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The Dual Impact Of Foreign Exchange And Institutional Quality On Fiscal Sustainability In Sub-Saharan Africa

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Abstract
The objective of this paper was to analyze the impact of foreign exchange rate and institutional quality on fiscal sustainability in Sub-Saharan Africa. The study analyzed a sample of 966 country-year observations drawn from 42 countries over the years 2000–2023. The study employed the GMM model analysis on the panel data to test the hypotheses. In addition, the fixed effect model was employed to validate the baseline regression results. Results based on the GMM model suggest that foreign exchange rate and institutional quality both have positive effect to the fiscal sustainability respectively. In other words, foreign exchange rate appreciation led to higher fiscal sustainability in SSA. Similarly, inclusive institutional increases fiscal sustainability. Our results remained robust under fixed effect model. The practical implications of these findings suggest that policymakers should prioritize strengthening institutional frameworks and stabilizing foreign exchange rates to enhance fiscal sustainability. Investing in governance and regulatory transparency will promote accountability and economic growth, while measures to manage currency volatility will protect fiscal health. These strategies will create a more resilient economic environment conducive to sustainable development.

Keywords: *Fiscal debt, Institutional quality, generalized method of moment model, fixed effect model*

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I. Introduction

Taking into consideration Alexander Hamilton's quote on public debts, it may also be stated that sustainable debt could act as a regional strength (Barreyre & Delalande, 2020). However, Latin America has not been able, in the past, to maintain a high amount of indebtedness, especially in the form of long-term local currency debt. Eichengreen and Hausmann (2005) described this as Latin America's 'original sin'. When a country is able to ensure that deficits and high debts are sustainable, then these acts can be a boon for the economy since they aid in the growth of the economy. On the other hand, fiscal surpluses and falling debt are not always beneficial. This view is consistent with Abba Lerner's (1943) concept of 'functional finance'; where deficits and debt have to be assessed from their economic effects and not from the conventional 'sound finance' standpoint. According to Lerner, if deficits and debts help promote growth and generate more equitable income distribution then they are beneficial, otherwise surpluses and debts reductions are only as positive as the contribution they make.

After the Asian crisis of 1997 and the global financial crisis of 2008 exchange rate became a major concern for the emerging economies due to the effects of foreign capital inflows or outflows on exchange rate and macro-economic stability. Dua & Sen (2017) and Park & Sung (2020) cited Eichengreen and Hausmann (1999) indicating that crises in Asia and Latin America in the 1990s was due to external borrowing in foreign currency and intensification of downturns. Besides, Bordo et al. (2001) proved that the growth of foreign currency debt increases the vulnerability to currency and debt crises. Still, Radalet et al. (1998) and Rodrik & Velasco (1999) demonstrated that short term capital flows contributed to the escalation of financial crises.

Ever since Adam Smith, the issue of government debt has remained central to political economy. In light of Domar (1944), scholarly debates on public debt have focused on issues to do with sustainable and the right amount of outstanding public debt balance as well as on ways of getting public sector net cash flow to zero. After the global financial crisis in 2008, the issue of public debt has emerged on the agenda of policymakers, analysts and journalists due to the numerous fiscal incentives (Cox, 2020). Whereas earlier, the debt crisis was witnessed only in developed countries and emerging economies like the Eurozone, debt problems have plagued even low-income countries quite seriously as these fiscal challenges show (Bua et al.,

2014; Essl et al., 2019; De Marchi, 2022). Political authorities are becoming more aware of time horizons extending to future generations. Studies suggest that budget deficits together with impacts of public debts are among the critical components of fiscal policy, especially when there exists a large scale of fiscal easing (Chuku et al., 2023). While government expenditure is involved in economic progress, high levels of debt result in budget imbalances, forcing governments to borrow from domestic and international markets to finance these imbalances (Adam & Bevan, 2005; Loganathan et al., 2010; Baldacci & Fletcher, 2004). Therefore, borrowing in an effort to finance budget deficits automatically creates huge financial commitments for governments, often leading to repeated debt sustainability issues (Cassimon et al., 2008)."

"According to economic principles, debt, specifically that owned by the public, can enhance a nation's economy as long as it is well managed. This outcome, however, has not been consistently delivered in sub-Saharan Africa (SSA) (Olaoye, 2023; Akinsola, 2020; Saleh, 2015). As seen in other parts of the world where institutional quality is better, public debt has largely enhanced the advancement of economy (Jalles, 2011; Kim, Ha, & Kim, 2017). However, it is almost astonishing to note that many SSA nations are still piling up public debt while they constantly exhibit low economic growth (Bataka, 2023; Fosu, 1996; Iyoha, 1999). Debt stabilization measures like debt rescheduling, Structural Adjustment Programmes and debt relief efforts have been used to address over borrowing. However, these efforts have not effectively dealt with the emergent debt crises within the region as ongoing low economic growth and high debt levels are still considered as struggles (Bataka, 2023; Ershad Hussain, Haque, & Igwike, 2015; Lekomola, 2010). This scenario calls for more attention to avoid a repetition of the 1980 and 1990s debt crisis that hit most SSA countries.

