

# Dynamic Relationship between Public Debt and Exchange Rate Misalignment in Kenya

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## Abstract

Kenya's sovereign debt has increased throughout the years to reach a figure of above Kenya Shilling 10 trillion. At the end of June 2023, the total public debt, excluding that which is guaranteed publicly and pending bills, stood at around Ksh. 5.39 trillion in external debt and domestic debt of Ksh. 4.90 trillion. As a result, the country is facing a debt crisis and fiscal distress due to high debt service. As the public debt is growing, the fiscal deficit has also been increasing, averaging about 5.2 percent of GDP as of the 2023/2024 fiscal year. The consequence is huge public debt, and more borrowing to refinance the existing debts. The problem is more pronounced on the external debts. This is because Kenya needs to earn more foreign currency to service the debt. This, however, is not happening as the exports continue to decrease and imports continue to expand. Consequently, the country faces a problem in its current account. The rate of exchange has also been observed as overvalued, creating a misalignment in the real exchange rate. This adversely affects trade and generates pressure and volatility in the exchange rate market, consequences that are undesirable for the stability and overall growth of the Economy. The situation leads to depreciation or loss of strength of the local currency. However, the monetary authority constantly intervenes to manage the exchange rate and prevent depreciation. This raises the question of whether the observed misalignment in the real exchange rate is related to the growth in the public debt. The study, therefore, sought to get more information on the dynamic relationship between public debt and the exchange rate misalignments in Kenya. It employed secondary time series data running from the year 1980, when the country adopted the floating exchange rate, to the year 2023. The study made use of the Vector Autoregressive Model to analyze the direction of causality and impact response. It is deduced from this study that the Budget Deficit is a strong determinant of Exchange Rate Misalignments. This means that persistent budget deficits fuel both external imbalances and public debt. Misalignments not only worsen the current account but

are themselves affected by fiscal and external indicators. Rising external debt is influenced by fiscal and external sector pressures, necessitating coordinated macroeconomic management.

## Keywords

Public Debt, Exchange Rate, Current Account, Budget Deficit

## 1. Background

Public debt in Kenya has been ballooning, and together with it, an expanding budget deficit and challenges in the trade balance that are being exacerbated by heightened increases in imports and diminishing exports. Public debt in Kenya has now posed a debt crisis and has resulted in fiscal distress. At the end of June 2023, the total government debt, including sovereign guaranteed loans, was at Ksh. 5.39 trillion in external debt and Ksh. 4.90 trillion in debt acquired in the domestic market. At the end of the year 2012, Kenya's public debt was at Ksh. 1.8 trillion. This, however, increased to an unprecedented figure of over Ksh. 10 trillion at the end of 2023. In regard to the regimes, the administration up to 2003 was not able to borrow much, owing to the reluctance of lenders to lend to Kenya. At around 2003, government debt was approximately Ksh. 600 billion. Up to the year 2013, the accumulation of public debt was slower compared to the growth of the economy, and public debt increased to Ksh. 1.8 trillion, with borrowing only focused on development projects. During this period, ordinary revenue rose from Ksh. 200 billion to over Ksh. 800 billion. The period between 2013 to 2022 recorded the most dependence on borrowing, with expensive projects and commercial loans taking center stage in the public expenditure. The spillover effect of this borrowing dependence continues to date, with the country spending an unprecedented amount of its public revenue on public debt servicing (Nkatha, 2022). **Table 1** gives a trend of the national debt in Kenya and its composition from 2014 to 2023.

**Table 1.** Trends in Kenya's public debt Ksh. billion.

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Total PPG Debt Stock	2423	2844	3611	4407	5047	5809	6693	7697	8635	10,279
PPG Debt as % of GDP	48	48.8	53.8	57.5	57.1	62	65.8	68.1	67.7	70.8
o/w External	22.6	24.4	26.8	30	29	32.3	34.6	35.4	33.7	38.2
o/w Internal	25.5	24.4	27.1	27.6	28	29.7	31.2	32.7	33.9	33.3
PV of Debt to GDP	48	48.8	53.8	55.4	57.6	59.9	55.7	58.8	63.1	64.4
Annual Debt Growth Rate	14.3	10.2	9.7	9.3	10.3	18.3	15.2	15	12.1	19.1
Annual GDP Growth Rate	5.4	5.7	5.9	4.9	6.3	5.1	-0.3	7.6	4.8	5.3

Sources of data: Various annual public debt management reports.

**Table 1** shows that the stock of Public and Public Guarantee (PPG) debt surged from Ksh. 2.4 trillion in 2014 to Ksh. 10.3 trillion in 2023. In terms of PPG debt as a proportion of GDP, it soared from 48 percent in 2014 to 70.8 percent in the year 2023. Of the 70.8 percent, 37.5 percent is external debt, and 33.3 percent is domestic debt. As a Present Value (PV) of debt to GDP, the stock of debt increased from 48 percent in 2014 to 70.8 percent in 2023. The rate of growth in public debt is also noted to be higher than that of the economic growth rate (Nkatha, 2022).

Most governments fund budgetary spending extensions using borrowing and revenue-raising measures like taxation. The consequences of taxing more and financing through debt can be evaluated by examining the policy effects on the combined economic expansion, which is preceded by effects on demand (Aschauer, 1985). The essential view is the impact of the budgetary approach on development, as well as the conflicting effects of debt and tax financing. Expansionary Fiscal policy is most operative in raising gross output and demand under liquidity constraints or during declines. However, this effect differs under mediums of transmission, which in some cases confine the efficacy of fiscal policy. For example, the growth ramifications of fiscal expansion may depend on the extent to which public spending replaces private consumption (Blanchard & Fischer, 1989). Early studies on fiscal policy have found that government spending may sometimes result in a reduction in household and firms' consumption, and as such, government spending may not be ideal for covering private shortfalls. Thus, government policy may not substitute private spending but may result in further recession, especially if the rise in public expenditure is expected to raise taxation.

