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Fiscal Policy Regimes And Public Debt In Kenya

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Abstract:
The fiscal policy regime in Kenya is thought to be unsustainable as the rise in debt levels is linked to a worsening fiscal balance. The fiscal balance ratio to GDP deteriorated from a 0.2 percent surplus in 1964 to a 7.6 percent deficit in 2018. Besides, the debt to GDP ratio in the same period reached a peak of 55. 2 percent from 25. 4 percent. The unprecedented accumulation of debt shows that debt stabilization is not a major concern for the government. Thus, the study tried to relate the ways which fiscal policy regimes impact public debt in Kenya. The study's specific objectives were establishing the fiscal regimes that favor sustainable debt in Kenya and how long fiscal policy regimes last. The study was conducted using the annual time series data from 1990 to 2023. Data that was used for the analysis was obtained from Kenya's Economic surveys and the World Bank. The economic surveys were the data source for domestic debt and fiscal deficit, while World Bank data provided information on the interest rate and inflation. The study used structural breaks to account for regime changes. The paper used the Markov switching model as a way to set up the fiscal regimes endogenously. The debt coefficient in the Markov Switching model was used to determine whether the fiscal regime was active or passive i.e. significant and negative debt coefficient, the regime was termed passive and vice versa. Stationarity tests were also performed on each variable to establish the order of integration through the Dickey-Fuller (DF). The fiscal balance and public debt trends were also analyzed to identify structural breaks and the overall trend.

Key Word : *fiscal policy regime, debt to GDP ratio, debt stabilization, Markov Switching model, active or passive regimes, structural breaks, regime changes*

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I. Introduction

Fiscal policies are crucial in influencing the economic performance of a country. Fiscal policies are macroeconomic tools governments use through tax policies and government spending to correct the economy's inefficiencies and influence the economy's course (Musgrave & Musgrave, 1989). Like many other countries, Kenya uses fiscal policies to stabilize the economy, attain economic growth, create employment, and encourage investments and innovations. A significant characteristic of a good fiscal policy is that it can make enough fiscal room for counter-cyclicality in case of destabilizing economic shocks (Mutuku, 2015). When economies face prolonged periods of harsh macroeconomic conditions, they result in fiscal spending to counteract the adverse macroeconomic shocks resulting in public debt accumulation (Chalk et al. 2016).

Public debt and fiscal policy performances usually go hand in hand. Research has indicated that governments resort to expansionary fiscal interventions during economic downturns (countercyclical fiscal policies). A fiscal expansion often leads to high debt levels, constraining future policy. Additionally, it raises interest rates, thus pushing the cost of servicing public debts. Countries with fiscal deficits result to domestic and foreign borrowing to close up the gap. Therefore, persistent deficit financing results in the buildup of public debt. Hence, there is a positive correlation between large fiscal deficits and public debts.

Using fiscal policies as stabilization tools was very prominent during the 1930 great depression until the 60s. However, they became unpopular in the 70s as economists such as Milton Friedman questioned their effectiveness in economic stabilization. Over the years, an upsurge in government spending has led to fiscal deficits and has put constraints on most countries' debt/ GDP ratios. Due to the unpredictable nature of the economy, the efficiency of fiscal interventions depends on the fiscal regimes, i.e., the rules used to decide on fiscal policy actions (government spending or taxation) prevailing at that time. Fiscal policy regimes can be identified as passive or active regimes, further described as Keynesian or Ricardian and contractionary or expansionary regimes.

It is essential to understand that fiscal policies switch depending on the existing fiscal regime. The fiscal intervention will differ in magnitude and instrument used due to the prevailing political and economic circumstances. Previous research papers elucidated the fiscal reaction function and then used it to determine the behavior of the government in response to its debts.

The paper used Markov-switching model to determine how different regimes have affected public debt in Kenya. The Markov-switching model is appropriate when correlated data displays distinctive dynamic patterns during various periods.

Historical background

Recently, the study of policy regimes has been of emerging interest to economists. However, most empirical and theoretical literature has concentrated more on monetary policy compared to fiscal policy. The rationalization for this bias is the belief that inflation stabilization is the responsibility of the monetary authority because the central banks are more independent and, thus, more credible. However, this outlook has shortcomings because it requires a well-defined fiscal rule for a monetary policy to be effective. Besides, it assumes that passive fiscal regimes are stable. However, fiscal regimes have been found to vary with time as they are susceptible to the unpredictable nature of politics over time. Overtime due to these factors, there has been an increased interest in understanding how fiscal regimes impact stabilization and public debt.

Global Trends

The progression of fiscal regimes and public debt in developed countries such as the USA can best be described as a variation between fiscal rules intended for budget-balancing (passive) and those only concerned with discretionary macroeconomic stabilization, with no regard for their impact on government debt (active) (Davig et al. 2004). According to (Woodford, 1998), the US fiscal policy can be described as active from the late 1960s and the early1970s and passive through 1980s to 1990s. The doctrines of fiscal stabilization were believed to have returned in the 1990s. However, the tax cuts undertaken from 2001 to 2003, and the most recently introduced Tax Cuts and Jobs Act of 2017, have indicated a re-establishment of the fiscal policy countercyclical role. As a result, the Budget surplus has reversed, and the public debt level has progressively risen.

Based on the 2019 IMF report on worldwide debt, the debt level amounted to $ 184 trillion and it had reached 225% of the GDP which is the highest ever.

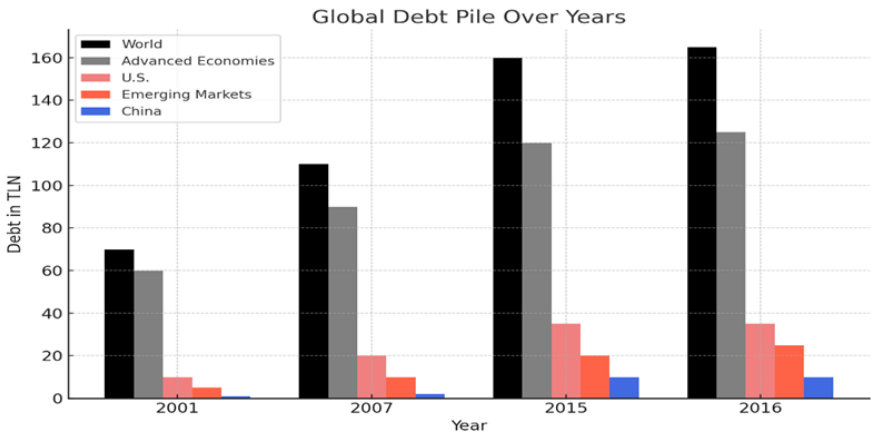

Figure 1.1: Global Debt Levels
Source: Global Debt Database and IMF Staff Calculations

In Africa, high debt levels started in the 1960s, occasioned by the newly independent countries' public spending spree to stimulate their economies. The funds were channeled to investments in industries and infrastructure projects. The extremely high spending was fueled by commodity booms, extensive use of foreign debt, and a reliance on anticipated export revenues to pay down the loans. Conspicuously, the fiscal policy reactions for those countries during the adverse commodity shocks were to take more loans instead of reducing expenditures. The then-current active fiscal regimes drove the resulting debt crisis and the global recession of the 1980s. By the decade's end, the continent's external debt-to GNI ratio had risen to 104 percent from 49 percent in 1980.

Most African countries have had a prolonged period of active fiscal regime, which has been the primary cause of today's rising debt situation comparable to the HIPC era (Nganga w. et al. 2018). Most governments resulted in countercyclical fiscal policies to compensate for the suppressed private sector investment during the global financial crisis of 2007-2008. Further, there was a massive escalation in public spending, mainly on infrastructure, by the continent to close the huge infrastructure gap between it and developed countries. The most considerable magnitude was felt during the 2014 negative commodity price shock and the 2019/2020 COVID-19 pandemic, dramatically reducing government revenues.

Kenyan Trends

Public debt trend

Expansionary fiscal policy mostly leads to increased public debt resulting from increased government spending. Most developing countries, including Kenya, have been experiencing rising public debt due to increasing government spending. Like any other developing nation, Kenya's agenda is driven by the need for infrastructure growth, which forces fiscal agents to rely on deficit financing (Kirui, 2017).

For instance, by the close of the 2018/19 fiscal year in Kenya, the country's public debt was Ksh. 6.693 trillion, which was 64 percent of GDP. The figure has been rising steadily, surpassing the October 2019 parliament's approved country's debt threshold of Sh9 trillion, as treasury tries to finance its annual Budget deficit. Kenya's public debt stock hit Ksh 9.182 trillion in January 2023 translating to 92% of the PFM debt ceiling of sh. 10 trillion. Foreseeing the potential limit breach, the government, through PFM (Amendment) Bill 2023, changed the debt limit anchor from the Sh. 10 trillion limit to a 55% debt to GDP ratio. However, the debt-to-GDP ratio stood at 70.2% by June 2023.