Preliminary evidence suggests that institutional quality serves as the primary determinant of cross-country differences in economic growth (Acemoglu et al., 2001; Butkiewicz & Yanikkaya, 2006; Siba, 2007). Moreover, the studies show that effects of finance on growth are more significant in the countries with better institutions (Law, Azman-Saini, & Ibrahim, 2013; Law & Habibullah, 2006). This underlines the necessity of examining the institutional quality in the context of the debt –growth nexus, which has been understudied in SSA literature. Strong institutions are believed to enhance the borrowing efficiency (Daud & Podivinsky, 2014; Presbitero, 2008), while the weak ones can lead to borrowing volatility and wasted borrowed resources on valueless projects (Jalles, 2011) and lead to default and stagnation (Ciocchini et al., 2003). Since underdevelopment of SSA is blamed on poor institutional quality (Brautigam & Knack, 2004; Siba, 2007) and a burgeoning debt burden (Ezenwe, 1993; Iyoha, 1999; Omotola & Saliu, 2009), this study aims to investigate the effect of institutional quality on fiscal sustainability in SSA. This is especially relevant given the current state of affairs in the institutional quality of the region: high corruption, relatively low rule of law, social unrest, political instability, and regional conflicts explain significant fiscal and external imbalances. These challenges augment public debt requirements and escalate the implications of sustaining security (Onuoha & Qobo, 2012; Tarek & Ahmed, 2017).

There has been literature focusing on the relationship between exchange rate, institutional quality, and fiscal sustainability. This paper seeks to assess the impact of exchange rate fluctuations and institutional environment on fiscal balance in forty-two SSA countries for the period 2000-2023. Thus, applying the GMM panel data model to the specified research question for the first time, this study is exceptional within the SSA context as it employs the GMM technique while other relevant studies have not. The remainder of this document is structured as follows: Section two discusses related empirical studies on the first two relationships in focus, which are foreign exchange rate and fiscal sustainability and institutional quality and fiscal sustainability. The following section provides an outline of the data employed in this study, the methodologies used for the assessment and the identification of variables. In Section 4, the results are presented and discussed in multiple models and Section 5 offers policy implications of the results.

II. Empirical Literature

Foreign exchange rate and Fiscal sustainability

Previous literature exploring Foreign exchange reserves, rates, and foreign debts have included both the developed and developing countries for investigation using different econometric models at different periods too. For example, Fida et al. (2012) examined the relationship between foreign debt and exchange rate by using Johansen cointegration technique to test the long-run co-integration between foreign debt and exchange rate. They chose to use VAR and cointegration to check for the presence of a long-run relationship between these variables and they confirmed from the result that these variables are related in the long-run. In the sample of India, Cooper (2019) used a declining domestic currency value that enhanced the demand for foreign currency for foreign debts' servicing as the key factor driving the increase in foreign debt and the depreciation of the exchange rate. The following is the conclusion that Cooper made; the compounded annual growth rate in debt was 11.80% and this was coupled with the depreciation of the Indian Rupee as foreign debt escalated.

In another study, the relationship between inflation, credit, and exchange rate in Malaysia was examined through the cointegration and Granger causality analysis for the period 1960–2014 by Yien, Abdullah and Azam. In the long-run, they established that there was only unidirectional causality flowing from the exchange rate to the public debt. They also discovered that there was bidirectional causality between FDI, economic growth, domestic debt, and inflation. Moreover, in a connected research study, Middle Eastern and North African countries, including Morocco, Egypt, Jordan, Turkey and Tunisia, Author Neaime (2009) have used granger causality approach on panel data to establish and estimate of the impact of foreign debt on exchange rates, whereby there was positive regression between external public debt and the exchange rate.

In Nigeria, Konneh, (2022) has identified external debt as having relationships with the exchange rate, domestic prices, government spending, and interest rate from 1975 to 2006. The analysis showed that the increase in the exchange rate coefficient implies a statistically significant decrease in external debt: the level of external debt was 0.01 percentage points lower each year with one-percent growth of exchange rate. In Kenya, Odera (2015) adopted an OLS regression analysis to investigate the effects of exchange rate volatility and external public debt in Kenya in the period 1993-2013, coming to the conclusion that the exchange rate volatility may have an impact on the additional expansion of public debt.

In the context of South American countries, Breton (2004) have estimated a long-term, positive co-integrating relationship between public debt and real exchange rates using small open economy model. Likewise, Ouhibi and Hammami (2020) tried to analyze the impact of exchange rate fluctuations for debt, public debt service, and public debt management for Thailand for the period of 1990–2017. Their conclusion pointed to the fact that due to the fluctuating nature of key currency exchange rates, most from mid-eighties, public debt management strategies was increasingly built much stronger. This body of literature also captures the multi-faceted and sometimes time and region sensitive relationship between foreign debt, exchange rates and other macroeconomic indicators.

For Nigeria in particular Abdullahi et al. (2015) recognized a macroeconomic vector analysis to identify if the foreign debts where stimulated by macroeconomic indicators like interest rates, national savings, exchange as well as budget deficits in the short-run and long-run. During short and long run, the results revealed that interest rates, exchange rates, and budget deficits had negative and significant effects on FDS in the foreign countries. However, contrary to Abdullahi et al' study, Anidiobu and Okolie (2016) found a positive relationship between foreign exchange rate and foreign debt in Nigeria. Based on their research, these experts on currency management recommend that in order to attain a stable exchange rate, there is the need to focus the foreign debt on improving the production of the non-oil sectors, encouraging import substitution and export promotion.