Deficit financing's effect on the growth of an economy is noted to be mixed. Some economic theories, the overlapping generations and the infinite horizons, propose neutrality in output of some of the usual debt and tax financing. For example, financing through debt, even for development, signals that taxes may have to be increased in the future, and this therefore encourages households to save instead of expanding consumption with the hope of de-saving when the expectations of higher taxes are actualized. Capital accumulation may also result from public spending, reducing equilibrium consumption and altering expected future interest rates (Romer, 2006).

When there are economic constraints, especially reduced liquidity or during crises like the recession, expansionary fiscal policy is employed in many instances, financed through borrowing. However, fiscal development may not yield the desired results in economic revival due to interest rate changes and expectations that lead to diminished capital accumulation (Reinhart, Rogoff, & Savastano, 2003). It is not possible for a government to perpetually borrow to finance development without sharp adjustments to the economy at some point. While the government may be meeting the short-term goals, this can only be sustainable if the present value of future primary surpluses stream is equivalent to or greater than the current market value of debt (Reinhart, Rogoff, & Savastano, 2003). This view postulates that the sustainability of external debt is dependent on the capability of the

sovereign to run a current account surplus enough to cover the entire debt stock. Also, the primary budget surplus has to be guaranteed in the future, which is more than the present value of debt taken in.

High fiscal deficits and consequent debt repayments have accompanied the expansion in government debt in Kenya. The fiscal deficit averages close to 6 percent of GDP. As of the 2023/2024 fiscal year, the public debt is consuming over 70% of the ordinary revenues. To sustain operation, the sovereign may borrow more. **Table 2** demonstrates the fiscal budget trends for the fiscal period 2014 to 2023.

**Table 2.** Public budget and deficit in billions 2013/14-2020/21.

		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Recurrent Expenditure	Budgeted	10,434	1411	1584	1734	2107	1948	2399	2018	2627	2553
	Actual	1022	1381	1564	1657	2084	2375	2447	2333	2486	2703
Development Expenditure	Budgeted	635	684	683	762	671	607	652	668	658	561
	Actual	511	572	483	626	492	570	809	554	540	494
Total Gov. Exp.	Budgeted	1679	2096	2267	2496	2778	2555	3051	2887	3286	3367
	Actual	1533	1954	2047	2283	2576	2945	3256	2749	3028	3221
Ordinary Revenue	Budgeted	1007	1171	1300	1515	1651	1795	2116	1579	1851	2145
	Actual	974	1113	1236	1404	1522	1699	1894	1562	1918	2041
Recurrent Balance	Budgeted	(37)	(241)	(284)	(219)	(456)	(153)	(283)	(439)	(896)	(877)
	Actual	(48)	(268)	(328)	(253)	(561)	(676)	(553)	(771)	(1094)	(896)
Budget Deficit	Budgeted	672	925	967	981	1127	761	935	1308	828	860
	Actual	559	840	811	879	1054	1246	1362	1187	966	889
Nominal GDP		4745	5403	6284	7023	8166	8892	9740	11,304	12,698	14,274
Budget Deficit as a % of GDP		11.8	15.7	12.9	12.5	12.9	14.	14	10.5	8.7	6.5

Source of data: Various economic surveys.

The table shows that the budgeted recurrent expenditure increased from Ksh. 1.04 trillion in fiscal year 2013/2014 to Ksh. 2.4 trillion in 2019/2020. This is a huge 131 percent increment over the period and an average of 19 percent yearly growth. This is against a meager percentage growth in revenue. The consequence is that Kenya is borrowing to finance the government's recurrent budget, and more to refinance the existing debts. Development allocation is affected in the process. As a result, the capacity to finance the debts may be fading. Also, there have been shortfalls in projected revenues, leading to either underfunding of development projects or further deficits.

The personnel emolument continues to gobble up a significant amount of the public funds. This is higher than what is left of revenue after debt servicing. Consolidated Fund Service (CFS), where debt service is anchored, is now the largest budget line in Kenya. Borrowed funds, which are meant only for development, are

spent in servicing personnel emoluments. **Table 3** shows the percentage allocation of the budget to programs for the fiscal period 2013/2014 to 2023.

**Table 3.** Percentage allocation of public budget to programs.

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Recurrent	78.4	64.9	65	67.6	78	71.5	72.8	70.8	75.5	72
o/w Personnel Emolument	45.7	40	40.2	41	49.7	43.3	44.8	44.2	47.4	48
o/w O&M	32.7	25	24.8	26.5	28.2	28.2	28	26.6	28	27
Development	21.6	35	35	32.3	22	28.5	27.2	29.2	24.5	22

Source of data: Various economic surveys.

The high fiscal deficit in Kenya may be attributable to higher growth in recurrent expenditure volumes relative to total expenditure, creating the need for borrowing resources. Given the CFS, the need to expand the government budget to service the existing stock of debt is widening. This is, with the need to invest in capital to expand the economy. Therefore, the link between fiscal deficit and stock of public debt, including the direction of causality, may not be clear given the current situation. There is a need for further study on what leads to the other, and consequently, an effective policy to tame the runaway public debt.