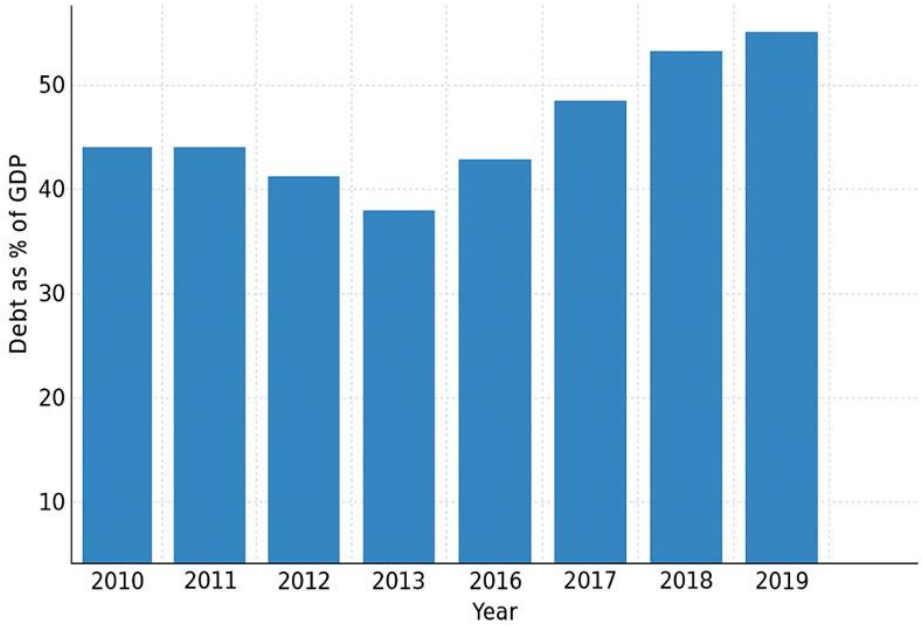

Figure 1.2: Kenya's public debt trends as a percentage of GDP
Source: Tradingeconomics.com / Central Bank of Kenya

Further, the trend in Kenya's public debt is broken as follows;

Table 1.1: Trends in Kenya's Public Debt (Ksh Million)

	June 2019	June 2020	June 2021	June 2022	June 2023
Total debt stock	**5,808,622**	**6,693,338**	**7,696,634**	**8,634,909**	**10,278,673**
External debt	3,023,139	3,515,812	3,999,541	4,305,835	5,446,561
Domestic debt	2,785,483	3,177,526	3,697,093	4,329,074	4,832,113
% share of External debt	52.0	52.5	52.0	49.8	52.9
% share of Domestic debt	48.0	47.5	48.0	50.2	47.1
Debt as a % of GDP	**62.0**	**65.8**	**68.1**	**67.7**	**70.8**
Real GDP Growth	5.1	-0.3	7.6	4.8	5.3

Source: National Treasury and Central Bank of Kenya

The ratio of external public debt to domestic public debt as of June 2023 stood at 52.9% to 47.1%. The depreciation of the shilling has continued to affect the foreign debt balance and interest repayment. The shilling depreciated from an average conversion rate of a dollar of 112.7543 in 2021/2022 to an average rate of 126.1706 in the 2022/2023 financial year. The financial year 2023/2024 saw an all-time high of 157.3235 in January 2024. The debt repayment proportion has shown an upward trend, escalating from Ksh 917,778 million in June 2022 to Ksh 1,201,033 million by June 2023. In the fiscal year ending in June 2023, the ratio of ordinary revenue to total debt service surged to 58.8%, a notable increase from 47.9% recorded in June 2022. This rise primarily stemmed from increased domestic debt interest and a depreciation of the shilling against the US dollar.

Fiscal policy trend

According to Ocharo et al. (2018), Kenya's fiscal policy was unstable between 1963 and 2015, with the fiscal deficit averaging 4.7% of GDP over the period. Multiple economic shocks that demanded government involvement through fiscal policy were to blame for the instability of the fiscal policy. Among these shocks are the price shocks for oil experienced in Kenya in 1973/74 and 1979/80 (the Republic of Kenya, 1975 and 1981), persistent and pro-longed famines (the Republic of Kenya, 1985 and 2001), Gulf War of 1990/91 that caused oil prices to rise, accompanied by a significant drop in tourism earnings, high-interest rates, and exchange rate devaluation, the post-election violence in 2007 and 2008, Global Financial Crisis (GFC) of 2008 and the accompanying soaring global food and oil prices (the Republic of Kenya, 2009). Additionally, the Covid-19 pandemic brought significant disruptions to government revenue collection and spending patterns, which in turn negatively impacted the economy.

Fiscal regimes trend

Due to fiscal balance instability, the economy has performed poorly over time, creating large amounts of public debt and high interest rates. In Kenya's case public debt levels have been influenced by the fiscal policy regimes, as illustrated in Figure 1.3 below;

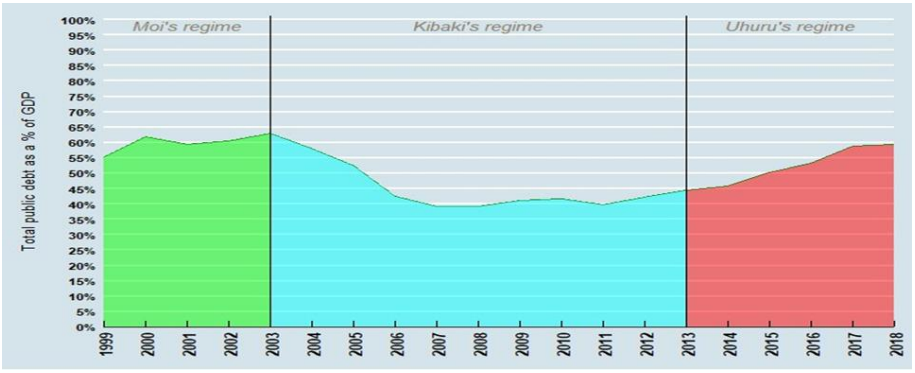

Figure 1.3:Public debt to GDP ratio under different regimes
Source: Institute of Economic Affairs Kenya

The graph shows that fiscal policy regime changes significantly influence the public debt levels in Kenya. The fiscal policy regime cycle shifts after approximately five to ten years. The fiscal policy regimes in Kenya are mainly expansionary, contractionary (active, or passive). The expansionary fiscal policy regimes correspond with the active fiscal policy regimes, where the government actively partakes in debts to foster economic growth. From 2003 to 2011, Kenya experienced a passive fiscal policy regime where established laws on government spending and taxation remained unchanged for long periods.

On the other hand, Kenya has been experiencing an active fiscal regime for the past decade whereby taxation levels and government spending pegged on public debt have been rising and have kept changing from one Budget to the next. Additionally, fiscal policy regimes are impacted by the prevailing political environment and the economic cycles. Therefore, it is essential to understand how changes in fiscal policy regimes impact public debt levels and assess the degree to which cyclicality and persistence of unsustainable regimes threaten the long-term sustainability of public debt.

Statement of the Problem

Kenya’s public debt had risen to Kshs. 10.526 trillion as of August 2023 bringing the debt to GDP ratio to 73%. The debt-to-GDP ratio is now above the 55% ceiling set in the PFM Act amendment of 2022 as well as above the recommended 55% threshold for Kenya as per the IMF-World Bank guidelines. Kenya’s public debt has been increasing at an alarming rate in the last few years, which is why the IMF has rated Kenya’s debt levels as high risk of debt distress. From 1998 to 2018, Kenya’s debt as a percentage of GDP averaged 54.14%, the highest being 78.30 percent in 2000 and the lowest being 38.20 percent in 2012. In the last five years, between 2019 and 2023, the average debt-to-GDP ratio has surged to 65. 5%. The pattern of Kenya’s debt buildup has largely been driven by the fiscal policy decisions of successive regimes. Over the years, these policies have alternated between active and passive approaches, each influencing borrowing trends differently. For instance, between 2007 and 2012, the government debt-to-GDP ratio was at an average of 40.2% when fiscal policy could be considered passive. There was an upward trend of nominal debt from 48.4% in 2013/2014 to 59.4% in 2018/2019 and a high of 70.2% in June 2023, when the country has been experiencing an active fiscal regime.

Previous studies have focused on how fiscal policy stability affects public debt stabilization and how regime changes affect fiscal sustainability. However, there is a gap in tying the fiscal regime changes to public debt levels. Previous studies have used the fiscal reaction function as the dependent variable and employed the Markov switching model to distinguish between sustainable and unsustainable fiscal regimes. This paper estimated debt as the dependent variable and fiscal balance among other independent variables to demonstrate how active and passive regimes influence public debt in Kenya. In addition, it assessed which fiscal policy regimes contribute to long-term debt sustainability hence closing the literature gap tying fiscal policy regimes to public debt in Kenya.

Research Questions

The study sought to answer the following research questions:
What effect do different fiscal policy regimes have on Kenya's public debt?
Which fiscal policy regimes favor debt stabilization in Kenya?

Study Objectives

The study's primary goal was to examine fiscal policy regimes' effects on public debt in Kenya.
The study's specific objectives were:
To establish how long fiscal policy regimes last
To establish fiscal policy regimes that favor debt stabilization in Kenya.

Significance of the study

This research is primarily intended for policymakers. This research will give a light on how fiscal policy regimes affect debt levels and the policy regimes that favour debt stabilization. The paper will concentrate on the motion of fiscal policy regimes, show how the systems of transition between sustainable and unsustainable fiscal regimes in Kenya are managed, and how they influence the growth of debt in the respective regimes.

Scope of the study

The study centered around fiscal policy regimes in Kenya and their effects on public debt. The analysis used time-series data covering the years 1990 to 2023. Data on public debt levels in Kenya for this period was available and the fiscal policy regimes in Kenya tend to go hand in hand with the political regimes. This period covered most of the political regimes in Kenya since independence.

Limitations of the Scope of the Study

The study was limited to the period between 1990 and 2023 because of unavailability of reliable and consistent data relating to public debt and fiscal balances in earlier years.

Organization of the Study

The subsequent sections of the study are organized as follows: The second chapter encompasses a comprehensive literature review, drawing upon both theoretical frameworks and empirical studies. In the third chapter, the experimental segment unfolds, presenting the theory and model employed in the study. The fourth chapter gives an overview of the research findings based on the data collected and analyzed and finally chapter five which provides a summary, conclusions, and policy implications of the study.

