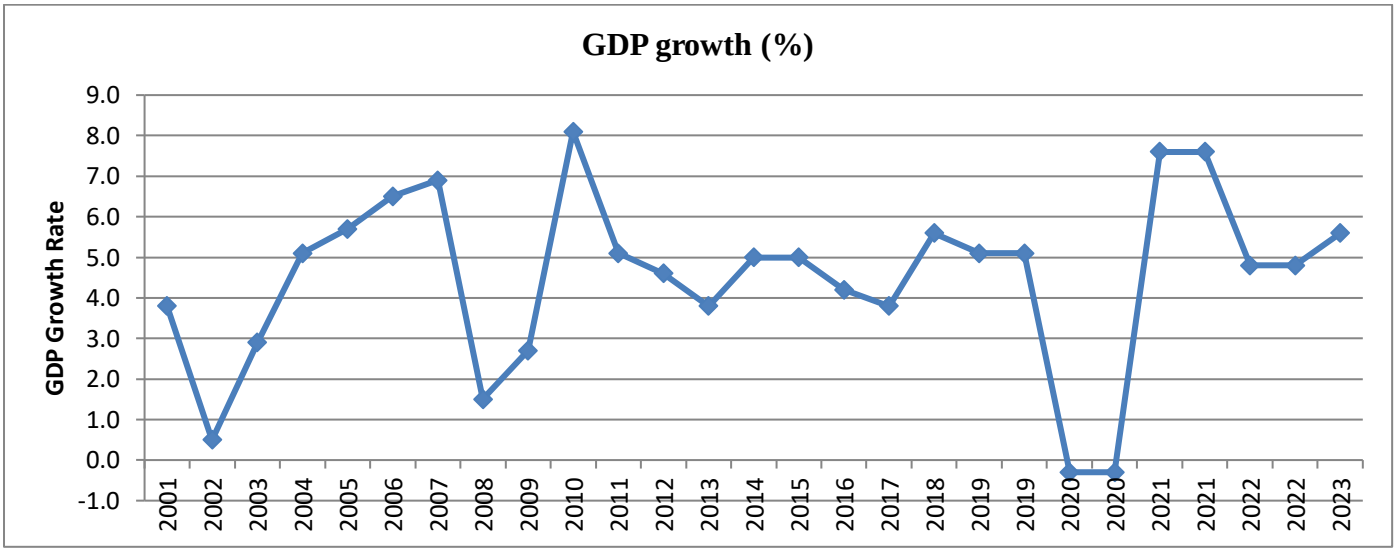

Figure 1

Trend of Economic Growth (2001-2023)

The dynamics of the performance of the Kenyan economy have been shown by the outcome of the annual average growth rate of the gross domestic product between 2001 and 2023. The early 2000s are presented with the time of economic hardship, as the growth rate of the GDP increased and decreased dramatically. Growth rate was very low in 2002 when it stood at 0.5%, but to show economic recovery it had increased once again by 2004 to stand at 5.1%. The same trend has been going higher with the growth rate hitting the high point of 8.1 percent in 2010 (Central Bank of Kenya, 2023). This growth can be explained by a number of factors and they include good governance, foreign investment and strong economic policies that put in place a favorable environment of growth. Nevertheless, the world

financial crisis and political unrest especially the post-election violence of 2007-2008 adversely affected the growth rate and plummeted to 1.5 percent in 2008.

Since 2011, the rate of growth slightly stabilized, varying between 3.8% and 5.1% in the period till 2018. In 2020, there was a sharp down turn with GDP growth rate of -0.3% probably as a result of the negative impact of the COVID 19 pandemic that halted economic operations all over the world. Nonetheless, the economy exhibited its fortitude displaying a robust recovery in 2021, which recorded a growth rate of 7.6 percent (Central Bank of Kenya, 2023). Such a rebound can be explained by the reduction of the pandemic-related restrictions as well as the adoption of economic recovery plans. A trend of gradual economic recovery is expected since the growth is stable in the following years at 5.6 percent in the year 2023. On the whole, the statistics indicate the ability of Kenya to resist financial difficulties and continue a line of growth in spite of temporary failures.