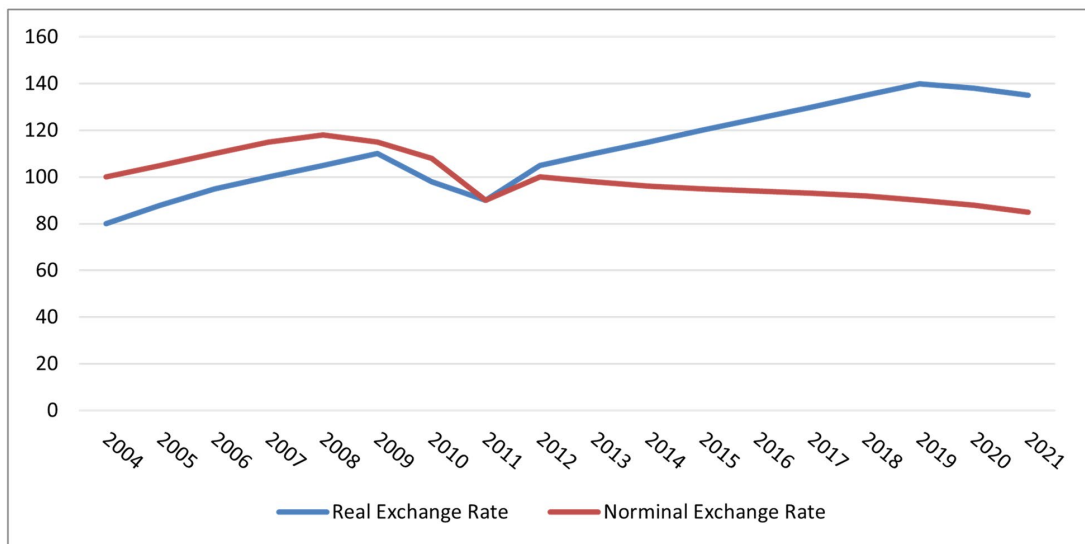
### 1.1. Public Debt and Exchange Rate Misalignment

Exchange rate misalignment occurs when the nominal exchange rate of a domestic currency deviates from its real exchange rate over a prolonged period. That real value is thought of as the level consistent with underlying economic fundamentals such as productivity, terms of trade, net foreign assets, trade openness, etc. (Pasara & Mugwira, 2023). If the domestic currency is over-valued, it means that the currency is relatively expensive compared to what the nominal rate suggests. If the currency is under-valued, the real exchange rate is weaker than the nominal rate. A misalignment arises when the real exchange rate is not equal to observed or nominal rates. This can happen due to, nominal exchange rate policies like fixed or management of exchange rate (Gachoki, Okeri, & Korir, 2019).

Public debt is normally justified when borrowing is procured in order to invest and to accumulate capital (Clark & MacDonald, 1998). This is done to enhance the county's position to produce more, generate more, and grow in the hope that they will create an enabling environment for raising more revenue to sustainably service the incurred public debt. However, borrowing tends to create exchange rate misalignment, which refers to a long-term divergence of the real exchange rate (either over-appreciation or over-depreciation) from its long-period trend in line with fundamentals in the economy. This misalignment can impede the performance of the economy and the need for further cumulative borrowing. In addition, misalignment may cause negative consequences on the stability of and growth of the economy when exchange rate volatility affects decision-making in trade and invest-

ments (Krugman, 1989).

Exchange rate misalignments may lead to resources being allocated in suboptimal trends within sectors of the economy. The depreciation of exchange rates in developing economies promotes exports, and it is expected that these economies should devalue their domestic currency with the aim of making prices of exported goods lower while also making the prices of imports more expensive. This could help in improving the current account and consequently the Balance of Payment (Clark & MacDonald, 1998). However, on the other side, most developing countries rely on imports of raw materials, intermediary goods, and capital to fuel production. A devalued currency, therefore, makes these goods more expensive, thereby making the final products uncompetitive. This also may lead to inflation and consequently make locally produced goods more expensive in the domestic market. This school of thought postulates that intervention from government should be to make the domestic currency appreciated comparatively to other currencies. Kenya's monetary authority has found itself in the center of this, with most cases resulting in the latter. Consequently, the exchange rate has been overvalued, as demonstrated in Figure 1.



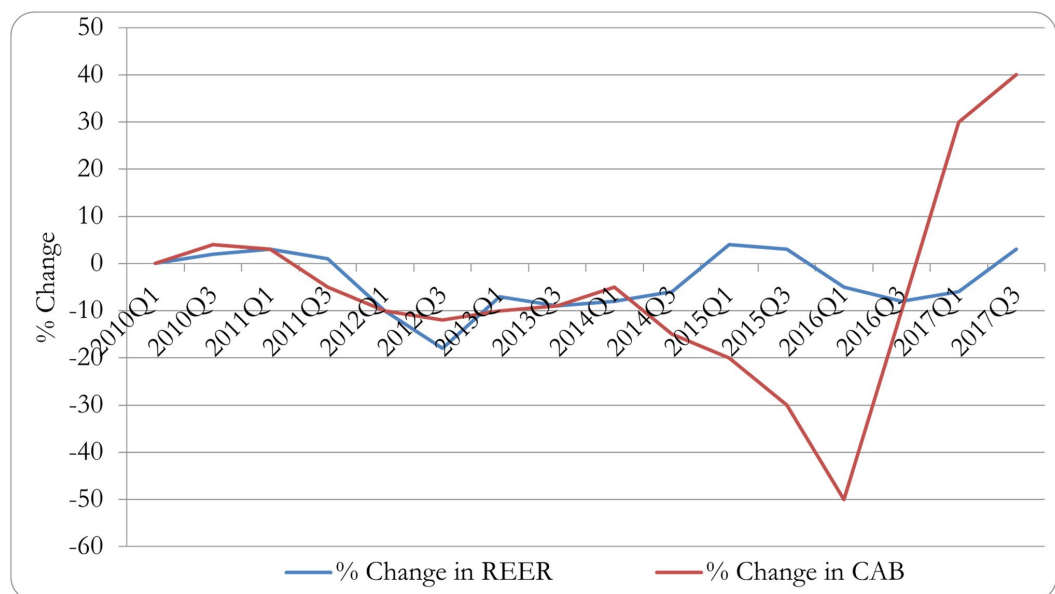
Source: Federal Reserve Economic Data (2022).