II. Literature Review

Introduction

The chapter contains a theoretical and empirical literature review and a literature summary. The review of theoretical literature concentrated on theories that have been advanced on fiscal policy regimes and their effects on public debt. Empirical literature looked at studies that others have previously conducted on this topic and were based on real-life observations. This chapter also critiqued existing literature and identified research gaps.

Theoretical Literature

Ricardian Equivalence Theory

The theory was proposed by David Ricardo in the early 1800s and later developed by Robert Barro of Harvard University. The theory claims that attempts to revive the economy by raising government expenditure backed by debt will be ineffective as demand will remain unchanged. According to the theory, consumers would save the money they receive to compensate for the expected tax rises needed to pay off the debt. A government windfall is seen as a bonus by those who receive it rather than a long-term rise in income. Therefore, they will refrain from spending it, knowing that it is not likely to recur and will even be clawed back as higher taxes. The theory assumes the income life-cycle hypothesis and perfect financial markets exist. The theory also assumes

rational expectations, i.e., Consumers will save a windfall received from the government in anticipation of a potential future tax hike. The theory has been criticized based on its assumption of perfect capital markets because liquidity constraints exist, and consumers are sometimes irrational. Consumers may not anticipate the future tax consequences.

Robert Barro later expanded and modeled the theory based on the lifetime income hypothesis and the modernized version of rational expectations theory. Barro also incorporates the assumption that people are concerned about the welfare of future generations and hence they save for future tax burdens. This assumption is called intergenerational altruism. The theory assumptions provide a ground for the effectiveness of the cyclical measures. The theory's assumptions make up the necessary conditions for failure of countercyclical efforts. For instance, if consumers are rational, tax cuts today will mean increased pressure to raise tax in the future hence overall demand remains unchanged. For effectiveness of countercyclical fiscal policy, one of the Ricardian's equivalence theory assumptions should not hold. How a fiscal policy is paid in the future, and the efficiency of government spending are the main factors that determine the efficacy of a fiscal policy. Ricardian equivalence in turn emphasizes the importance of fiscal reforms which are vital to change government spending and improve the efficiency of countercyclical policies.

Ricardian equivalence underlies the current study as it shows that fiscal policies have a bearing on the public debt. The Ricardian Equivalence theory claims that debt-financed fiscal policy is ineffective because rational consumers foresee future taxes required to service public debt and adjust their savings accordingly. Essentially, a Ricardian regime will favor policies that encourage conservative borrowing because they assume the consumers are rational and any increase in debt-financed government spending won't stimulate the economy.

Keynesian theory

Developed by John Keynes (1935), the theory argues that aggregate demand aggregate demand drives economic output even though it is frequently erratic and unstable, leading to ineffective macroeconomic outcomes. Keynesians advocate for active fiscal and monetary policies to moderate economic fluctuations, mainly through deficit spending during recessions and fiscal consolidation during booms. As a solution to the Great Depression, Keynes proposed that the economy needed to be stimulated by increasing government investment in infrastructure and lowering interest rates. Investment by the government would inject income, resulting in more spending and stimulating more production and investment. Keynes advocated for government intervention when the classical economists' approach to free markets that created full employment through self-balancing mechanisms failed to work. During the contractionary period of the economic cycle, Keynes called for deficit spending. Additionally, he advocated for countercyclical fiscal measures, including tax increases to cool the economy, avoidance of inflation during periods of high demand, and deficit spending on labor-intensive infrastructure developments to create jobs and help to stabilize wages during recessions.

The theory assumes that aggregate demand drives the economy, there exit sticky prices and wages (they are not so flexible in adopting to economic cycles), closed economy, and multiplier effect. The Keynesian argument contends that budgetary adjustments have short-run contractionary impacts because of sticky pricing and expectations about future investments. The theory argues that fiscal consolidations have adverse indirect effects on output and direct effects that reduce aggregate demand and income. The conventional Keynesian view also considers that consolidation measures stifle growth; hence, consolidation periods are accompanied by an upsurge in the debt ratio.

However, Keynes critics, such as the monetarists, contend that using monetary rather than fiscal policy is more effective in dealing with economic volatility. Milton Friedman also contends that government spending can crowd out private investment through increased interest rates and reduced funds available for borrowing. Friedrich Hayek and Murray Rothbard also criticize the theory arguing that government intervention can lead to inefficient resource allocation and deter the natural market forces leading to economic instability.

The Keynesian theory has clear linkage between public debt and fiscal policy regimes study. The theory advocates for active fiscal policies in times of recessions by supporting the use of deficit spending as a counter-cyclical tool. The active fiscal policies have led to increased government spending and debt, raising concerns about the sustainability of public debts.

Fiscal Theory of Price Level

Eric M. Leeper, Christopher A. Sims, and Michael Dean Woodford developed the price level (FTPL) fiscal theory in 1991, 1994, and 2001, respectively. FTPL holds that the critical factor influencing the level of prices or inflation is the government's fiscal policy, which includes current and potential debt and taxation rather than the monetary policy. To attain stable price levels, sustainable government finances are mandatory, i.e., the government must maintain a balanced Budget throughout the business cycle. In nominal terms, the government must either refinance (roll over the debt, borrow afresh to pay off the old debt) or use surpluses to pay off its

existing debts. In real terms, to lower the amount it would have to repay, a government can artificially inflate its debt by causing or permitting high inflation. It also has the alternative of defaulting on the debt.

Based on the theory, if a country's fiscal policy is unsustainable and foresees that future tax revenue can't pay off its obligations, it can inflate the debt away. Therefore, to ensure stable price levels, governments must observe fiscal discipline, defined as a balanced Budget throughout an economic cycle, is needed.

The relationship between price stability and public debt is explained by the Fiscal Theory of the Price Level (FTPL), which supports the non-Ricardian view that the government does not necessarily adhere to intertemporal budget constraints. Thus, the price level is set by the mix between monetary and fiscal policies instead of responding to government solvency. Therefore, this theory calls for policy coordination to control inflation.

$$\frac{Nominal\ debt_t}{price\ level_t} = E_t \sum_{j=0}^{\infty} \frac{Real\ primary\ surplus_{t+j}}{Discount\ rate_{t+j}} \quad \text{.....2.1}$$

The equation suggests that if future surpluses cannot cover debt, inflation adjusts to restore equilibrium. Buiter (1999) reasons that it is a misconception that a government's actual expenditure, revenue, and senior age plans could be fixed exogenously. It is also a misconception that changes in general price level adjusts the value of a government's legally binding nominal debt commitments to preserve its ability to meet its obligations as they arise. However, the theory has gained appeal as a theoretical framework for determining the circumstances in which fiscal policy alone drives inflation dynamics. For instance, one of the applications of FTPL theory consists of the difference between the Ricardian and non-Ricardian fiscal regimes, which was introduced by Woodford (1995). Monetary policy is a nominal anchor in the Ricardian regime, and the market sets the price level. In non-Ricardian regimes, however, the nominal anchor is the fiscal policy. The theory is criticized on empirical ambiguity because few real-world cases display fiscal dominance as well as challenges in fiscal policy coordination.

The theory is relevant to this research because it ties sustainable fiscal policy to public debt management. Unsustainable fiscal policy ultimately causes inflation as a means to lessen the real debt burden. The theory also helps differentiate Ricardian and non-Ricardian regimes.

Empirical Literature

Sims (1994) made a conceptual distinction between fiscal policies that stabilize government debt and policies that do not. According to Leeper (1991), the former is known as a "passive" (Ricardian) fiscal policy, whereas the latter is known as an "active" (non-Ricardian) fiscal policy. In a passive regime, expected future revenues cover current government obligations, and the fiscal policy makers align their policies to maintain this balance. To preserve fiscal solvency, primary fiscal balances should respond to government debt.

Bohn, in 1998, studied how federal debt and deficits in the US behaved to establish how the governments responded to the growth of debt. He was concerned with whether governments took corrective measures to prevent debt from mounting or let it grow. Examining yearly time series data between 1916 and 1995, the researcher investigated the responsiveness of primary budget surpluses to fluctuations in the debt-to-GDP ratio. The findings revealed a positive correlation between the primary surplus and fluctuations in the debt-to-GDP ratio, suggesting adherence to intertemporal budget constraints. Hence, countries pursuing debt sustainability should strengthen their primary fiscal position by either maintaining surplus conditions or reducing deficits in response to rising debt-to-GDP ratios.

Extensive scholarly work has also focused on estimating fiscal policy reaction functions. Passive fiscal reaction functions are grounded on the assumption that a passive fiscal regime prevails when fiscal authorities prioritize debt stabilization and sustainability concerns and vice-versa for active regimes.

For instance, the primary surplus is found to be positively related to the government debt in the framework of the EU panel by Ballabriga and Martinez-Mongay (2005). Additionally, Afonso (2010) backs the passive fiscal regime theory for an EU panel and a countercyclical reaction of fiscal policy given the favorable effects of increases in the output gap. At the same time, Golinelli and Momigliano (2008) evaluate alternate parameters for fiscal policy reaction functions.

Further, research has been carried out on regime switches using the Markov regime switch method. The methodology has been used extensively in the US for fiscal development. Within this framework, two primary approaches have been commonly utilized. The first involves formulating a fiscal policy rule that governs the primary budget deficit to ensure debt ratio stabilization. The second approach focuses on estimating fiscal rules related to government expenditure or revenue, enabling revenue to adjust in response to changes in governments spending, output gap variations, and debt dynamics.