Enhancing the discourse on Nigeria's foreign debt profile, Senibi et al. (2016) noted that foreign debt was often used to top up forex reserves, to finance balance of payment shortfalls, and to compensate for lost income – which resulted in exponential debt accumulation. Their study also suggested that there was a long-term positive short-run causality between public debt and foreign exchange reserves with the sovereign debt crisis being associated with external and internal factors which include structure of Nigerian economy, economic policies, high oil dependency and exchange rate volatility. In that sense, this correlation means that currency depreciation theoretically raises foreign debt and vice versa.

Sayoga (2017) has defined foreign exchange Reserves as a reserve of foreign currency, which are external assets of high liquidity, held by a country's monetary authorities and usable for the settlement of international claims and trade obligations. Hence, these reserves are well correlated to the levels of foreign debt. The same finding was made by Qian and Steiner (2017) using the VAR approach to determine that foreign exchange reserves have a positive correlation with both public and private foreign debts. The findings also revealed that levels of reserve had an inverse relationship with the cost of servicing foreign debt through moderating the risks inherent in debt instruments especially in the short and long term debts.

Septia Lygina et al. (2015) employed Granger causality analysis to investigate on the nexus between foreign exchange reserves and foreign debt in Indonesia for the period of 2003 to 2013. Thus, their findings illustrated a unidirectional causal relationship between the foreign exchange reserves and foreign debt. This collection of studies recognizes the complex nature of macroeconomic relationships between the selected variables, exchange reserves, and debt levels with consideration of the structural characteristics of the countries under comparison.

Based on the theoretical and empirical reviews, we formulate the following hypotheses:
H1. *Foreign exchange rate has a significant effect on Fiscal sustainability in SSA*

Institutional quality and fiscal sustainability

Jalles (2011) studied various facets of democracy such as democratic accountability as well as corruption control on the debt growth relation in 72 developing countries for 1970–2005 period. These results

pointed out that the lower the corruption levels, the better the countries' debt management, proving that better institutional governance leads to healthier debt conditions. In the same way, Kim et al. (2017) tried to analyze the effect of corruption on the debt-growth nexus and observed that corruption exerted statistically significant and negative impact on reducing the capacity to overcome debt in developing states.

Building upon such a framework, Cooray et al. (2017) explored the relationship between corruption, the shadow economy, and government debt over the period 1996–2012 and showed that the effects of corruption and the shadow economy are synergetic to the public debt. They also found out that the shadow economy erodes the potential tax revenue thereby increasing debt levels. In addition, Daud and Podivinsky (2014) applied the threshold analysis to estimate the interaction between public debt, economic freedom and growth in Malaysia and showed that the quality of institutions plays a moderating role in this respect.

In their more recent study, Tarek and Ahmed (2017) argued that frail institutions cause public indebtedness in MENA. They found out that political stability, regulation quality, the rule of law has a significant effect on debt levels in the region which in turn has an indirect negative effect on decline of GDP growth. Fan et al. (2008) examined the link between external debt and growth for 114 developing countries and stressed that institution and policies are crucial for debt dynamics. Moreover, Asiedu (2003) employed twelve institutional factors to analyze the relationship between foreign debt cancellation and institutional status in highly indebted countries and realized that institutional quality of such nations is comparatively poor to other developing nations. He noted that to optimally utilize this debt relief, these countries require a certain level of institutional strength.

Thus, despite the conventional assumption that international indebtedness poses a central challenge to economic growth in less-developed states, the true channels through which credit inhibits growth seem to be significant problems of fiscal prudency associated with poor institutional environments. This is suggesting the need for systematic investigation that seeks to answer questions like how institutional quality determines the nature of the relationship between debt and growth especially in SSA where the public debt problem has been well documented but has remained persistent for a long time.

Kaufmann et al. (2011) proposed that officials prefer large projects that involve capital goods over projects that require extensive employment mostly for the purpose of personal gains. Consequently, when a government aims at funding its expenditure through borrowing and when corruption is deep rooted, the necessity for more borrowing increases so as to finance the new expenditure and the costs of servicing the new debt. This kind of corrupt practices directly results to higher public debt and raises the costs associated with it since often, large investments and expenditures are funded through debt. These practices also erode the available resources that are required for other necessities and also compromise the quality of the existing structures such as roads and other public constructions. However, the emphasis is on new, possibly value-added activities (Tanzi and Davoodi, 2012).

From the findings of Delavallade (2006), it is evident that corruption leads to the allocation of public money to sectors including public order, fuel & Energy and cultural and defense. This reallocation points to a reduction on the funding of essential sectors such as education, health and social protection. Governance, corrupt countries are slow to access external funds from global capital markets thus crippled their growth and development (Mohd-Rashid et al., 2023). More so, as these factors lower FDI and in this manner, decrease the prospects of future advancement in open economies. Adams & Opoku (2015) stressed that in the developing economies where economic growth is FDI-dependent, good governance and sound regulations play an important role: in the sub-Saharan Africa, high quality regulations underpin FDI blessings. Comprehensive and efficiently crafted regulations show the government's determination to implement policies that foster Private Sector development by setting competitive environment, modulating economic undertakings, as well as endorsing resource endowed. Observance of these regulations plays a role in the prevention of corruption and consequently, helps in the management of public debts.