Figure 1. US dollars value in relation to the Kenyan shillings.

Figure 1 shows that the real exchange rate value of Kenyan shillings per United States dollar has appreciated with time. Concurrently, the real exchange rate value has appreciated constantly while the nominal exchange rate has been relatively steady. Before the financial year 2010/2011, the nominal exchange rate value was noted to have been higher than the real exchange rate value, indicating an undervaluation. It means that the amount at which the Kenyan shilling purchased a US dollar was more than its real value. However, afterward, an overvaluation is noted, depicted by a real exchange rate higher than the nominal rate. This implies that the

amount of Kenyan shillings that can purchase a unit of US dollar is less than it should be. Central Banks' first line of defense when the currency shows depreciation tendencies, in a managed exchange rate regime, is to draw down the reserves and review the exchange rate within their control. These drawings down of reserves normally call for more borrowing if a country does not manage to have surpluses in the balance of payment (Clark & MacDonald, 1998). When this happens, more debt is required to pay the maturing debt as the defense of the exchange rate from depreciation continues.

Misalignment in the exchange rate distorts resource allocation between sectors of production. It also results in distorting repayment of debts, trade patterns, and others (Krugman, 1989). Figure 2 demonstrates the interrelation between the changes in the Real Effective Exchange Rate (REER) and the Current Account Balance (CAB) in Kenya from 2010 to 2017.



Source: Central Bank of Kenya (2019).

**Figure 2.** Percent changes in CAB and REER.

The figure confirms the continuous rise in current account deficit, especially after the year 2012. This is also the time when the rate of exchange is noted to be overvalued. With a decline in the real exchange rate, the current account deficit depicts an increase, as shown in Figure 2. The consequence of overvaluation of the domestic currency is a depletion in reserves for foreign exchange and other parameters, like widening current account deficit, as shown in the figure. It eventually becomes impossible for monetary authorities to sustain the overvalued rate for an extended period (Clark & MacDonald, 1998). By de-controlling the foreign exchange rate or devaluing the domestic currency, goods produced in the local market become cheaper than those imported. This increases employment opportunities and general output (Krugman, 1989).

## **1.2. Exchange Rate Policy in Kenya**

Up to 1975, Kenya employed the fixed exchange rate regime at given levels set by the monetary authorities. From 1975 to 1982, the domestic currency was pegged and attached to the Special Drawing Rights (SDRs), pegged to several currencies deemed to be more stable compared to the single currency. The pegging of the exchange rate to the SDR, however, did not reflect the pattern of trade then and was seen as inadequate. The regime of dual exchange rate started in the 1990s to correct the previous inadequacies. Under this regime of a crawling peg, the rates were adjusted on a daily basis against foreign currencies of considerable trading partners. Pressure from development partners and the donor community was piling up on Kenya to liberalize the exchange rate for the markets to determine the equilibrium rates. It was also among the conditions set by the same institutions for the country to access external financing. This culminated in the adoption of a floating exchange rate regime in 1993, at which point, it was left to be driven by the market, and since then, the Kenya Shilling is said to be on a free float, with the Monetary Authority supposed to only intervene to smooth the movement of the rate during erratic volatility. Since then, the shilling is said to be the exchange rate that is deemed as driven by market determination. Nevertheless, the intervention by the Central Bank of Kenya to supposedly smooth the movement is in many instances, seen as overbearing and encroaching on the management of the currency. These interventions have been more regular, causing misalignment in the exchange rate.

## **1.3. Statement of the Problem**

Public debt in Kenya has been ballooning over the years and now poses a risk of a debt crisis and has resulted in fiscal distress in the country. At the end of June 2023, the public debt, excluding public guaranteed debt and pending bills, stood at Ksh. 5.39 trillion in foreign debt and Ksh. 4.90 trillion in domestic debt. The increase in public debt has resulted to high debt servicing and further rises in fiscal deficit. The fiscal deficit averaged above 5.3 percent of GDP as of 30<sup>th</sup> June 2024. As of the year ending on 30<sup>th</sup> June 2024, the public debt is consuming around 83 percent of the public ordinary revenues. High fiscal deficit is attributable to higher growth in recurrent expenditure volumes relative to total expenditure, resulting from expanding consolidated fund services, creating the need for further borrowing. The recurrent expenditure increased from Ksh. 1.04 trillion in the fiscal year 2013/2014 to Ksh. 2.4 trillion in 2019/2020. This is about a 131 percent increment over the period and an average of 19 percent yearly growth. This is far above the growth in revenue and economic growth. The consequence is huge public debt, and more borrowing to refinance the existing debts. The problem is more pronounced on the external debts. This is because Kenya needs to earn more foreign currency to service the debt. This, however, is not happening as the exports continue to decrease while imports continue expanding. The difference between imports and exports propagates the problem, and domestic assets are increasingly becoming

foreign-owned. The country's exchange rate has been observed to be overvalued. The situation compels the domestic currency to decrease in value. However, the monetary authority constantly intervenes to manage the exchange rate and prevent depreciation. The real exchange rate, consequently, is observed to have surpassed the nominal exchange rate, indicating an overvaluation. This is the same period observed to have had a rapid escalation of public debt.