Favero and Monacelli (2005) chose fiscal policy rules to specify the optimal level of primary deficit. They wanted to establish a debt-stabilizing deficit. As per their paradigm, there exist two main categories of fiscal rules, where the difference between active and passive fiscal rule is the elasticity of the primary deficit to the debt-stabilizing deficit. They estimated that active fiscal policy occurred in the 1960s through the 1980s, progressively turned passive at the beginning of the 1990s, and then became active again in the early years of the

2000s based on a quarterly data sample for the years 1960 to 2002. The first regime's debt-to-GDP ratio takes off, while the second regime's primary deficit moves with the motive of debt stabilization. They conclude that the fiscal response to the output gap is significant in passive regimes, whereas, in active regimes, it is statistically insignificant.

To determine how the government Budget balance would respond to fluctuations in levels of debt and business cycle variations, Izák (2009) projected a fiscal reaction function for 10 European Union post-socialist countries. He employed cross-sectional data between 1995 and 2009. He discovered that a 1% growth in lagged debt results in a three to six-basis point surge in the primary deficit the following year and that a 1% reduction in the production gap reduces the primary deficit by roughly 20 to 30 basis points. Thus, the primary deficit increases with the debt-to-GDP ratio.

Nandelenga (2010) based his research on time series data on the Kenya's government borrowing and expenditure collected for the period 1985-2008 to test the sustainability of the country's debt. Furthermore, he aimed to set the debt levels at which these objectives should be reached. As per the research, the debt situation in Kenya is sustainable and the country has been able to repay its debts with a 35% payment ratio. 2% debt-to-GDP ratio is the perfect thing to be had by the target of 10% GDP growth.

In their study, Burger and Marinkov (2012) utilized annual data spanning from 1974 to 2008 to investigate how the South African government responded to fluctuations in its debt level using a fiscal reaction function. Their findings indicated that, the South African fiscal authorities responded to growing debt levels by lessening the primary deficit or potentially generating a surplus, thereby ensuring fiscal policy sustainability. However, it was also observed that the government often maintained fiscal balances that exceeded the levels required for debt stabilization.

Mupunga and Roux examined the theories and empirical grounds for Zimbabwe's public debt trends 2016. Using data from 1982 to 2012, the aim was to pinpoint the main macroeconomic and fiscal elements that impact the Republic of Zimbabwe dynamics of government debt and to estimate the principal balance adjustments necessary to guarantee a sustainable level of public debt. The study reveals a primary surplus above 6 % of GDP is needed to accomplish the 2030 preferred debt-to-GDP ratio threshold.

Mutuku (2015) examined Kenya's fiscal reaction function using data spanning from 1970 to 2013 to assess the sustainability of the country's fiscal policy. The study aimed to comprehend how fiscal policy responds to economic variations and whether the government adopted suitable measures to avoid unwarranted debt accumulation. The findings indicated that the government's fiscal behavior was both cyclical and inconsistent in how it responded to mounting debt levels. There is a lack of deliberate effort by the Kenyan government to stabilize the country's debt, raising concerns about the long-term sustainability of its fiscal policy.

In two fiscal regimes, Hollmayr (2018) assessed the sustainability of the fiscal debt under each regime's fiscal policy. The main aim was to determine how long periods of fiscal policy could persist without fiscal policymakers responding to government debt before debt sustainability is threatened and what factors determine the average length of such periods. He uses linearized government Budget constraints and passive and active regimes to get the general analytical conditions for debt stationarity. The findings demonstrated that maintaining a stable debt-to-GDP ratio becomes more challenging the longer an active policy regime exists. This has consequences for the overall business cycle, meaning if an active regime endures for long, the economy experiences a higher volatility of inflation and production.

Makau et al. (2008), investigated whether debt stabilization ranked as a primary concern for the Kenyan government. They assessed the debt-to-GDP ratio to ascertain the stability of debt levels and employed a fiscal reaction function to scrutinize the government's responses to debt fluctuations. Analyzing data spanning from 1963 to 2015, they found that fiscal policy had not sufficiently responded to escalating debt levels, undermining efforts to achieve fiscal debt sustainability.

A significant portion of contemporary research neglects the dynamic aspect of fiscal policy, frequently opting for linear methods to evaluate fiscal policy sustainability. In contrast, this study is founded on the notion that fiscal policy oscillates between periods of sustainability and unsustainability over time. Moreover, the utilization of the Markov-switching model will elucidate the ongoing transitions of fiscal policy regimes from sustainable to unsustainable states. Additionally, it will evaluate how the cyclicality and persistence of these unsustainable regimes might influence Kenya's long-term capacity to uphold stability in the debt-to-GDP ratio.

Overview of Literature

Theoretical literature shows that a negative supply shock goes hand in hand with declining production, rising inflation, and rising debt. The Ricardian equivalence theory advocates for passive fiscal policy regimes that prioritize debt stabilization because debt-financed fiscal policy is ineffective in stimulating aggregate demand. On the other hand, Keynesian theory supports active fiscal regimes where the government uses deficit spending during economic downturns to foster output and employment. The counter-cyclical fiscal policy infers that tax revenues fall and spending increases with GDP, and a debt structure that is characterized by the

nominal debt reduces actual debt repayment during an economic downturn. The FTPL theory goes further to show the inflationary implications of unsustainable fiscal policies under non-Ricardian regimes underscoring the inflation risks from fiscal indiscipline. Collectively, the theories offer a framework for analyzing debt dynamics, fiscal policy regimes, and macroeconomic stability. Empirical literature reveals that fiscal policy regimes correlate with the level of public debt. In addition, it is important to address the influence of these regimes on the debt-to-GDP ratio dynamic. Further, the empirical literature for both developed and developing economies identifies passive (Ricardian) fiscal regimes as regimes where the government is concerned with debt stabilization while active (non-Ricardian) regimes are regimes where debt is allowed to accumulate without any apparent corrective measures. Whereas existing literature contributed greatly to understanding fiscal policy and debt dynamics, notable gaps exist. Limited attention has been given to the cyclical transitions between sustainable and unsustainable fiscal regimes especially in African economies which the study seeks to do.

III. Methodology

Introduction

This chapter outlines the methodology adopted in this study and is organized into several key sections: research design, theoretical framework, empirical model focusing on the fiscal regimes and public debt in Kenya, definition and measurement of variables, the type and source of data, the method and procedure for data collection and, finally how data was processed and analyzed.

Research design

This study focused on the non-experimental research design, as variables were not be manipulated or controlled. The research was conducted through the correlational design approach, which is a type of non-experimental design because it attempts to determine the correlation between public debt and fiscal policy regimes. The relations can be positive, negative, or no relation. The secondary data was utilized in analyzing the correlation between the variables.

Theoretical framework

The theoretical framework of this study is founded on the Keynesian theory of public debt. According to Keynes perspective, government can finance its expenditures either through taxation or by borrowing at an interest rate r. The government budget constraint (GBC) serves as the basis for the fiscal reaction function by Bohn. These functions respond to changes in the public debt/GDP ratio, where debt accumulated in period t-1 influences period t. The static budget constraint equation at period t is as follows:

$$\mathbf{D_t = D_{t-1} + i_t D_{t-1} + B_t} \quad \text{.....3.1}$$

D_t is the total amount of public debt, i is the nominal interest rate on government-issued bonds, and B is the primary surplus or deficit. The above equation can be expressed in absolute terms and in terms of debt-to-output ratio as follows;

$$\frac{\boldsymbol{D_t}}{\boldsymbol{Y_t}} = (\mathbf{1} + \boldsymbol{r})\frac{\boldsymbol{D_{t-1}}}{\boldsymbol{Y_{t-1}}} + \frac{\boldsymbol{B_t}}{\boldsymbol{Y_t}} \quad \text{.....3.2}$$

Equation 3.2 demonstrates that any period's change in debt should equal the sum of the prior debt plus the interest due plus the primary deficit. The preceding debt as a ratio from the previous output is given by multiplying (1+r) $\frac{D_{t-1}}{Y_{t-1}}$ by $\frac{Y_{t-1}}{Y_t}$ and restructuring as follows:

$$\frac{\boldsymbol{D_t}}{\boldsymbol{Y_t}} = (\mathbf{1} + \boldsymbol{r})\frac{\boldsymbol{D_{t-1}}}{\boldsymbol{Y_{t-1}}}\frac{\boldsymbol{Y_{t-1}}}{\boldsymbol{Y_t}} + \frac{\boldsymbol{B_t}}{\boldsymbol{Y_t}} = (\mathbf{1} + \boldsymbol{r})\frac{\boldsymbol{Y_{t-1}}}{\boldsymbol{Y_t}}\frac{\boldsymbol{D_{t-1}}}{\boldsymbol{Y_{t-1}}} + \frac{\boldsymbol{B_t}}{\boldsymbol{Y_t}} \quad \text{..... 3.3}$$

Note that $\frac{Y_{t-1}}{Y_t} = \frac{1}{1+g}$where g represents the real growth rate. Let i_t be the debt-to-output ratio, and *B* be the primary surplus-to-output ratio. To obtain;

$$\boldsymbol{D_t} = \frac{(\mathbf{1}+\boldsymbol{r_t})}{(\mathbf{1}+\boldsymbol{g_t})}\boldsymbol{D_{t-1}} + \boldsymbol{B_t} \quad \text{.....3.4}$$

From the above equation, , *r* stands for the real interest rate, *g* represents the real economic growth rate, B_t indicates the actual primary deficit as a share of GDP, and D_t denotes the ratio of public debt to GDP (i.e., D_t/Y_t).