III. METHODOLOGY

The study adopted a descriptive and Causal research design. The study used secondary time-series data, covering the period between 2014 and 2023, which was obtained from the Central Bank of Kenya, Kenya National Bureau of Statistics (KNBS), and The World Bank. The quantitative data was collected, edited and coded into Statistical software known as STATA version 14, for statistical analysis. Analysis of the quantitative data will be based on descriptive and inferential statistics. Descriptive statistics focused on computation of mean, percentage, standard deviation and frequencies. Inferential statistics included correlation analysis and regression analysis. In this study, Ordinary least squares (OLS) regression was explained in bivariate model setting, that is, model where dependent study variable (Y) is predicted by a single independent study variable (X).

The regression model was as follows;

$$ES_t = \beta_0 + \beta_{1t} DRG_t + \varepsilon \quad \ldots\ldots (1)$$

EC_t is the dependent variable Economic Stability, B_0 is the y intercept (Constant), β_1 is the coefficients of determination, DRG is Debt-To-GDP Ratio, t represents time (2014-2023) and ε_t is an error term.

In this study, several diagnostic tests were conducted to ensure the validity of the regression model and adherence to underlying assumptions. These included tests for normality, autocorrelation, heteroscedasticity, linearity, multicollinearity, and stationarity. Normality was assessed using the Jarque-Bera test, skewness, and kurtosis, with acceptable thresholds set to determine if the data followed a normal distribution. Autocorrelation was tested using the Breusch-Godfrey test, which detects serial correlation in residuals. Heteroscedasticity was examined using the Cook-Weisberg and Breusch-Pagan tests to ensure constant variance in residuals. Linearity was visually assessed through scatter plots to confirm a linear relationship between variables. Multicollinearity was checked using the Variance Inflation Factor (VIF) to detect inter-variable correlations. Also, stationarity was tested using the Augmented Dickey-Fuller and Phillips-Perron unit root tests to confirm the stability of time series data over the study period.

IV. FINDINGS & DISCUSSION

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics for two key variables: Economic Stability (ES) and Debt-To-GDP Ratio (DGR). These statistics offer insight into the central tendencies, variability, and distribution patterns of the data between 2014 and 2023. Understanding the behavior of these indicators is crucial for assessing the macroeconomic effects of public debt levels in Kenya.

Table 1

Descriptive Statistics

Stats	ES	DGR
N	10	10
Min	-0.3	40.25559
Max	7.6	79.10352
Mean	4.69	54.1605
Sd	2.023995	12.72871

Between 2014 and 2023, Kenya's average annual GDP growth rate stood at 4.69%, with a standard deviation of 2.02, reflecting moderate economic fluctuations. The lowest growth rate of -0.3% was recorded during the COVID-19 pandemic, while the highest rate of 7.6% reflects periods of strong economic activity. Over the same period, the Debt-To-GDP Ratio averaged 54.16%, ranging from 40.26% to 79.10%, indicating a steady rise in public debt relative

to national output. This increase in the debt burden underscores growing fiscal challenges, which may constrain economic performance and limit future fiscal space if not effectively managed.

4.1.1 Economic Stability

Figure 2 illustrates the trend in Kenya's economic stability, measured by annual GDP growth rates, over the period 2014 to 2023. This visual representation helps identify fluctuations and patterns in economic performance, providing context for the analysis of debt dynamics.