Theories and some of the empirical works assume a causal relationship between fiscal deficit, exchange rate, and public debt (Alexander, 1952; Reinhart et al., 2012; Ogero, 2021). However, this is empirically demonstrated, and the inquiry sought to delve to find the interaction between fiscal deficit and public debt accumulation, and exchange rate misalignments. The literature also ignores the fact that debt could be denominated in different currencies. They do not seek to consider the domestic and foreign debt with the view of establishing how exchange rate misalignment affects either (Del Monte & Pennacchio, 2020). This study analysed the relationship by separating debt that is foreign and domestically owed public debt. The study got more information based on available data on the dynamic relationship between public debt with the exchange rate misalignments in Kenya.

#### **1.4. Research Objectives**

To investigate the dynamic relationship between public debt with the exchange rate misalignment in Kenya.

#### **1.5. Significance of the Study**

Over the years, Kenya has continued to institute policies focused on bridging the ever-widening gap in the balance of payment that has been exacerbated by the trade imbalance between Kenya and the trading partners, with Kenya recording more import value than exports. At the same time, the debt portfolio in Kenya has grown in size and composition, with the country borrowing both in the domestic market and internationally to fund the various public expenditures. To manage the currency exchange rate, the country, through the CBK, has adopted a floating exchange rate regime but periodically intervenes by drawing down reserves, among other tools. This has mainly been to support the strengthening of the local currency. Stakeholders and policymakers, including the CBK, the National Treasury, the executive arm of government, as well as parliament, will benefit from the study's findings. It has provided information on the relationship between public debt with exchange rate misalignment, which is of benefit to the policy and decision-making organs on the interventions needed in the currency exchange rate market. Scholars could also benefit from this study to enrich their research.

#### **1.6. Scope and Limitations of This Study**

The study concentrated on the public debt accumulation in Kenya from 1984 to 2023. It also tracked the current account deficit within the same period while still

investigating the exchange rate over time. The current account deficit is part of the wider BoP for the country within the same period. There was an effort to compare the public debt and current account deficit trends, especially based on prevailing exchange rates. The scope of the study covered the Republic of Kenya and concentrated on the period during which there was significant policy shift in exchange rate management. The major limitation was that in this kind of study, there was an overreliance on government data, which has a possibility of being subjective to project-calculated results and therefore biased. The study relied on other secondary data from various global institutions, which would also have bias. It is also possible that some data, especially on public debt, could be understated or not accurate overall.

## 2. Methodology

The study made use of a non-experimental research design and a longitudinal data set. The design was appropriate since it permits the analysis of duration and allows the measurement of variation in a variable from one period to another without the requirements of a controlled environment (Gujarati, 2003).

Using the Purchasing Power Parity (PPP), the study considered the approach given by Qayyum, Khan, and Zaman (2005). The approach considers the scenario of traded goods in that,

$$P_i = S_i P_i^* \quad (1)$$

where  $P_i$  is the price of a commodity  $i$  denoted in local currency,  $S_i$  is the nominal exchange rate stated in local currency per unit of foreign currency.  $P_i^*$  is the price of good  $i$  articulated in foreign currency. The PPP perspective is based on the simplified assumption of having the same basket of commodities that have the same tastes across countries. It helps in realizing price measures that are comparable to or Consumer Price Index (CPI). PPP assumes there are no price differences when comparing goods in different countries due to arbitrage; however, this assumption is sometimes negated due to the presence of high transaction costs. When aggregated over all goods, the law of one price yields the PPP equation given in (2)

$$P_t = S_t P_t^* \quad (2)$$

where  $P_t$  is the price in the home state at time  $t$ ,  $S_t$  is the nominal conversation rate and  $P_t^*$  is the price level in external currency at a given time.

Transportation costs, tariffs, and non-tariff barriers are assumed to be constant over time, represented by a constant term,  $\beta_0$  in Equation (3)

$$P_t = \beta_0 (S_t P_t^*) \quad (3)$$

After expressing Equation (3) into a logarithmic function, Equation (4) is attained, where lower-case letters represent logs

$$p_t = \beta_0 + s_t + p_t^* \quad (4)$$

Equation (4) can be reorganized to give the nominal exchange rate ( $S_t$ ) as the

subject of the formula. This is expressed in Equation (5)

$$s_t = -\beta_0 + p_t - p_t^* \tag{5}$$

where  $s_t$ ,  $p_t$  and  $p_t^*$  are natural logarithms of the nominal exchange rate, domestic and foreign prices, respectively.

The elasticity of the rates of exchange regarding the export and import prices leads to the adjustment mechanism that helps attain balance in the exchange market.

### 2.1. Empirical Model

To establish the dynamic association between the Public Budget and the Exchange Rate Misalignment, equation 5 was used and expressed as in Equation (6).

$$ERM = f(CAB, PBD, GROWTH) \tag{6}$$

where ERM is the observed Real Exchange Rate Misalignments, CAB is the Current Account Balance, PBD is Public Budget Deficit, and GROWTH is Economic Growth Rate. Equally, Equation (6) was estimated in Augmented VAR by use of Toda Yamamoto to assess the Granger interconnection. Impulse response functions were applied to track out the time shocks on the dependent variables.