From equation 3.4, the debt to GDP ratio rises if *r* is more significant than *g*. If this occurs, a debt stabilization policy should increase the anticipated primary surplus so that debt remains bounded. On the other hand, if r < g, then the fiscal policy cannot, in theory, become unsustainable if the definition of unsustainability is a public debt/GDP ratio that increases indefinitely in a finite time.

When *r* is greater than *g* and $t \to \infty$, the debt-to-GDP ratio will blow up. When *r* is less than *g,* the debt-to-GDP ratio will stabilize in the long-term.

From equation 3.4, we can take α to represent r−g /1+g to simplify it as derived as;

$$\boldsymbol{D_t} = \alpha\, \boldsymbol{D_{t-1}} + \boldsymbol{B_t} + \boldsymbol{\varepsilon_t} \quad \text{..... 3.5}$$

A Markov-switching model can be used to approximate Equation 3.5 to consider the possibility that, subject to the sign of the (rg /1+g) gap, the federal government might or might not respond to the ratio of debt to GDP. According to Leeper (1991), the fiscal response can shift between an active and a passive regime over the short term.

Model Estimation

The Markov switching model was introduced to identify distinct policy regimes adopted by policy makers. Hamilton (2005) asserts that the Markov-switching approach assumes endogenous regime switching, implying that the policy regimes are specified in the model. The fiscal policy regimes are unobservable variables inferred from the behavior of time series data or economic variables. Therefore, it makes sense to maintain two regimes, passive and active. In one of these regimes, government spending is sensitive to debt levels and can be defined as passive. The other regime breaks this rule, and government expenditure is no longer permitted to respond to debt. Thus, the government is said to be pursuing an active fiscal policy. When viewed independently, the first regime yields a stable and determined equilibrium, whereas the second regime is seen to be unstable. Let $S_{t,}$ therefore, stand for the unobservable regime at period *t*.

The Markov-switching model operates through two key mechanisms: (1) discrete regime transitions governed by constant or time-varying transition probabilities, and (2) state-dependent parameters that capture structural shifts in policy behavior (Hamilton, 2010).The likelihood of the regime regardless of what state it is, switching from state i to state j for all i, j = 1, 2 is defined by the transition probability that is assumed to be constant and specified by the matrix $\begin{matrix} p11 & p12 \\ p21 & p22 \end{matrix}$

Time-varying probabilities assess the likelihood of perceiving state i as either a passive or active regime at period t, as proposed by (Davig,2005). Regime States are;

Passive Regime (St=1St=1): Government adjusts fiscal policy to stabilize debt

Active Regime (St=2St=2): Government does not respond strongly to debt.

After identifying active and passive regimes and the transition probabilities, the effect of the regimes on public debt were examined. There was no need to introduce dummy variables to capture regime changes because a Markov process estimated the transition probabilities between regimes and assumed that the system can switch between unobserved states (Active vs. Passive fiscal regimes). The model was estimated as follows;

$$\boldsymbol{PD_t = \alpha_0(S_t) + \alpha_1 Debt_{t-1} + \alpha_2 Fb_t + \alpha_3 RINT_t + \alpha_4 EXR_t + \alpha_5 GRW_t + \alpha 6(St)\,\theta *_t + (S_t)\,\mu_t} \quad \text{.....3.7}$$

Where PD_t is the public debt as a ratio of GDP, S_t stands for the regimes at period t, $\alpha_0(S_t)$ is the intercept term that varies according to the regime, α1to α6 are the coefficients associated with each independent variable. $Debt_{-1}$ is the previous debt as a percentage of GDP, Fb_t is the fiscal balance as a percentage of GDP at period t, $RINT$ is the real interest rate, EXR is the exchange rate, and GRW is Real GDP growth rate. The output gap and the government expenditure gap, denoted by $\theta*$, are the other control variables and μ is the error term. According to equation (3.7), the response of the existing Public debt (PD_t) is dependent on the debt level from the previous period ($Debt_{t-1}$), (Aldama & Creel 2016). The inclusion of lagged regressors such as $Debt$-1it results in the loss of the first observation in dynamic regression models.

The subsequent analysis delved into distinguishing between sustainable and unsustainable policy regimes. Furthermore, efforts were made to determine the long-term feasibility of implementing a sustainable fiscal policy. As this study states, the ones that are sustainable will replace the non-sustainable regimes in the future if the policy becomes sustainable. The NPG condition is applied for this case because the sustainability period's deficit is balanced off through a longer duration and a primary surplus that accumulates.

Variables definition and measurement

Table 3.1: Variables definition and measurement

Variable	Definition	Measurement
Total Debt/GDP- **Dependent variable**	The total debt is presented as a percentage of GDP as domestic and foreign debt.	Ratio
Independent variables		
Lagged Public Debt ($Debt_{t-1}$)	The previous period's public debt level, included to capture debt persistence.	Ratio
Fiscal balance/GDP	gap between government receipts and its expenditure as a proportion of GDP	Ratio
Economic Growth	The percentage change in real GDP.	Ratio
Real Interest Rate	nominal interest rate less the rate of inflation	Ratio
Exchange rate	The value of the domestic currency relative to major currencies.	Measured as KES/USD exchange rate (Kenyan Shilling per USD).
Output Gap	The difference between actual and potential GDP, reflecting economic slack	Measured as (Actual GDP - Potential GDP) / Potential GDP (%).

	or overheating. The Hodrick-Prescott filter is used to estimate the long-run Path.	
Government Expenditure Gap	The deviation of government expenditure from its long-term trend. The Hodrick-Prescott filter is used to estimate the long-run Path.	Measured as (Actual Government Expenditure - Trend Government Expenditure) / Trend Government Expenditure (%).

Data type and source

The data was compiled and plotted on an annual basis for the time series ranging from 1990 to 2023. The model specification included lagged regressors, leading to the loss of the first available observation (1990). As a result, the estimation sample spanned from 1991 to 2023. Annual observations covered discrepancies between actual and potential output, changes in real GDP, fiscal balance as a percentage of GDP, public debt as a proportion of GDP, and the economic growth as a percentage of GDP. Drawing data from diverse sources including the Central Bank of Kenya, Kenya National Bureau of Statistics reports, statistical abstracts, Treasury financial reports, KIPPRA reports, IMF reports African Development Bank fiscal statistics, and the World Bank's Africa databases, the report was substantiated by a multitude of reputable sources.

Data collection

Annual time series data from 1990 to 2023 was be used to estimate the model. Structural breaks were introduced to account for the regime changes.

Data processing and analysis

To identify structural breaks and the overall trend, the fiscal balance and trend of public debt was analyzed. The Markov-switching model was estimated using equation (3.7) for the policy reaction function. Regression diagnostics were carried out on the model to assess its validity based on its assumptions hence a hybrid model Markov-Switching Dynamic Regression model. The following tests were carried out:

a) The normality of a dataset was assessed using a normality test. Shapiro-Wilk test for Normality was employed to determine if the dataset exhibits skewness and kurtosis resembling a normal distribution. In a normally distributed dataset, the test statistic is positive, with zero skewness and a kurtosis of three. The null hypothesis states that the data follows a normal distribution. Acceptance of the null hypothesis occurs when the P-value exceeds 0.05, indicating a 5 percent significance level. If the data deviates from normality, transformation methods such as logarithmic, inverse, or square root functions can be applied to mitigate skewness or reduce outliers.
b) Heteroscedasticity- In linear regression, homogeneity of error variance was assumed. Heteroscedasticity occurs when the error term's variance is not constant, leading to biased standard errors of coefficients. The White test was employed to detect heteroscedasticity. The null hypothesis posits homoscedasticity, while the alternative suggests heteroscedasticity. Rejecting the null hypothesis, indicated by a P-value below 0.05, implies heteroscedasticity. To address it, weighted least squares or the Newey-West procedure can be applied.
c) Multicollinearity arises when there is a correlation among independent variables in a model, leading to less reliable statistical inferences. The test used the variance inflation factor for every independent variable. The size of VIF was used to determine if multicollinearity exists where a value of more than 5 multicollinearity were interpreted to be high. One way to correct multicollinearity is to eliminate some of the much-correlated variables.
d) Stationarity- Given the dependence on time series data, performing a stationarity test was crucial. The Dickey-Fuller (DF) test assessed the null hypothesis of a unit root in the model, indicating non-stationarity. Rejecting the null hypothesis happens when the test statistic falls below the critical values at 1%, 5%, or 10%, or if the P-value is lower than the α value. To tackle stationarity concerns, differencing methods were employed.
e) Autocorrelation refers to the correlation between values of the same variable, whose observation is at different points in time. Autocorrelation was tested using the Portmanteau LM test. It tested whether the residuals from your VAR model are serially uncorrelated (i.e., no autocorrelation left over after estimating the model). The test null hypothesis was that no autocorrelation exists at the specified lag. If p-value > 0.05 you fail to reject the null hypothesis and if p-value ≤ 0.05 you reject the null hypothesis. To address serial correlation, the Newey-West method can be employed.

The entire fit of the regression model was established through the use of goodness-of-fit measures R2. The significance of individual variable coefficients was also tested. Descriptive statistics, encompassing mean, standard deviation, minimum, and maximum values, were employed to analyze continuous variables.

IV. Empirical Findings And Discussion

Introduction

This chapter provides an overview of the research findings based on the data collected and analyzed. The discussion of the results is in relation to the study's objectives and hypotheses. The chapter begins with descriptive statistics to offer an overview of the data and then moves to inferential analyses that test the research hypotheses. Visual aids like graphs and tables are used to enhance comprehension of the data. The significance of the results is also discussed as well as any divergence or convergence with existing literature.