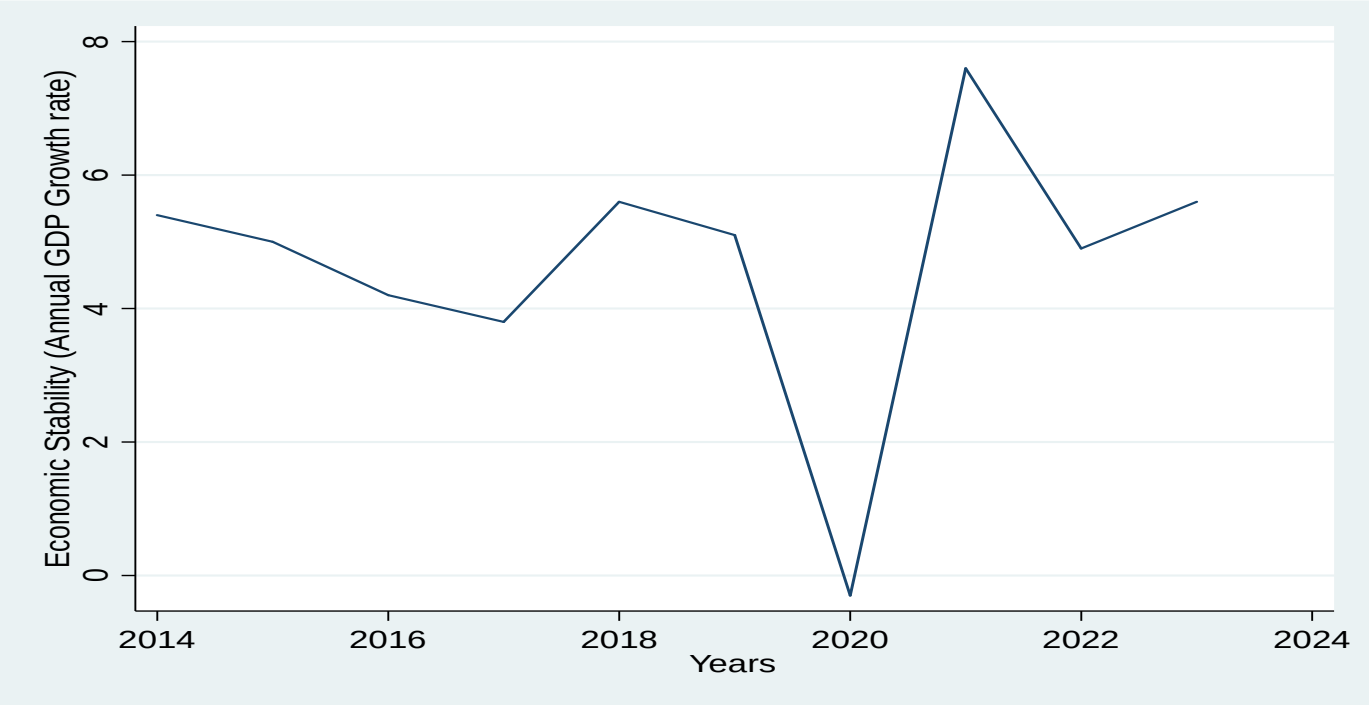

Figure 2
Trend Line Graph for Economic Stability

In addition, between 2014 and 2023, Kenya's average Debt-to-GDP ratio was 54.16%, with a standard deviation of 12.73, indicating significant variation in public debt relative to the country's GDP. The ratio ranged from 40.26% to 79.10%, showing that debt levels fluctuated considerably over the period. A higher Debt-to-GDP ratio suggests increased borrowing, which may have been driven by infrastructure development, public service funding, or budget deficit financing. However, sustained high debt levels can pose risks to economic stability, including increased debt servicing costs and potential difficulties in accessing further credit. Conversely, lower ratios indicate periods of more sustainable debt levels, possibly due to improved fiscal discipline or higher GDP growth (Central Bank of Kenya, 2023).

4.1.2 Debt to GDP Ratio

Figure 3 presents the trend in Kenya's Debt-to-GDP ratio over the period 2014 to 2023. The graph illustrates how the country's debt levels have evolved relative to its economic output, providing insights into the sustainability of public borrowing.