### 2.2. Definition and Measurement of Variables (Table 4)

**Table 4.** Definition and measurement of variables.

Variables	Definition	Measurement
Current Account Balance (CAB)	This measures the country’s net international transactions and economic activity for each year	Difference between exportations and imports as a proportion of GDP
Economic Growth Rate	It is the annual rate at which a country’s real Gross Domestic Product (GDP) increases between two years	Percentage two periods real GDP
Exchange Rate Misalignment	This is the rate of exchange rate deviation from the actual rate	$ERM = \left( \frac{\text{Actual Rate} - \text{Real rate}}{\text{Real Rate}} \right) * 100$
Public Budget Deficit	Total amount of securities issued by the government at any given year	Ratio of deficit to GDP

### 2.3. Diagnostic Test and Data Analysis

Several empirical diagnostic tests were employed in the study. They include the stability test, unit root test, and cointegration test. To investigate or identify non-stationarity, the study made use of unit root tests to prevent spurious results. A series is stationarily distributed when the mean and variance of a stochastic process stay constant throughout the period considered. Non-stationary series are those in which the mean and variance of the series vary throughout a period. A stationary series will be utilized in this study because it will allow a behaviour examination of the series at a certain moment in time and then extrapolate the results to other periods. The unit-root test will be carried out using the Augmented

Dickey-Fuller unit-root method. When it is determined that variables are not stationary, differencing is employed until stationarity is achieved. The data was time series data, and the research relied on secondary data sources such as the Kenya National Bureau of Statistics, the National Treasury Annual Reports, the Central Bank of Kenya reports, the International Monetary Fund Yearbook, and the International Financial Statistics (IFS).

The study's objective was achieved through the use of Vector Autoregressive (VAR) Model analysis using Equation (6). As we cannot ascertain the direction of causality between public debt and exchange rate misalignments, the VAR approach was the most suitable in analyzing long-run relationships between the variables. The study used the OLS data estimation technique for estimation. To analyze the dynamic relationship, the study carried out a causality and impulse response test. This was accomplished by doing a modified form of the Granger causality test using Toda-Yamamoto. The technique is effective notwithstanding of whether a series is integrated of order zero, integrated of order one, integrated of order two, non-cointegrated or cointegrated of any arbitrary order. The import of the technique is that it evades the possible prejudice connected with unit root and cointegration tests (Doran & Rambaldi, 1996).

### 3. Empirical Findings

The summary figures in terms of the mean, median, maximum, minimum, and standard deviation of the variables used in the research study are shown in **Table 5**.

**Table 5.** Descriptive statistics.

	GDP Growth Rate	External Debt	Exchange Rate Misalignment	Total Debt	Current Account Deficit	Budget Deficit
Mean	3.819125	31.33796	18.29897	40.46263	10.01596	3.576752
Median	4.250500	29.78776	18.75948	38.01217	10.31025	3.087490
Maximum	8.058000	79.75348	59.19493	89.36204	18.93436	8.574517
Minimum	-1.080000	16.46726	-0.300000	21.27948	3.128211	0.000000
Std. Dev.	2.295805	12.70558	13.69286	13.50465	4.466447	2.843944
Skewness	-0.425841	1.454883	0.657456	0.804324	0.224551	0.274767
Kurtosis	2.412846	6.401900	3.141631	3.002815	1.979228	1.671924
Observations	40	40	40	40	40	40

Source: Author's computations.

Kenya's GDP Growth Rate over the period ranged between -1 to 8 percent and averaged 3.8 percent with a standard deviation of 2.3 out of a hundred. During this period, external debts averaged 31 percent of GDP from 1994 to 2023, with a record high of 79.8 percent and a minimum of 16.5 percent of GDP.

The current account deficit indicates that the country experienced trade defi-

cits, which normally create instability in the exchange rate. The trend indicates a trade deficit with a mean and a mode of 10 percent of GDP. Kenya's exchange rate misalignment had a mean of 18.3 and a median of 18.8 percent, with a maximum of 59.2, a minimum of -0.3, and a standard deviation of 13.7.

The exchange rate misalignment shows an overvaluation of the Kenya currency, averaging 18 percent. This shows a non-conformity of the real exchange rate from its long-run balance level. On average, therefore, the exchange rate is often overvalued. Misalignment in Kenya could be associated with exchange rate interventions by the Central Bank of Kenya. Over this period, Kenya's exchange rate was misaligned with fluctuating degrees. This level of exchange rate misalignment is in consonance with Kiptui and Ndirangu (2015), who found that Kenya's exchange rate displayed both periods of overvaluation and undervaluation between 2000 and 2014. The study by Kiptui and Ndirangu (2015) shows that in most of the period, the exchange rate misalignment deviated within 10 percent of its equilibrium level.

Budget deficit ranged from 0 to 8.6 percent of GDP with a deviation of 2.8 from the mean, showing moderate variation and skewness of 0.27, indicating it is slightly positively skewed. The average budget deficit was 3.6 for the period 1994 and 2023. Kenya has run an average budget deficit of about 3.6 percent of GDP, indicating a moderate and persistent fiscal gap over the years. The relatively low minimum suggests periods of fiscal balance, possibly during donor-supported fiscal consolidation efforts or windfalls. The maximum deficit of 8.57 percent reflects years of significant fiscal stress, often tied to election years, public infrastructure investments, or shocks like COVID-19 in the year 2020. The positive skewness means a few years had much higher-than-average deficits, pulling the distribution rightward. The deficit data shows moderate variability but is not extremely volatile over the long term.

External debt as a percentage of GDP indicates a mean of 31.3 percent, a lowest of 16.47 percent, and an extreme of 79.75 percent. The standard deviation is 12.71, indicating high variations. Kenya's average external debt level, with a high standard deviation, signals significant fiscal deterioration in certain years. The strong positive skew indicates that external debt was exceptionally high, likely due to major external borrowing episodes (e.g., Eurobond issuance starting 2014, and post-COVID recovery loans). High kurtosis confirms the presence of extreme values, suggesting fiscal vulnerability to shocks and international borrowing fluctuations.

Kenya's total debt burden has averaged about 40 percent of GDP over the past 30 years. The trend is showing an increasing trend in recent years. The maximum value of over 89 percent of GDP indicates a sharp rise in public debt, mostly after 2013, due to infrastructure spending and the growing domestic debt market. Moderate skewness and normal kurtosis suggest that while the debt levels have risen, they are not driven by a few extreme years alone, but there is a gradual upward trend in debt accumulation. The wide standard deviation of 13.5 percent supports the idea that Kenya has undergone significant structural shifts in fiscal policy and

debt strategy.