Descriptive Statistics

The dataset's descriptive statistics which include variables such as public debt, lagged debt, fiscal balance/GDP, real interest rate, exchange rate, economic growth and output gap are presented in this section. The descriptive statistics for key variable are as shown below;

Table 4.1: Descriptive Statistics of Key Variables

Variable	Observations	Mean	Std Dev	Min	25%	Median	75%	Max
DEBT	34	0.6134	0.204	0.3569	0.4684	0.584	0.6804	1.2898
DEBT t-1	34	0.6122	0.2034	0.3569	0.4684	0.584	0.6804	1.2898
Real Interest rate	34	0.0786	0.072	-0.101	0.0503	0.0752	0.1192	0.211
Economic Growth	34	0.0373	0.0226	-0.008	0.0238	0.0415	0.051	0.081
Exchange Rate	34	78.05	25.21	22.91	62.11	77.95	96.10	139.68
Fiscal Balance	34	-3.7239	3.1249	-8.5746	-6.6519	-3.656	-0.5776	0.8427
Output Gap	34	-2462.19	9696.34	-36362.2	-380	372.08	815.2	8846.95
Expenditure Gap	34	1801.19	10616.02	-28380.8	-2687.7	764.79	3893.13	34276.82

Source: Research Data 2023

The 25% (25th percentile) and 75% (75th percentile) are measures in quantile analysis, showing the distribution of key variables. For instance, 25% of debt-to-GDP ratio observations are below 0.4684 while 75% are below 0.6804. The interquartile range falls between 0.4684 and 0.6804 showing moderate variability. Table 4.1 shows Average debt-to-GDP ratio is 61.34%, peaking at 128.98% (1993) and hitting a low of 35.69% (2011). DEBT t-1 closely tracks DEBT, since it's the previous year's value. The std deviation of DEBT was 20.4%. The real interest Rate had wide fluctuations, from -10.10% (2009) to 21.10% (1998). The high variance suggests fluctuating monetary conditions. Average growth of 3.73%, with contractions in 1992 (-0.8%) and 2020 (-0.3%) and max of 0.8% in 2010. The std deviation of 2.26% shows low variability suggesting that economic growth is relatively stable year-to-year. There is a significant depreciation of the Kenyan shilling over time, from 22.91 (1990) to 139.68 (2023). The table shows persistent deficits (avg: -3.84% of GDP), worst in 1993 (-8.57%). The only surplus years are 1999 (0.8%), 2000(0,4%), and 2004(0,5%). High std deviation for the fiscal balance, output gap and expenditure gap reflect economic volatility and fiscal uncertainty. The output gap range was between -36,362 to +8,846 with a mean of -2462.19 indicating that the economy was often operating below potential. The expenditure gap -28,381 to +34,277 and a mean of 1801.19 suggests government spending often exceeding target levels.

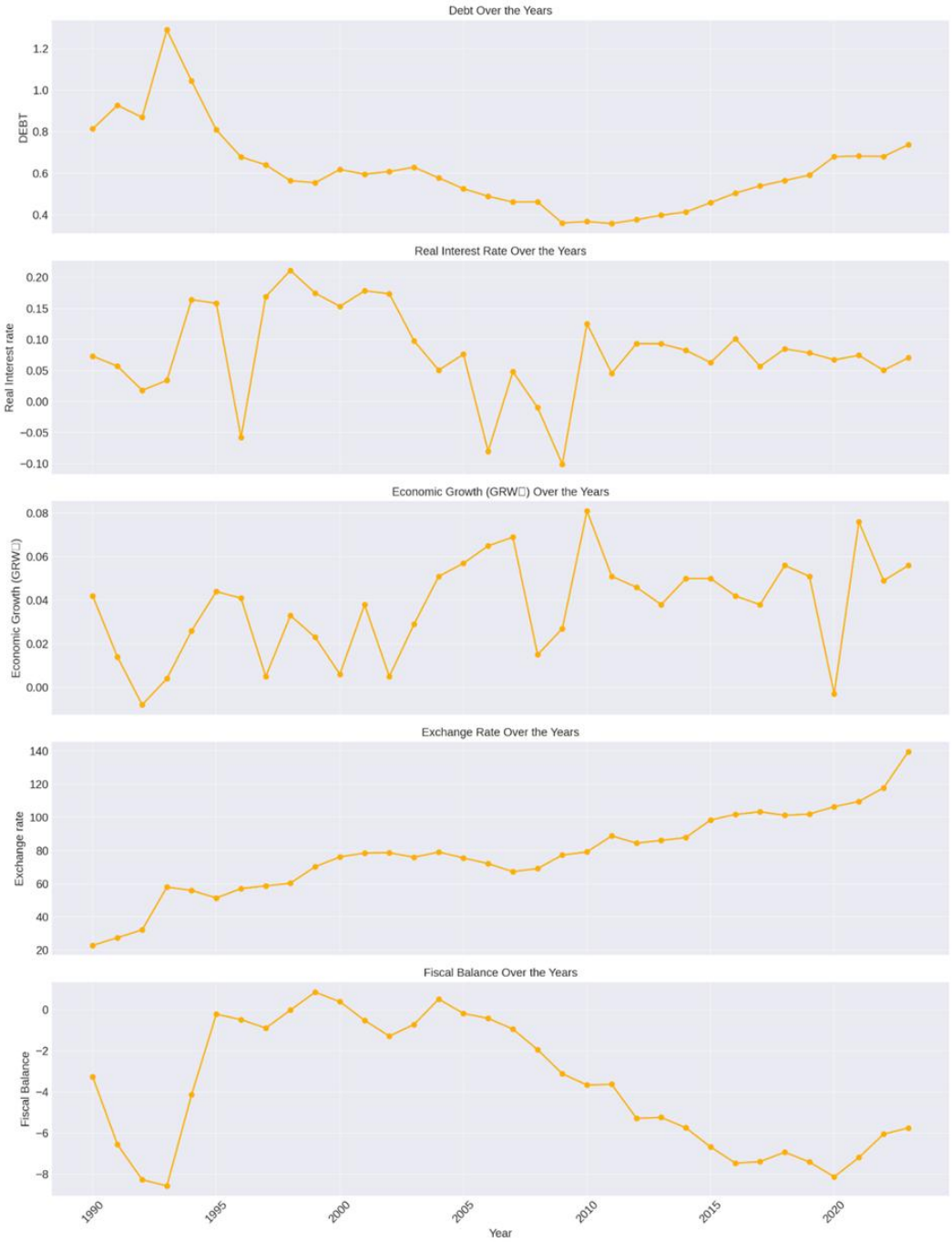

Figure 4.1: Economic trend of key economic indicators over time
Source: Research Data 2023

Figure 4.1 shows the Debt to GDP ratio has a sharp upward trend in 1993 followed by a steady decline until from 2013 when it starts to gradually increase with a sharp increase from 2020 to 2023. It hits the lowest level between 2009 and 2011 and sharply increasing hitting the highest level in 2023 at 73.73%. The real interest rate shows fluctuations, including negative values between 2005 and 2009 indicating periods of economic instability. The economic growth rate has been mostly positive but volatile, with noticeable dips during global downturns (e.g., 1992, 2002, 2008, and 2020). The foreign exchange rate indicates a steady depreciation of the Kenyan Shilling (Ksh) against the USD over time. The primary balance has been alternating between surpluses and deficits, with increasing volatility in recent years. The overall trend shows improving fiscal health and declining debt between mid-1990s and early 2000s, between mid-200s and 2010 there is more stability but also hints of growing structural imbalance. Finally, post 2013 there is evidence of rising debt, falling fiscal balance, persistent negative output gaps, and rising government expenditure.

Diagnostic Tests
Normality

Table 2.2: Shapiro-wilk test

Variable	Obs	W	z	Prob > z	Normality
DEBT	34	0.90003	2.605	0.00460	❌ Not Normal
ln_DEBT	34	0.97278	-0.106	0.54228	✅ Normal
Fiscal Balance	34	0.90298	2.543	0.00550	❌ Not Normal
ln_Fiscal Balance	34	0.89505	2.706	0.00340	❌ Not Normal
Output Gap	34	0.61030	5.440	0.00000	❌ Not Normal
ln_Output Gap	34	0.28634	6.701	0.00000	❌ Not Normal
Expenditure Gap	34	—	—	0.00000*	❌ Not Normal
ln_Expenditure Gap	34	0.27809	6.724	0.00000	❌ Not Normal
Real Interest Rate	34	0.94181	1.477	0.06981	✅ Normal
Economic Growth	34	0.96891	0.171	0.43195	✅ Normal
Exchange rate	34	0.97784	-0.534	0.70337	✅ Normal

Some data variables were still not normally distributed even after transformation. However, the Markov Switching Models are built to capture structural breaks, regime shifts, and non-linear dynamics in time series data. These types of models are less sensitive to violations of normality and hence the MSM can still hand the non-normal variable without affecting the results of the study.