In a study conducted by Mehmood et al., (2021) studying the relationship between institutional quality and public debt in Pakistan from 1996 to 2018 the authors concluded that growth in public debt has direct association with voice accountability, regulation quality and corruption. It is their work which shows that there is an inverse relationship between the institutional quality of nations and their ability to protect financial balances from crisis that consequently lead to inefficiencies hence the high public debt. On the other hand, Mehmood et al. (2022) pointed out that higher institutional quality could lead to increased market transparency, and therefore, reduction of the public debt.

Tarek and Ahmed, 2017 studied the linkage between governance and public debts in the context of MENA countries for the period 1996-2015 and they have come to know that political stability, no incidence of violence, regulatory quality and rule of law have great impact on the public debts in these nations. They also pointed out that excellent institutional quality is required in mitigating fiscal and external shocks resulting from terrorism, war expenditures, and oil price changes. While there are a considerable amount of studies that has focused on the relationship between institutional quality and economic growth, investment, and fiscal policy,

much still remains unknown about how different facets of institutional quality are related to public debt – especially in regions such as sub-Saharan Africa.

Based on the theoretical and empirical reviews, we formulate the following hypotheses:
H2. *Institutional quality has a significant effect on Fiscal sustainability in SSA*

III. Research Design

Sample size and data

The target population for this study encompassed all the countries within Sub-Saharan Africa. The criteria for selecting the final sample size were twofold. First, only those nations that were recognized as sovereign republics between 2000 and 2023 were included. Second, the selection process also depended on the availability of comprehensive and complete data for each country under examination. This study used secondary data which are collected from reputable sources, including the World Bank database and the respective national statistics bureaus of the selected countries. Ultimately, the final dataset consisted of 966 country-year observations, encompassing 42 countries, covering the timeframe from 2000 to 2023. This substantial dataset provides a robust foundation for analysis, allowing for a comprehensive understanding of the economic phenomena under investigation in the Sub-Saharan African context. The choice of this specific time frame enables the study to capture trends and patterns relevant to recent economic developments and challenges faced by the region.

Measurement of variables

Dependent Variable

Fiscal sustainability is the dependent variable. Essentially, fiscal sustainability refers to a government's ability to maintain a balanced budget and effectively handle its debt, so preventing future generations from being burdened with an overwhelming amount of debt. The unit of measurement is Debt to GDP ratio.

Independent Variables

Foreign exchange rate is measured as the price of one currency against the USD (Bernoth & Herwartz, (2021). The study utilized the Institutional Quality index, which was created by the world governance indicators. This index includes various factors such as political stability, control of corruption, regulatory quality, the rule of law, voice and accountability, and government effectiveness (Easterly 2002, Al-Marhubi (2004), Méon and Weill (2005), Bjørnskov (2006), Kaufmann et al. (2009), and Langbein and Knack 2010).

Control variable

The population of a given area is the total number of people that are normally found in a given country (Gu, Andreev & Dupre, 2021). There is also economic growth, which is expressed by the change in the gross domestic product (GDP) of a country, which is the total value of all goods and services produced in the country in a given period, usually a year or a quarter. The GDP can be measured in current prices which give the current value of goods and services produced in a country or in constant prices which involves adjustments for inflation to give a better understanding of the real growth in the economy (Mankiw & Taylor, 2020). Inflation can be measured using indices that compare the average price level of goods and services produced in a certain period of time. The most popular is the CPI that gives the average rate of change of the price of a fixed basket of consumer goods and services, including food, shelter, and transport (Mankiw & Taylor, 2020). Human capital is defined as the total health expenditure that is divided by the GDP.

IV. Regression Models

The following regression equations were adopted to test the proposed hypotheses:
Model 1: testing the effect of control variables on fiscal sustainability.

$$FS_{it} = f(POP_{it}, GDP_{it}, INF_{it}, HC_{it}) \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Model 2: testing the effect of foreign exchange and institutional quality on fiscal sustainability.

$$FS_{it} = f(POP_{it}, GDP_{it}, INF_{it}, HC_{it}, FX_{it}, IQ_{it}) \ldots\ldots\ldots\ldots (2)$$

Where:
FS= Fiscal Sustainability
POP= Population
GDP = Economic Growth
INF= Inflation