These descriptive statistics in **Table 5** show numerous breaches that necessitate additional investigation, such as disaggregated government spending, i.e., recurrent and development, the definite input of trade deficit in real operative exchange rate volatility, the consequence of real effective exchange rate, and the actual situation of fiscal position in the face of mounting external debt and accelerated import. Section 2.3 outlines the diagnostic tests of the variables used.

### 3.1. Diagnostic Tests

The foremost motive for determining stationarity or non-stationarity of data beforehand running regression analysis is to eradicate the risk of getting substantial regression results from unconnected data if a non-stationary data series is applied in regression analysis. Non-stationary variables in regression models may produce spurious results such that the *R*-square values and *t*-statistics no longer follow the normal distributions and can be wildly exaggerated. That is, if non-stationary time series are used in a regression model, the results may indicate a significant relationship where none exists. The study utilized time series data, and therefore, there was a need to establish the stationarity or non-stationarity of the data. The Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) was used since it eliminates possible low power against stationary near unit root processes associated with ADF. KPSS, therefore complements the ADF test of stationarity. The results of the diagnostic tests are summarized in **Table 6**.

**Table 6.** Stationarity tests.

Variable	Test	Conclusion
Total Debt	ADF	Stationary at 1st Difference
	KFSS	Stationary at 1st Difference
Current Account Deficit	ADF	Stationary at 1st Difference
	KFSS	Stationary at 1st Difference
GDP Growth Rate	ADF	Stationary at Levels
	KFSS	Stationary at Levels
Exchange Rate Misalignment	ADF	Stationary at 1st Difference
	KFSS	Stationary at 1st Difference
External Debt (% GDP)	ADF	Stationary at 1st Difference
	KFSS	Stationary at Levels
Budget Deficit (% GDP)	ADF	Stationary at 1st Difference
	KFSS	Stationary at Levels

The outcomes demonstrate that some variables were stationary at level while some were stationary at the first difference. Total debts, Current account Deficit, Exchange Rate Misalignment, and Budget Deficit were stationary at first difference, while GDP Growth Rate was stationary at level. From **Table 6**, the variables

were integrated of order one I(1) and integrated of order zero I(0), and none was integrated of order two I(2). This complements the use of Vector Autoregressive (VAR) Model as the favoured modelling method because it does not need variables to be integrated of the similar order.

Based on Engle and Granger (1987), cointegration means that, although distinct time series can be non-stationary, a linear amalgamation of two or additional series can be stationary. That is, a long-run relationship exists among non-stationary time series. Cointegration tests effectively test the stationarity of the residuals, such that two variables are said to be cointegrated if the residuals are stationary, and are not cointegrated if the residuals are non-stationary, and any regression connection amongst the two variables is said to be spurious. ARDL bounds test was seen as the most suitable technique to test for cointegration when variables were integrated of order zero I(0) and integrated of order one I(1). According to Pesaran et al. (2001), cointegration exists when the F statistic surpasses the higher bound. Nevertheless, when the F statistic is below the lower bound, then there is no cointegration. In the case where the F-statistics lie between the two limits, then the test is inconclusive. The bounds test results and the computed F-statistics were compared with the critical value bound at the optimal lags (k) according to Pesaran et al. (2001). From the results, cointegration existed since the F-statistics exceeded the upper bound, representing a long-run relationship among the variables.

Diagnostic tests were also conducted to establish the suitability of the VAR model. The estimated R-squared was 96 percent. The estimated F-statistics were 26 and a log-likelihood of 47.28, implying joint significance of all independent variables used in the models. A CUSUM test was conducted to determine the stability of the model parameters. The line for the cumulative sum is within the critical lines, and therefore, it was concluded that the parameters were stable.

### 3.2. Relationship between Public Budget Deficit and Exchange Rate Misalignment

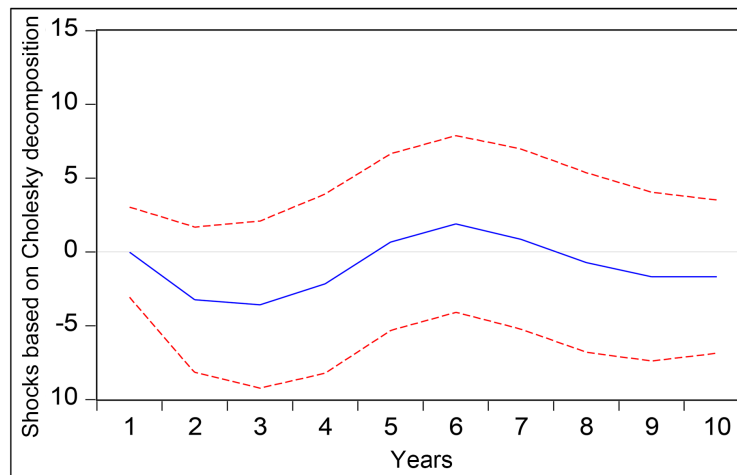
From the VAR regression results given in Table 7, the budget deficit coefficient with respect to exchange rate misalignment is significant.