Heteroscedasticity

```
White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(9)      =      6.45
         Prob > chi2  =    0.6938

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	6.45	9	0.6938
Skewness	3.52	3	0.3187
Kurtosis	0.81	1	0.3675
Total	10.78	13	0.6291

.

Heteroskedasticity Chi² (9) = 6.45, p = 0.6938 we do not reject the null hypothesis of homoscedasticity. The White's test indicates that the model is not heteroscedastic.

Multicollinearity

```
. vif
```

Variable	VIF	1/VIF
FiscalBala~e	1.61	0.620975
Exchangerate	1.57	0.637527
ln_DEBT	1.45	0.689082
OutputGap	1.23	0.814789
RealIntere~e	1.19	0.841463
Expenditur~p	1.12	0.890886
Mean VIF	1.36	

All VIF values are below 5, hence there is no multicollinearity concern.

Stationarity test

Table 4.3: ADF Test results

Variable	ADF Statistic	5% Critical Value	p-value	Stationary at 5%?
ln_DEBT	-1.641	-2.98	0.4616	No
DEBTt1	-1.629	-2.980	0.4679	No
RealInterestrate	-2.886	-2.98	0.047	Yes
EconomicGrowth	-3.221	-2.98	0.0188	Yes
Exchangerate	-0.327	-2.98	0.9216	No
FiscalBalance	-2.22	-2.98	0.1991	No
OutputGap	-2.996	-2.98	0.0352	Yes
ExpenditureGap	-4.725	-2.98	0.0001	Yes

Ln_DEBT, DEBTt1, Exchangerate, and Fiscal Balance are non-stationary therefore we differenced the non-stationary variables.

Table 4.4: Stationarity results after first differencing

Variable	ADF Statistic	5% Critical Value	p-value	Stationary	Order of Integration
ln_DEBT	-1.641	-2.980	0.4616	No	I(0)
D_ln_DEBT	-5.118	-2.980	0.0373	Yes	I(1)
DEBTt1	-1.629	-2.980	0.4679	No	I(0)
D_DEBTt1	-3.922	-2.980	0.0019	Yes	I(1)
RealInterestrate	-2.886	-2.980	0.0470	Yes	I(0)
EconomicGrowth	-3.221	-2.980	0.0188	Yes	I(0)
Exchangerate	-0.327	-2.980	0.9216	No	I(0)
D_Exchangerate	-3.225	-2.980	0.0186	Yes	I(1)
FiscalBalance	-2.220	-2.980	0.1991	No	I(0)
D_FiscalBalance	-3.963	-2.980	0.0000	Yes	I(1)
OutputGap	-2.996	-2.980	0.0352	Yes	I(0)
ExpenditureGap	-4.725	-2.980	0.0001	Yes	I(0)

Cointegration test

Since Ln_DEBT, Exchangerate, and Fiscal Balance are non-stationary at first test but stationary at first difference a cointegration test was conducted using Johansen cointegration test

```
Vector error-correction model

Sample:  1991 - 2023                    Number of obs     =        33
                                        AIC               =  8.277755
Log likelihood =  -128.583              HQIC              =  8.399822
Det(Sigma_ml)  =  .4863995              SBIC              =  8.640544

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
D_ln_DEBT              2     .127412   0.0006   .0183368   0.9909
D_Exchangerate         2     6.78323   0.2377   9.666328   0.0080
D_FiscalBalance        2     1.20576   0.3084   13.82108   0.0010
------------------------------------------------------------------
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_ln_DEBT						
_ce1						
L1.	-.0013428	.065912	-0.02	0.984	-.1305279	.1278423
_cons	-.0019836	.0532232	-0.04	0.970	-.1062992	.1023321
D_Exchangerate						
_ce1						
L1.	2.906378	3.509048	0.83	0.408	-3.971229	9.783986
_cons	1.405174	2.83352	0.50	0.620	-4.148423	6.95877
D_FiscalBalance						
_ce1						
L1.	2.308139	.6237535	3.70	0.000	1.085604	3.530673
_cons	-1.769378	.5036745	-3.51	0.000	-2.756562	-.7821938

Cointegrating equations

Equation	Parms	chi2	P>chi2
_ce1	2	11.21057	0.0037

Identification: beta is exactly identified

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
ln_DEBT	1	.	.	.	.	.
Exchangerate	.0086278	.003513	2.46	0.014	.0017424	.0155131
FiscalBalance	-.0356746	.0257244	-1.39	0.166	-.0860935	.0147444
_cons	.4899959	.	.	.	.	.

Cointegrating equation (_ce1) is significant at p = 0.0037, so the long-run relationship exists. Only D_FiscalBalance responds significantly to the error correction term, suggesting it's the one adjusting toward equilibrium. ln_DEBT and Exchangerate don't significantly adjust in the short run (at least with one lag and constant trend). Since some variables were I(0) (stationary) and others I(1), the analysis proceeded working without cointegration in some variables, since the study used Regression Models. In such models each variable is explained by its historical values and the historical values of all other variables in the system.

Autocorrelation

```
. varlmar

  Lagrange-multiplier test
```

lag	chi2	df	Prob > chi2
1	56.7722	49	0.20793
2	47.8494	49	0.51978

```
  H0: no autocorrelation at lag order

.
```

The residuals do not exhibit significant autocorrelation at lag 1 or 2.

Model Fit & Diagnostics

```
Vector autoregression

Sample:  1992 - 2023                    Number of obs     =         32
Log likelihood =  -590.5962             AIC               =    43.47476
FPE            =   3.13e+10             HQIC              =    45.06896
Det(Sigma_ml)  =   2.53e+07             SBIC              =    48.28421

Equation          Parms      RMSE    R-sq     chi2     P>chi2
------------------------------------------------------------
ln_DEBT              15    .105781  0.9316  435.5174   0.0000
RealInterestrate     15    .072353  0.4786  29.36853   0.0093
EconomicGrowth~          15    .014941  0.7674   105.552   0.0000
Exchangerate         15    8.01515  0.9274  408.5778   0.0000
FiscalBalance        15    .846753  0.9612  791.9026   0.0000
OutputGap            15    11157.8  0.3120    14.515   0.4121
ExpenditureGap       15    11423.9  0.3757  19.25784   0.1553
------------------------------------------------------------
```

The Sample size is sufficient for regression with reasonable lags. Strong fits: ln_DEBT, Exchangerate, FiscalBalance, and EconomicGrowth. These variables are well-explained by the VAR system. Weaker fits: OutputGap and ExpenditureGap. Low R-squared and high p-values suggest they're not as responsive within this system. RealInterestrate has a borderline R^2 (~0.48), but statistically significant and hence useful.

Regression analysis

The Markov-Switching Dynamic Regression examines the effects of fiscal policy regimes on public debt in Kenya. The independent variable analyzed it the public debt to GDP ratio at period t. The independent variables

were debt to GDP ratio at period *t-1*, real interest, fiscal balance, exchange rate, economic growth, output gap and expenditure gap. Table 4.5 presents the Markov-Switching Dynamic Regression results.

Markov-Switching Dynamic Regression Results
Sample: 1991 - 2023 **No. of obs** = 33
Number of states = 2 **AIC** = -1.4565
Unconditional probabilities: transition **HQIC** = -1.2734
SBIC = -0.9123
Log likelihood = 36.03172

Table 4.5: Markov-Switching Dynamic Regression Results

D_ln_DEBT	Coef.	Std. Err.	Z	P>|z|	[95% Conf. Interval]	
D_ln_DEBT						
D_DEBTt1	-.0259458	.1553763	-0.17	0.867	-.3304779	.2785862
RealInterestrate	.7116694	.2297146	3.10	0.002	.2614371	1.161902
EconomicGrowthGRW$_t$	.2142	1.504833	0.14	0.887	-2.735218	3.163618
D_Exchangerate	.012536	.0031324	4.00	0.000	.0063966	.0186753
D_FiscalBalance	-.0267213	.0117482	-2.27	0.023	-.0497473	-.0036952
OutputGap	-1.10e-06	1.51e-06	-0.73	0.466	-4.06e-06	1.86e-06
ExpenditureGap	-1.68e-06	1.33e-06	-1.26	0.207	-4.28e-06	9.29e-07
State1						
_cons	-.2070234	.0787313	-2.63	0.009	-.361334	-.0527129
State2						
_cons	-.055168	.0778737	-0.71	0.479	-.2077976	.0974616
Sigma	.0565043	.0124392			.0367023	.08699
p11	.7210172	.2362289			.205505	.9627184
p21	.1761295	.162894			.0231352	.6586774

σ (sigma) = 0.0565 — common standard deviation of residuals.

P-Values and Coefficients interpretations

The Markov Switching Dynamic Regression identifies two distinct regimes:

State 1: Constant = -0.20702(p-value = 0.009)

Significant negative intercept suggests that public debt is low in this state hence **passive regime**

State 2: Constant = -0.05517 (p-value = 0.479)

Insignificant negative intercept suggesting an **active regime**

The intercepts are ***α0(St)*** that varies across different regimes.

As presented in table 4.5, the Markov dynamic regression model finds that real interest, exchange rate, and fiscal balance are statically significant with P-values of less than 0.05 at the 95 percent significance level. Lagged debt, economic growth, output and expenditure gaps are statically insignificant with P-values of more than 0.05 at the 95 percent significance level.

Real interest is highly significant. A one percent rise in real interest increases debt growth by 0.71%. This supports debt dynamics theory in the theoretical framework that increases in interest rates make debt more expensive. Exchange rate is strongly significant indicating that 1% depreciation leads to 0.013% increase in debt. Currency depreciation is associated with debt growth especially for foreign nominated debts. Fiscal balance is significant with a negative coefficient of -0.0267 confirming our expectation that improved fiscal balance reduces debt growth.

Lagged debt is statically insignificant despite the expectation and the theoretical framework where debt in period t was affected by debt in period t-1. Economic growth, output gap and expenditure gap are also statically insignificant.

Transition Probabilities

The transition probabilities refer to the likelihood of a transition occurring between two states. The Markov switching Dynamic Regression mode estimated the likelihoods of the regimes switching from one state to another and the results are as below;

Transition Probabilities	Estimate	Std. Err.	[95% Conf.	Interval]
p11	.7210172	.2362289	.205505	.9627184

p12	.2789828	.2362289	.0372816	.7944950
p21	.1761295	.162894	.0231352	.6586774
p22	.8238705	.162894	.3413226	.9768648

The result show that, once in state 1, there's a 72.10% chance of staying and 27.9% chance of switching to State 2. Once in State 2, there's a 17.61% chance of switching to State 1 and 82.39% chance of staying in State 2. There is strong persistent in both states though state 2 is more persistent at 82.39% than state 1 at 72.10%. This suggests that while the passive regime exhibits some persistence, there is a reasonable chance of switching to an active stance when economic or fiscal conditions change and staying there. The results are consistent with Kenya's fiscal policy history, where periods of fiscal consolidation and debt stabilization have often been followed by prolonged episodes of fiscal expansion and excessive borrowing.