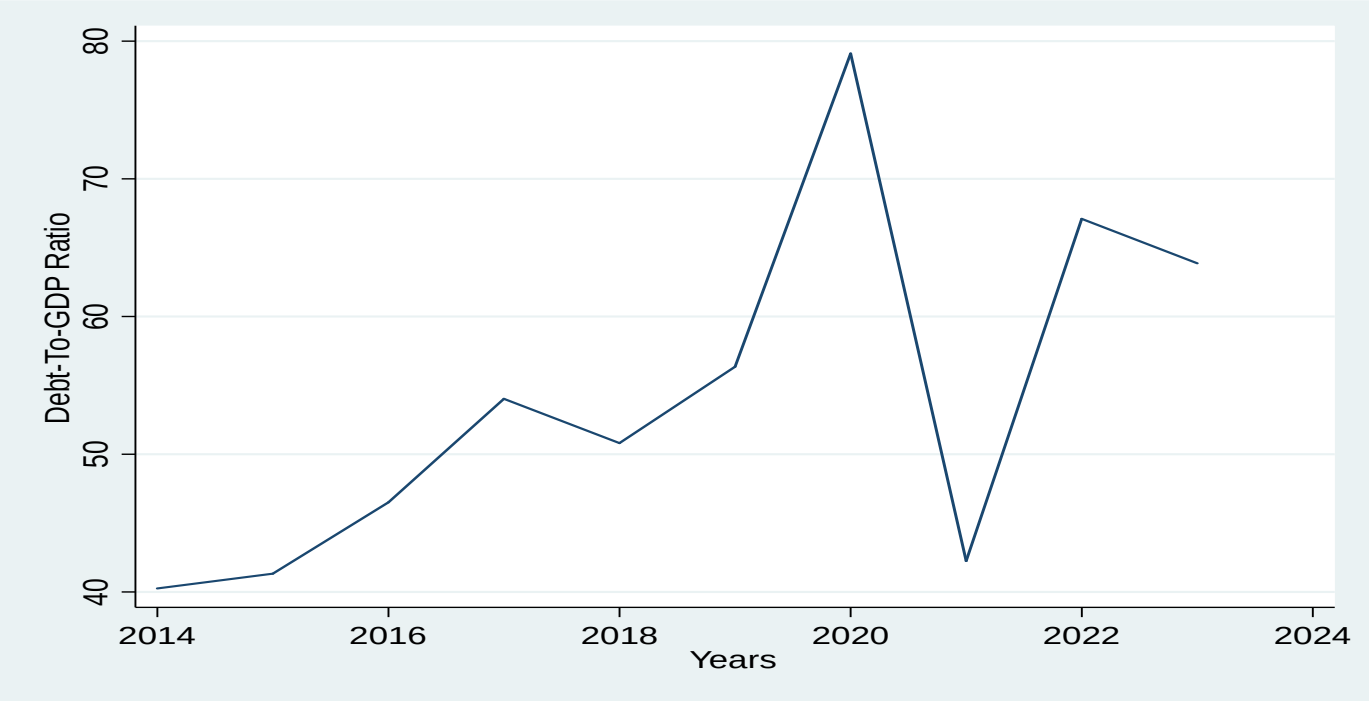

Figure 3
Trend Line Graph for Debt to GDP Ratio

The average Debt Service Ratio reached 38.6% during the period of 2014-2023, with the high standard deviation of 15.40 which means the significant changes in the proportion of revenues of the government spent on paying the debt. Its ratio varied between the lowest of 17.5 per cent and the highest of 58.8 per cent and indicated phases when the government had to work under the heavy burden of debt repayment and thus had little fiscal room to spend on development and social projects. This could be due to the high cost of repaying debt that could be driven by higher borrowings, interest rates, or declining currency with respect to the repayment of the external debts (International Monetary Fund, 2021). On the other hand, low debt service ratios will indicate that there are lower repayment burdens, which might be through a good restructuring of the debts or a good collection of revenues.