HC= Human Capital
FX= Foreign Exchange
IQ= Institutional Quality

Empirical findings and discussion
Descriptive statistics

Table I displays the mean, standard deviation, minimum and maximum of variables used in this study. The mean of the fiscally sustainable index for the region is 3.12 while the standard deviation is 5.06 this means that while fiscally sustainable is moderately high in the region there is a high variance in fiscally sustainable indices across countries. The minimum value is very low at 0.0048 which can be attributed to countries in the region with possible severe fiscal problems such as high public debt or fiscal deficits. The highest score of 59.67 indicates that there are certain countries that have good fiscal sustainability, which may be due to good management of budgets or natural resource revenues. Countries with strong fiscal frameworks, such as Botswana, exhibit higher fiscal sustainability, while those with high debt burdens, such as Mozambique and Zimbabwe, struggle to maintain fiscal balance (World Bank, 2022). However, the wide range implies significant variation in the fiscal condition among the countries in the region. The average of population size in Sub-Saharan data set is 20.8 million with a high standard deviation of 305 million due to the variation in population density in this region. The minimum population indicated is 143,714, probably from small country or territory and the maximum of 219 million may include big countries like Nigeria. The demographic situation in the given region with high growth rates of the population in a number of countries indicates the potential for economic development but also the problems associated with the provision of population needs in terms of life support and the provision of jobs, education, and health care. Population growth is a double-edged sword. High growth rates, particularly in Nigeria and Ethiopia, increase labor force participation but can strain resources and infrastructure. Smaller countries like Seychelles face slower population growth, which can limit the size of the domestic market, reducing fiscal revenues from consumption-based taxes

The average economic growth is 60.6 billion USD, and the standard deviation is 224 billion USD, meaning that there is a considerable variation in economic size. The lowest is 76 million USD, it is for smaller or less developed countries or regions; while the highest figure of 2.06 trillion USD probably refers to the larger, resource-endowed nations such as South Africa or Nigeria. The high USD therefore informs of the heterogeneity of the region economically, with small economies to regional powers, most of them being Third World economies. Collectively, the average inflation rate in the region is 10.26%, but the standard deviation is as high as 33.6%, signaling variability in the inflation rates of countries in the region. The minimum inflation rate of -16.86 is an indication of some of the countries having deflation possibly as a result of a shrinking economy or external factors while the maximum of 557.2 is an indication of hyperinflation particularly in Zimbabwe. This wide range illustrates the problem of price stability, which many countries in the region face for reasons like currency devaluation, fiscal deficits, or supply chain disruptions. High inflation, such as in Zimbabwe**,** undermines fiscal sustainability by eroding the value of revenues and increasing debt servicing costs. On the other hand, countries like Botswana with stable inflation rates can better manage public finances. Deflation or very low inflation, as observed in Comoros**,** may signal economic stagnation and reduce fiscal revenue from consumption-based taxes (Barrios et al., 2019).

The regional mean of the human capital index is 5.26 while the standard deviation is 2.32. This implies that there is moderate variability of the human capital for the countries of the world. The minimum value of 1.47 is a sign that some of the countries lack education, health, and necessary skills to advance economically. The maximum value of 22.2 signifies the countries that missed the opportunity to create human capital and intervened in the economy later and brought about betterment. Nevertheless, the majority of the nations in the region still struggle to nurture the required human capital for the continuous growth. The average foreign exchange rate can be estimated at 13.8 million (in local currency per USD) with the highly significant standard deviation of 224 million which signifies that the exchange rate values vary a lot across the region. The minimum of 0.0445 indicates that some countries have stable or even stronger currencies while the maximum of 6.72 billion may be due to the Zimbabwean experience of hyperinflation and currency devaluation. Such a wide fluctuation shows the differences in the stability of currency in different countries due to severe devaluations and exchange rate risks especially during economic turmoil. For instance countries like South Africa have relatively stable exchange rates, fostering investment and fiscal predictability. In contrast, nations such as Sudan experience extreme volatility, which destabilizes trade and increases external debt burdens (IMF, 2023). In the case of institutional quality, the mean score is -0.77 and the standard deviation is 0.66. The negative sign of the mean demonstrates the weakness of regional institutional environments, governance, and corruption. The lowest score of -2.22 is an indication that some of the countries have a very poor institutional quality that hampers development while the highest score of 1.04 shows that some countries have relatively stronger institutions that enhance stability and development. Countries like Mauritius and Botswana score higher on institutional quality,

benefiting from effective governance. Conversely, nations such as Kenya and DRC face governance challenges that undermine fiscal discipline and economic growth. In a nutshell, lack of institutional capital in the region is a major impediment to sustainable growth in the long run.

Table I: Descriptive statistics results

Variable	Obs	Mean	Std. Dev.	Min	Max
Fiscal sustainability	966	3.122617	5.056503	0.004773	59.67141
Population growth	966	2.08e+07	3.05e+08	143714	2.19e+08
Economic growth	966	6.06e+10	2.24e+11	7.60e+07	2.06e+12
Inflation	966	10.26286	33.60457	-16.85969	557.2018
Human capital	966	5.26286	2.318729	1.465947	22.19721
Foreign exchange rate	966	1.38e+07	2.24e+08	0.0444684	6.72e+09
Institutional quality	966	-.7746299	0.6647647	-2.224527	1.044383

Source: Authors computation

Correlation results

Table II shows correlation coefficients which provide some information about the nature of association between, on one hand, fiscal sustainability and on the other hand population growth, economic growth, inflation, human capital, exchange rate and institutional quality. Fiscal sustainability has a weak inverse relationship with population growth ($r = -0.0877$; $p<0.05$). This implies that countries with a relatively high population growth rate will, on average, have lower levels of fiscal sustainability. Population growth may exert pressure on public revenues, especially in developing countries as rising needs for infrastructure, health and education may prove demanding on government's balance sheet. This is especially realized in Sub-Saharan Africa where fertility rates are high and the rate of urbanization is high thus leading to fiscal deficits (Bloom & Canning, 2008). The relationship between fiscal sustainability and economic growth is almost negligible and non-significant with a coefficient of determination of -0.0123. This highlights the fact that a country's ability to sustain fiscal balance does not determine its economic growth performance. External trade, aid, or the fluctuation of commodity prices is likely to exert a greater influence on growth in Sub-Saharan Africa than fiscal discipline (Adegboye, 2021).