Expected Regime Duration

The expected duration of each regime is calculated using the transition probabilities from the Markov-switching model as follows;

Expected Regime Duration$_{(i)} = \frac{1}{1-pii}$

State 1

Duration State 1=1/ (1−0.7210) ≈**3.58 years**

State 2

Duration State 2=1/ (1−0.8239) ≈**5.68 years**

The average duration is roughly **4.63 years≈5years**

The results suggest that the Active Regime tends to last longer, with an average expected duration of approximately 5.7 years, while the Passive Regime persists for about 3.6 years before switching which coincides with the transition probabilities results.

Structural Breaks

The study identified structural breaks through the Markov-Switching Dynamic Regression model which allows for the identification of structural breaks in the fiscal policy regimes over time by examining changes in regime probabilities. The structural breaks represent point and time where there was a shift in fiscal policy behavior affecting debt dynamics. The Markov-Switching Dynamic Regression model results presented in Figure 4.2 and table 4.6 identify four notable structural breaks for the study period.

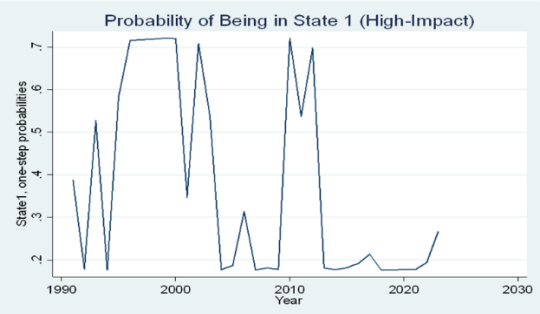

Figure 4.2: Regime Probabilities
Source: Stata

Table 4.6: Identified structural breaks in Stata

	Year
1.	1993
2.	1995
3.	2002
4.	2010

There are structural breaks detected in the years 1993, 1995, 2002, and 2010, which correspond to major fluctuations in regime probabilities observable in figure 4.2. Between 1990 and 1994 there is a volatile switching between states with most probabilities falling to below 0.5 indicating a more persistent active regime. There is a structural break in 1995 showing efforts for debt stabilization and transition to a passive regime. In the late 1990s and around 2010, the probability of being in State 1 is consistently high (close to or above 0.7). This suggests that

during these periods, the economy was predominantly in the Passive Regime (State 1). From the mid-2000s and especially after 2012, the probability of State 1 drops sharply and remains low (below 0.2) for extended periods, particularly after 2015. This indicates a strong shift away from the passive regime to the active regime (State 2) during these years.

The graph confirms the transition probabilities results where State 1 is not persistent throughout the sample. State 2 is more persistent with long stretches of time especially in the last decade. The identified structural breaks also correspond to important historical, political, and economic events that shaped Kenya's fiscal policy stance over time.

Achievements of the Study Objectives

The primary objective of the study was accomplished by using transition probabilities and intercepts to identify fiscal policy regimes. The presence of two regimes (passive and active) confirmed that Kenya's fiscal policy has not been static overtime. The model incorporated regime-specific intercepts $\alpha 0(St)$, which captured the average debt growth behavior intrinsic to each fiscal policy regime, independent of the explanatory variables. The statistically significant negative intercept in State 1 indicated that, on average, public debt growth was lower in this regime, and the insignificant intercept in State 2 indicated that debt growth was uncontrolled during the Regime. The regression results therefore confirmed that fiscal policy regime affect public debt in Kenya because while statically significant variables such as the real interest rate, exchange rate, and fiscal balance showed strong effects on debt growth across both regimes, the differing intercepts showed that the fiscal environment within which these effects operate determined the level of public debt.

The study also established the duration of fiscal policy regimes through the transition probabilities and computation of expected duration which revealed that the active regime was more persistent and lasted for approximately 6 years while the passive regime lasted for approximately 4 years

The study also showed that passive fiscal regimes favored debt stabilization compared to active regimes. The intercept for State 1 is -0.2070 ($p=0.009$), which was statistically significant and negative, suggested that during periods classified under this regime, public debt growth was lower on average. Additionally, the regime probability plot shows that during certain periods, particularly in the early 1990s and around 2010, the probability of being in State 1 was consistently high, reflecting proactive fiscal management aimed at debt stabilization. This historical alignment further validates the model's ability to differentiate between the two regimes in terms of their debt stabilization capacity.

V. Summary, Conclusions And Policy Implications

Introduction

The chapter provides a summary of the key findings, conclusions, and policy implications arising from study; Fiscal Policy Regimes and Public Debt in Kenya. It further identifies limitation of the study and potential areas for further research.

Summary

The main objective of the study was to examine fiscal policy regimes' effects on public debt in Kenya. The study's specific objectives were to establish how long fiscal policy regimes last and the fiscal policy regimes that favor debt stabilization in Kenya. A two-state Markov Switching Dynamic Regression (MSDR) model was estimated using annual data from 1990 to 2023, with the growth rate of public debt (D_ln_DEBT) as the dependent variable. The model captured unobserved regime shifts in fiscal policy behaviour and identified how these regimes affect debt accumulation. The model was therefore able to address literature gap by tying the fiscal regime changes to public debt levels.

The model identified two regimes; passive regime with an intercept = -0.207 ($p = 0.009$) showing that the government in this regime was concerned with debt stabilization and an active regime with an intercept of -0.055 ($p = 0.479$), which is insignificant implying lax fiscal policy. There was a 72.1% chance of remaining in a passive regime and a 82.4% chance of remaining in an active regime. The transition probabilities indicated that the active regime was more persistent. The average time for regime change was 4.68 years with the passive regime lasting approximately 3.59 years and the active regime persisting for approximately 5.68 years. Th Structural breaks were detected in the years 1993, 1995, 2002, and 2010, which correspond to major fluctuations in regime probabilities graph. The graph showed the passive regime being more prominent in the late 1990s and early 2000s until around 2010. The active regime kicks off in earnest around 2012 and persists until 2023 with a very minimal likelihood of returning to the passive state.

The regression results showed that real interest, exchange rate, and fiscal balance were statically significant. Real interest had a positive relationship with debt growth with a coefficient of 0.712 showing that a higher borrowing cost increases debt level. Change in exchange rate also had a statistically significant positive correlation with debt growth with ($\beta=0.0125$, $p<0.05$) suggesting that currency depreciation increases a country's

debt burden particularly for the foreign nominated debts. The negative coefficient of -0.0267 for fiscal balance indicated that increases in fiscal balance lower governmental debt.The other variables such as economic growth, output gap, and expenditure gap did not show significant effects in this specification.

Conclusion

According to the study, Kenya's public debt levels are significantly influenced by fiscal policy regimes. The study shows two distinct fiscal regimes where in state1 (passive regime) there is fiscal discipline which corresponds with reduced debt levels and state 2 (active regime) where there is greater fiscal instability leading to higher debt growth and does not promote debt sustainability. There is also a persistence of the active regime showing that Kenya has historically remained longer in period of unstainable fiscal regime. The study findings underscore the need for fiscal discipline to stabilize debt. The study confirms that Kenya's debt is highly sensitive to policy choices rather than historical debt levels, since lagged debt was statically insignificant, emphasizing the need for proactive fiscal management in stabilization efforts. There is also to need improve fiscal balance and manage the risks related to exchange rate volatility as well as real interest rates.

Policy implications

The findings confirm that fiscal policy regimes affect public debt dynamics in Kenya. Kenya tends to spend more time in the active regime which does not encourage debt reduction. Policy makers should track regime changes and anticipate shifts in economic conditions such as exchange rate shocks that affect debt levels, using the probability of State 1 as a real-time indicator. For sustainable debt management, policy makers should strengthen the institutional rules such as fiscal deficit caps, debt brakes/ debt ceilings and policy frameworks that support the conditions observed in a passive regime. Policy makers should also avoid prolonged active regimes as they lead to debt accumulation and unsustainability. Policy makers should also aim at improving the fiscal balance, and mitigating exchange rate and interest rate vulnerabilities. The study also implies that Kenya debt dynamics is not influenced by past debt levels hence not reliable parameter in forecasting future trends. Policy makers should therefore concentrate on proactive fiscal management in stabilization efforts.

Limitations of the Study

The study was limited in terms of sample size (33 observations) because of data unavailability and reliability for data going back past 1990. The limited sample size prevented the coefficients of the key variables from varying across regimes because of collinearity. There is need for government, especially the Central Bank and KNBS, and other data sources such as World bank and IMF to back date their records to cover up to at least independence period (1963). There is also need for the government to synchronize all these data sources for data reliability.

Areas of Further Studies

Due to the sample size limitation, the model assumed that only intercepts switch between states and the coefficients are fixed across regimes. In the event there is availability of sufficient and reliable data, further investigation can be carried out by allowing key coefficients to vary by regime. This can reveal whether the impact of predictors changes during different regimes. The model captured only two states. There is room for further research to be carried out with an increased number of regimes to capture complex real-world economic dynamics. Further, the study used time series data Markov switching dynamic regression as a method of estimation, a similar study can therefore be done using different estimation techniques such as Bayesian methods or Markov Chain Monte Carlo.

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