4.2 Inferential Analysis

The inferential analysis is the discussion of the connections between the Debt-to-GDP Ratio in Kenya between 2014 and 2023. This is followed by correlation analysis which tests the strength of direction of correlation between the variables. The next stage will be regression analysis, in which the effects of the independent variable on economic stability will be measured.

4.2.1 Diagnostic Statistics

The Diagnostic Statistics tab evaluate the validity of the regression model with the review of certain assumptions that have to be made in order to conduct the reliable analysis. It also has the tests of normality, linearity, autocorrelation, heteroscedasticity and stationarity so that accurate and consistent results are found. Skewness, Kurtosis and Jarque-Bera (JB) statistics were applied to test the normality of the variables and find out whether the variables follow normal distribution which is a key assumptions in most regression analyses. As the findings show both the Economic Stability (ES) and Debt-to-GDP Ratio (DGR) meet the requirement of the normality assumption. It is clear that the p-values of the JB test (0.0792 and 0.6464) are bigger than 0.05, which means that the null hypothesis of normality cannot be rejected. As well as skewness and kurtosis values are at satisfactory levels (Skewness: 3; Kurtosis: 10) that validate the fact that the distributions of both variables are close to being normal (Brown & Greene, 2006).

Table 2
Normality Test

stats	ES	DGR
skewness	-1.3908	0.660468
kurtosis	5.106025	2.408674
Jarque Bera	5.072	.8727
P Value	.0792	.6464

The scatter plot, in Figure 4, illustrates the relationship between debt-to-GDP ratio and economic stability (annual GDP growth rate), with a downward-sloping linear regression line. The negative slope suggests an inverse relationship, where higher debt-to-GDP ratios are generally associated with lower economic stability. The data points are relatively dispersed but show a noticeable downward trend. The r-squared of 0.474 indicates that approximately 47.4% of the variation in economic stability is explained by changes in the debt-to-GDP ratio, suggesting a strong relationship between the two variables. These findings agree with Hu and Wong (2021), who observed that a significant relationship exists between debt-to-GDP ratios and economic stability, with variations in debt levels substantially influencing economic outcomes.