Thus, fiscal sustainability is positively though weakly related with inflation where coefficient of correlation was equal to 0.0832 significant at 0.05 level. This means that while countries with sustainable fiscal policy measures may record slightly higher levels of inflation, this may be due to attempts at covering fiscal deficits through monetary expansion or inflationary fiscal measures. Although moderate inflation may go hand in hand with fiscal correction, high sustained inflation rates may offset efficiency of fiscal sustainability through instability in the economy (Bofinger, 2024). Thus, in the context of Sub-Saharan Africa, controlling inflation remains a key concern for fiscal balances as well as macroeconomic stability. Where human capital is the dependent variable and fiscal sustainability is the independent variable, the result shows that the relationship between them is very low and even negative ($r = -0.0140$). This means that level of human capital development does not have direct impact on fiscal sustainability of a country. Although human capital development is crucial for the long-term economic development the short term effect may not have a significant impact on fiscal sustainability especially where other competing budget needs like debt and infrastructure are of paramount concern (Ozili & Iorember, 2024).

The nature of association between fiscal sustainability and foreign exchange rates is also insignificant (Pearson's $r = 0.0264$), which implies that foreign exchange and fiscal sustainability have negligible or no positive relationship. From this dataset, it is not clear that fiscal balance of a country is significantly linked to the stability or value of its currency. This could be due to factors such as changes in the international price of commodities, foreign aid or exchange rates in the sub-Saharan region instead of fiscal policies within the countries. The strongest and positive relationship is observed with fiscal sustainability and institutional quality =0.1860 **(0.05). From this, it can be inferred that higher levels of institutional quality correspond with an ability to attain fiscal balance. Accountable government, fiscal transparency, and sound institutions can improve the responsibility in the management of the government's financial resources and therefore avoid situations that lead to fiscal risk.

Table II: Correlation test results

	FS	POP	GDP	INF	HC	FE	IQ
Fiscal sustainability	1.0000						
Population growth	-0.0877*	1.0000					

Economic growth	-0.0123	0.1725*	1.0000				
Inflation	0.0832*	0.0820*	-0.0283	1.0000			
Human capital	-0.0140	-0.1799*	-0.1744*	-0.0968*	1.0000		
Foreign exchange	0.0264	-0.0151	-0.0134	0.0096	0.1339*	1.0000	
Institutional quality	0.1860*	-0.1271*	-0.0480	-0.1279*	0.0504	-0.0914	1.000

Source: Authors computation
Note(s): *σ<0.05

Regression results

Table III shows the regression results which provide for the fiscal sustainability analysis (Model 1) and discusses the impact of several control variables on fiscal sustainability. The coefficient estimate of the lagged value of fiscal sustainability is negative and statistically significant (Coef = - 0.492, $p < 0.05$). This goes further to show that there is a strong negative first order autocorrelation which means that a higher value of fiscal sustainability in the current period is likely to be followed by a lower value in the next period. The coefficient of fiscal error persistence of -0.492 indicates a high level of persistence in fiscal processes, implying that a sustainable fiscal balance is hard to achieve in the long-run. This finding is in consistent with the argument that fiscal problems might build up over time, and in the absence of other policy measures, past deficits or imbalance could potentially erode future fiscal stability (Havemann & Hollander, 2024).

In the case of the demographic factors, population growth was found to have a positive and statistically significant impact on the degree of fiscal sustainability (Coef = 0.135, $p < 0.05$). This implies that, countries with higher population growth, the aspect of fiscal sustainability is likely to gain. A possible reason is that a growing population can increase the number of people paying taxes and stimulate economic activity leading to increased government revenues. But this may be affected if the economy can support the increased demand in production, employment, and resources for the larger population (Chireshe & Ocran, 2020). For instance, population increase can lead to economic growth in sub-Saharan Africa but it also increases demand for public expenditure on social services including education, health, and infrastructure.

Economic growth leads to fiscally sustainable outcomes (Coeff = 0.058, $p < 0.05$). This observation tallies with the neoclassical view that more economic growth leads to a rise in tax revenues and improves the efficiency of public expenditure (Gurdal, Aydin & Inal, 2021). As economies expand, government receives more revenue from income and corporate taxes making its fiscal balance better off. Economic growth is therefore essential for Sub-Saharan Africa to bring down its debts and maintain fiscal balance when facing volatilities in the prices of commodities and shocks from the external world (Rodrik, 2013).