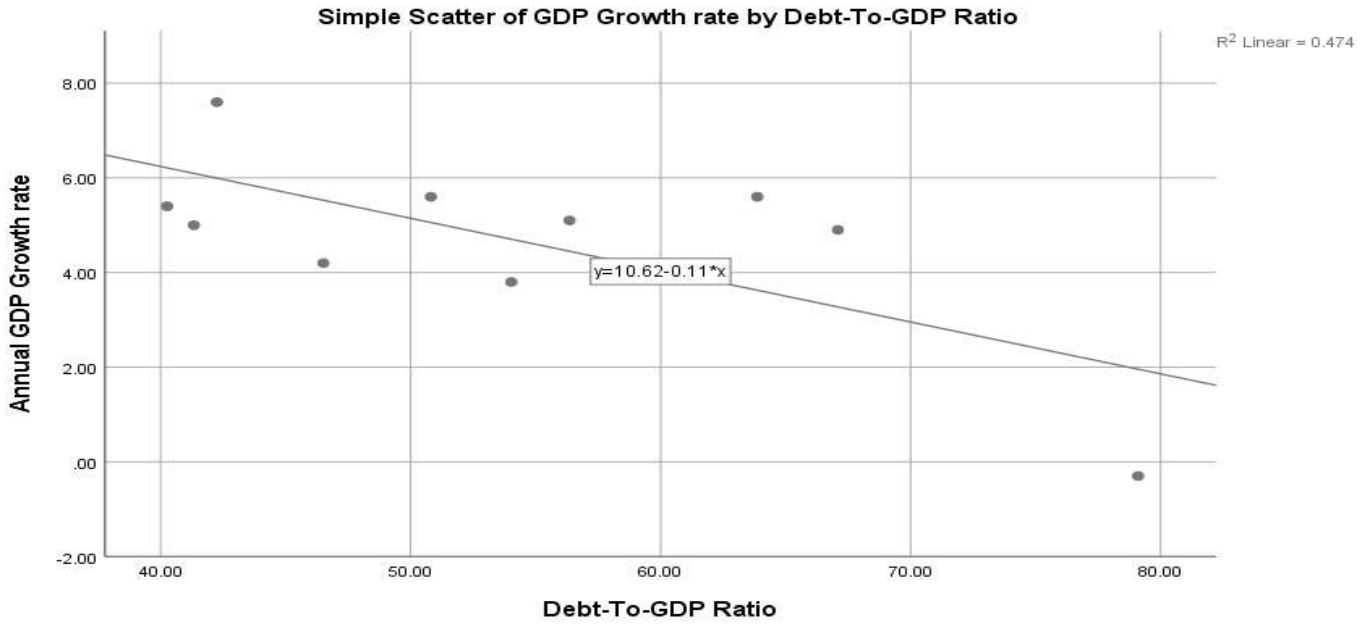

Figure 4
Debt to GDP Ratio and Economic Stability

Breusch-Godfrey LM test was used to assess the presence of serial autocorrelation. As shown in Table 3, the Breusch-Godfrey LM test for autocorrelation with a chi-square value of 1.106 and a p-value of 0.28427 suggests that the null hypothesis of no serial correlation cannot be rejected. This indicates that there is no significant evidence of autocorrelation in the residuals at the 5% significance level, supporting the assumption of independent errors in the regression model.

Table 3
Breusch-Godfrey LM test for Autocorrelation

lags(p)	chi2	df	Prob > chi2
1	1.106	1	0.28427

The Breusch-Pagan / Cook-Weisberg test for heteroskedasticity, in Table 4, shows a chi-square value of 1.86 with a p-value of 0.1485. Since the p-value is greater than the typical significance level (e.g., 0.05), we fail to reject the null hypothesis of constant variance. This suggests that there is no evidence of heteroscedasticity, and the residuals are likely homoscedastic (i.e., they have constant variance) (Njoroge, 2020)

Table 4
Heteroscedasticity Test Results

chi2(1)	Prob > chi2
1.86	0.1495

The Augmented Dickey-Fuller (ADF) Unit Root Test and the Phillips-Perron (PP) Test were conducted to examine the stationarity of the variables under study. The null hypothesis of both tests states that a unit root is present, meaning the variable is non-stationary. The alternative hypothesis suggests that the variable is stationary. A variable is considered stationary if the test statistic is more negative than the critical value, and the p-value is below 0.05. Since all variables have p-values below 0.05, they are stationary at the 5% significance level, meaning that they do not require

differencing before inclusion in further regression analysis. These findings are supported by Hassan et al., (2023), who outlined the unit root test methodology and the criteria for determining stationarity in time series analysis.

Table 5
Unit Root test

	ADF		Philip Perron	
Variable	**Statistics**	**p-value**	**Statistics**	**p-value**
Economic Stability	-3.478**	0.0086	-3.641**	0.0050
Debt-To-GDP Ratio	-3.880**	0.0022	-2.889*	0.0466

** Significance at 0.01, * significance at 0.05

4.2.2 Correlation Analysis

The Pearson correlation coefficient between the Debt-To-GDP ratio and economic stability is -0.7365, with a p-value of 0.0151. This indicates a significant negative relationship, suggesting that higher debt-to-GDP ratios are associated with lower economic stability. These findings are in line with Reinhart and Rogoff (2010), who found that countries with debt-to-GDP ratios above 90% tend to experience slower economic growth. Similarly, Kumar and Woo (2010) observed that higher initial debt leads to a slowdown in real GDP growth.

Table 6
Correlation Results

		Economic Stability	Debt-To-GDP Ratio
Economic Stability	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	10	
Debt-To-GDP Ratio	Pearson Correlation	-0.7365	1
	Sig. (2-tailed)	0.0151	
	N	10	10

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

4.2.3 Regression Analysis

Regression analysis was used to assess the relationship between debt-to-GDP ratio and economic stability in Kenya.

$ES_t = \beta_0 + \beta_{1t} DRG_t + \varepsilon$

EC_t is the dependent variable Economic Stability, B_0 is the y intercept (Constant), β_1 is the coefficients of determination, DRG is Debt-To-GDP Ratio, t represents time (2014-2023) and ε_t is an error term.

Table 7
Regression Analysis Results-Model Summary and ANOVA

Source	**SS**	**df**	**MS**	**Number of obs**	=	10
				F(1, 8)	=	11.7121
Model	4.50576	1	4.50576	Prob > F	=	0.0408
Residual	3.07767	8	0.38471	R-squared	=	0.724
				Adj R-squared	=	0.3912
Total	7.58343	9	4.89047	Root MSE	=	0.7162

The r-squared shows the proportion of the dependent variable that can be explained by the independent variables. In Table 7, the model shows strong explanatory power with an r-squared value of 0.7240, indicating that approximately 72.40% of the variation in economic stability is explained by the independent variables (debt-to-GDP ratio, debt service ratio and debt maturity structure). The model's F-statistic of 11.7121 is compared to the critical value from the F-distribution table for (1, 8) degrees of freedom at a 0.05 significance level, which is approximately 5.32. Since 11.7121> 5.32, the null hypothesis that the model has no explanatory power is rejected. Additionally, the p-value for the F-statistic is 0.0408, which is less than the significance level of 0.05, further confirming the overall significance of the model.

Table 8
Regression Analysis Results-Regression Coefficient

ES	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
DGR	-1.64891	0.480098	-3.43	0.014	-2.82366	-0.47415
_cons	-0.23349	1.724803	-0.14	0.897	-4.45393	3.986953

Based on the regression results provided, the revised regression model is as follows:

$$ES_t = -0.23349 - 1.64891DRG_t$$

The study found that debt-to-GDP ratio has a negative and significant effect on economic stability in Kenya. The coefficient for debt-to-GDP ratio is -1.64891 with a p-value of 0.014, indicating a statistically significant negative relationship with Economic Stability at the 0.05 significance level. This implies that a one-unit increase in the debt-to-GDP ratio is associated with a decrease of approximately 1.65 units in Economic Stability, holding other variables constant. Therefore, the null hypothesis that debt-to-GDP ratio has no significant effect on economic stability is rejected. The findings are consistent with Fetai et al. (2020) findings that countries with debt levels exceeding 90% of GDP tend to experience notably lower economic growth rates. Similarly, a study by Hu and Wong (2021) concluded that unexpected increases in public debt negatively affect real GDP, particularly in nations with already high debt levels. In addition, the findings are in line with Getinet and Ersumo (2020) findings that public external debt has a negative relationship with economic growth.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The research concludes that negative and significant relationship does exist between debt to GDP ratio and economic stability in Kenya, which is assessed on the annual rate of growth of GDP. This means that the rise in the amount of public debt to the economy level is likely to destroy the economic growth. Higher levels of debt-to-GDP impose additional pressure on the government resources in terms of increased expenses on repaying debts that may decrease the amount of funds spent on important development projects and social amenities. The results underline that Kenya must move towards an acceptable level of debt-to-GDP by ensuring that it only borrows sensibly in a bid to carry on with continued economic growth and stability in the long-term.

5.2 Recommendations

To address the negative impact of the debt-to-GDP ratio on Kenya's economic stability, the study recommends that the government to tighten the fiscal management by guaranteeing effective distribution and wise utilization of borrowed funds. The main point here should be ensuring that the level of debt is sustainable and not to overly borrow funds that would affect the growth of the economy in the long run. The government ought to strive in maximizing the domestic revenue collection, ensuring reduction of budget deficits and maximizing on expenditure where there is high economic returns. Investments are to be done in infrastructure, heaalthcare, education, agriculture, and manufacturing which can enable productivity and employment. It is also crucial to enhance debt transparency and the maturity profile of debts so as to minimize the refinancing risks and to increase fiscal soundness.

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