Inflation significantly and negatively affects fiscal sustainability (Coef = -0.439, $p < 0.05$). In addition, the high inflation rates are known to lead to poor fiscal stability as the cost of servicing the public debts augments while the tax revenues decrease in real value (Dakhlallah, 2020). They can also cause macroeconomic imbalances which in turn may compel governments to borrow or increase expenditure leading to fiscal unsustainability. This result should serve as a reminder that price stability must be upheld in order to preserve long-term fiscal balance. The results further show that human capital exerts a positive influence on fiscal sustainability (Coefficient = 0.224, $P < 0.05$). This implies that nations with more education, skills, and healthy workforce post better fiscal sustainability outcomes. Human capital development results in higher economic productivity and thus improves on the fiscal sustainability by increasing the overall tax returns and decreasing the welfare payment (Bawono, 2021). With regards to the SSA, this result implies that education and health sectors might have the potential to contribute to the improvement in the fiscal sustainability of the region.

The null hypothesis of no first-order autocorrelation in the errors can be rejected as the AR(1) estimate p-value is equal to 0.009. Yet the p-value of the AR(2) test is 0.061 which means that there is no second-order autocorrelation and therefore the model does not have a severe serial correlation problem. The p-value obtained through Hansen test is 0.103 which shows that the instruments applied are appropriate and the model is not over-identified. Based on Hansen test, which is considered more accurate in case of GMM models, the conclusions suggest that the instruments are properly selected and the model is correctly specified. The F-statistic of 175.17 indicates that the overall model is highly significant; it means that the variables used in this model significantly explain the fiscal sustainability.

The results of Model 2 of fiscal sustainability provide some insight into how the various variables impact fiscal sustainability with extra variables such as the foreign exchange rate and institutional quality integrated into this model. In Model 2, the coefficient for the lagged fiscal sustainability (Fiscal sustainability L1) is -0.259. It is statistically significant at $p < 0.05$. This means that fiscal sustainability in the previous period has a negative effect on the current period's fiscal sustainability, and that the effect is smaller in magnitude as compared to what was obtained in the Model 1 (-0.492 in Model 1). The fact that negative fiscal performance has been assumed to persist albeit to a lesser extent in this model implies that past fiscal stock affects the

present performance. This result coincides with the information from the literature on fiscal sustainability, which often describes the problems that countries encounter in reversing structural fiscal gaps over time (Furceri & Zdzienicka, 2012).

While in Model 1 the estimated coefficient of population growth is positive and significant, in Model 2 it is not significant (Coef = 0.017, $p > 0.05$). This means that, indeed, population growth does not have a significant direct effect on fiscal sustainability after accounting for the other variables like the foreign exchange rate and institutional quality. Besides, in Model 2, Economic growth continues to have positive and significant coefficient (Coef = 0.058, $p < 0.05$) comparable to Model 1. This indicates that only countries with higher rates of economic growth are capable of sustaining their fiscal balances. Firstly, it creates more opportunities for tax collection, leads to higher revenues, and lowers the demand for credit, which improves the fiscal balances. This supports the importance of economic development in enhancing fiscal responsibility and sustainability, more so in the developing world where fiscal challenges are well known (Sennoga & Balma, 2022).

In Model 2, inflation is found to have a positive but statistically insignificant impact on fiscal sustainability (Coef = 0.085, $p > 0.05$). This is in contrast to the negative and significant effect estimated in Model 1 above. A shift in the sign and magnitude of the coefficient indicates that after controlling for institutional quality and foreign exchange rate, the direct relationship between inflation and fiscal sustainability is less apparent. This may suggest that the effects of inflation on fiscal sustainability are conditioned by these other variables especially institutional quality which can inform how inflation is dealt with in policy. Human capital remains significant but with a much smaller positive effect in Model 2 (Coef = 0.0137, $p < 0.05$). This result suggests that human capital – including education and skills within the workforce – remains a net positive for fiscal sustainability, even if less so than in models 1. The increase in human capital can further improve productivity and tax collection hence likely to have a positive effect on fiscal sustainability though could depend on other macroeconomic and institutions factors. In Model 2, the foreign exchange rate significantly and positively affects fiscal sustainability (standard coefficient = 0.041, $p < 0.05$). This means that countries with a better foreign exchange position are better placed to maintain fiscal stability. A higher or more stable exchange rate would appear to decrease the cost of repaying foreign debt and also provide more certain revenues from international trade. The analysis of Model 2 also indicates that institutional quality is a significant and positive determinant of fiscal sustainability (Coef = 0.171, $p < 0.05$). This goes to support the call for the implementation of sound institutions that will ensure fiscal responsibility. Higher institutional quality increases the propensities for better governance, efficient fiscal management, and remunerate corruptions, which all have an impact on enhancing outcomes in fiscal (Acemoglu & Robinson, 2012). This result points out that more efforts need to be devoted to institution building for sustainable fiscal development because institutional voids as observed in Sub-Saharan Africa can compromise fiscal advances.

Concerning, the result of the AR(1) test of 0.001 indicates that there exists first order autocorrelation which is quite common in dynamic models. The value of the p- statistic for AR(2) is 0.115 thus suggesting that the residual of the model does not exhibit second order autocorrelation hence the model is not severely plagued by serial correlation. The calculated 'p' for Hansen test is equal to 0.102 which signify that the instruments are valid hence the strength of the model in regards to instrument choice. Model 2 shows an F-statistic of 135.99, which implies that the overall model is statistically significant and has the ability to account for a significant level of the variance in fiscal sustainability.

Table III: System GMM results

Fiscal sustainability	Model 1	Model 2
	Coef.	Coef.
Constant	-.104 (0.045)**	-0.068 (0.036)*
Fiscal sustainability L1.	-.492 (0.047) **	-.259 (0.056) **
Population growth	.135 (0.034) **	.017 (0.031)
Economic growth	.058 (0.011) **	.058 (0.008) **
Inflation	-.439 (0.190) **	.085 (0.103)
Human capital	.224 (0.046) **	.0137 (0.060)**
Foreign exchange rate		.041 (0.009) **
Institutional quality		0.171 (0.045) **
Post-estimation tests		
AR(1)	0.009	0.001
AR(2)	0.061	0.115
Sargan	0.002	0.020

Hansen	0.103	0.102
Observations	966	966
Groups	23	23
F	175.17	135.99
No. of instruments	12	12

Source: Authors computation

Note(s): **P<0.05, *P<0.1 Standard error (Std. Err.) in parentheses

Further analysis

The estimation from FEM (Fixed effect model) adds more value to the outcome arrived at the GMM System since it re-emphasizes the importance of fiscal sustainability and its lags as critical determinants of the current state of fiscal stocks, which is supported by positive coefficients of lagged fiscal sustainability (0.067 and 0.066) that are statistically significant at the 5% level. Similarly, both models revealed a negative relationship between population growth and fiscal sustainability, implying that higher population growth may exert pressure on available fiscal resources and possibly lead to sustainability pressures. On the economic growth front, equilibrium remains low and insignificant; institutional quality is positive and significantly valuable, indicating that sound governance structures are essential in maintaining sound fiscal conditions and GMM results confirmed institutional quality as an important factor driving fiscal sustainability. The results of the Fixed Effect Model presented in the table expanded the cross-section analysis by including the foreign exchange as an independent variable to support the results derived from the GMM analysis about its significant role in the fiscal sustainability. The increase in the R-squared from Model 1 (0.0143) to Model 2 (0.0683) means that the version of the model that incorporates other factors generates a better explanation of the data, which gives a larger total variance attributable to the assessment of fiscal sustainability. In summary, the Fixed Effect Model analysis supports and extends the findings of the GMM analysis, especially concerning the complex correlation of fiscal sustainability, foreign exchange rate, and institutional quality.

Table IV: Fixed effect results

	Fixed effect model	
Fiscal sustainability	Model 1	Model 2
	Coef.	Coef.
Constant	-0.040 (0.001)**	0.217 (0.042)**
Fiscal sustainability L1.	0.067 (0.031) **	0.066 (0.033) **
Population growth	-0.070 (0.012) **	-0.046 (0.012) **
Economic growth	-0.005 (0.012)	-0.003 (0.013)
Inflation	0.003 (0.022)	0.022 (0.017)
Health expenditure	0.015 (0.024)	0.004 (0.025)
Foreign exchange		0.047 (0.020) **
Institutional quality		0.337 (043) **
R-sq:	0.0143	0.0683
Number of Obs	966	966
Number of groups	23	23
F	76.37	42.33
Prob>F/Wald chi2	0.0000	0.0000

Source: Authors computation

Note(s): **P<0.05, *P<0.1 Standard error (Std. Err.) in parentheses

V. Conclusion And Recommendation

Overall, the GMM system results shed light on the important determinants of fiscal sustainability, and in particular emphasize the importance of lagged fiscal sustainability, population growth, economic growth, inflation and institutional quality. Consistently negative coefficients on lagged fiscal sustainability suggest that past fiscal imbalances have large negative effects on current conditions and imply that adequate responses to past deficits are necessary for future stability. Findings further indicate that initial positive relationship between population growth and fiscal sustainability is significant, but its impact declines in Model 2. Additionally, the significant positive effect of foreign exchange and institutional quality, reinforces the importance of robust

governance structures and sound economic policies to support sustainable fiscal practices. Together, these results highlight the value of a multi-pronged approach to fiscal management, including improving institutional quality and dealing with demographic pressures to promote long term fiscal sustainability.

Policymakers and practitioners are urged to adopt comprehensive strategies to enhance institutional framework and stabilize currency conditions, as based on the GMM results, foreign exchange rates and institutional quality are found to be highly significant determinants of fiscal sustainability. More importantly, institutions should be made stronger with robust governance, transparent regulatory settings, which will encourage fiscal discipline and accountability as well as sustainability in economic growth. In building investor confidence, this could mean investing in capacity building for institutions; better public financial management; and the rule of law. Second, policymakers should come up with measures to stabilize foreign exchange rates to steer clear of volatility that can be detrimental to Fiscal health and economic planning. This may also include prudent monetary policies, effective exchange rate management strategies and development of diversified economic base to reduce vulnerability to external shocks. This study was limited to exchange rate and institutional quality as determinants of fiscal sustainability, future studies should explore macroeconomic variables that influence fiscal sustainability. Institutional quality can also be studies and analyzed as a moderator variable.

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