**Table 7.** Dependent variable: Exchange rate misalignments.

Variables	Coefficients	Degree of Freedom	Probability
Current Account Deficit	42.81585	5	0.0000
Budget Deficit	11.14048	5	0.0487
External Debt	20.15457	5	0.0012
All	89.45841	20	0.0000

The results report that public budget deficit positively impacts exchange rate misalignments. With a fiscal deficit increase, the exchange rate gets overvalued in the long-run. However, the estimation results indicate that exchange rate misalignments have no significant impact on the fiscal deficit. This indicates that there

is a one-way and no two-way causality. There exists a one-way causality moving from fiscal deficit to exchange rate misalignment. Whereas a fiscal deficit will lead to undervaluation, overvaluation may not lead to a decline in the fiscal deficit. Nevertheless, a surge in fiscal deficit leads to a hike in the exchange rate above its equilibrium. This means that a rise in fiscal deficit leads to domestic currency appreciation, mainly happening due to borrowing from foreign market. **Figure 3** gives a response of exchange rate misalignments to the budget deficit.

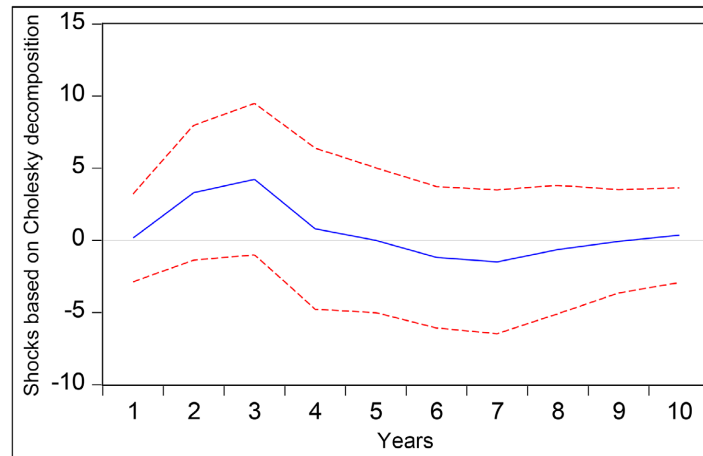


**Figure 3.** Responses of the exchange rate misalignment to the budget deficit.

The figure represents an Impulse Response Function (IRF) from a Vector Autoregressive (VAR) Model, showing the response of Exchange Rate Misalignment (ERM) coming from a shock in the Budget Deficit as given in the Kenyan context. The exchange rate misalignment initially falls after the budget deficit shock, showing a negative response. This means that for the first four years after the fiscal deficit positive shock, the local currency will appreciate (decrease in exchange rate) and remain so for the period. This budget deficit causes the exchange rate to initially appreciate or become overvalued (positive misalignment), possibly due to short-term capital inflows or expectations, together with increased demand for foreign capital by the public sector. Over time, the budget deficit shock begins to take effect, as the repayments come due and the inflows decline, causing depreciation and reduction of currency misalignments. As the outflow increases, the domestic currency loses and becomes negatively misaligned (the currency loses value beyond its long-run equilibrium). In the long-term, the reaction starts to decline gradually, indicating the misalignment dissipates slowly. The response converges towards zero, implying the shock is not permanent, consistent with the properties of a stationary VAR process.

Exchange rate misalignments are also caused by the current account deficit. This suggests that feedback from the current account imbalance causes exchange rate misalignment as a result of pressure on foreign exchange reserves or balance of payments instability. The Impulse Response Function (IRF) graph is illustrated

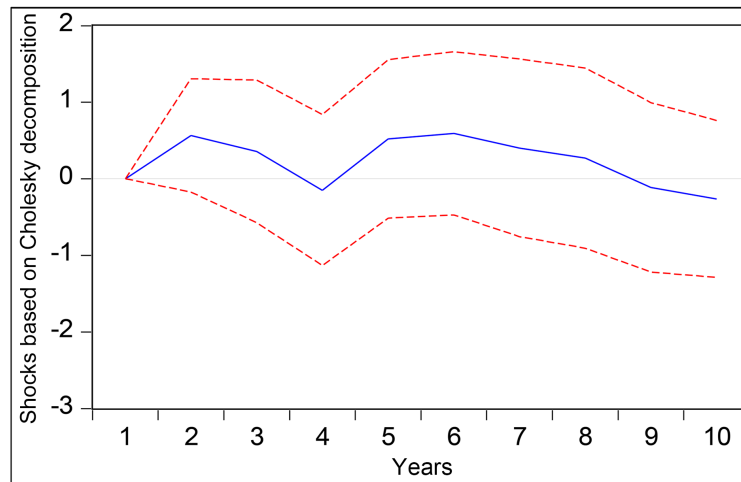
in **Figure 4**, showing the impact of current account deficit shocks on the exchange rate misalignment.



**Figure 4.** Responses of the exchange rate misalignment to the current account deficit.

A shock increase in the current account deficit leads to a rise in exchange rate misalignment (divergence from equilibrium). In the short to mid-term (2 - 5 years), the exchange rate misalignment response remains positive, fluctuates slightly, but stays elevated. This means the current account deficit shock has a sustained effect, likely due to external imbalances pressuring the exchange rate system. The size of the impact starts to weaken, suggesting growing uncertainty around the effect. In the long term (after 6 years), the response gradually declines and approaches zero, indicating that the effect of the current account deficit shock dissipates over time. A shock to the current account deficit (i.e., worsening of CAD) causes the exchange rate to become more misaligned, depreciating beyond its equilibrium level or overshooting due to market pressures. This may occur because a larger CAD implies a higher demand for foreign currency to finance imports or debt. This puts downward pressure on the local currency, leading to misalignment from its long-run equilibrium value. Over time, market forces (e.g., capital inflows, policy adjustments, or improved trade balance) help in correcting the misalignment. This means that persistent or large current account deficits can lead to currency instability and exchange rate misalignments.

In addition to the budget deficit significantly impacting the exchange rate misalignments, it also positively impacts on current account deficit and foreign debt. The results imply that the Budget Deficit is a determinant of current account deficit and foreign debt. Government borrowing needs directly fuels debt accumulation. The current account deficit coefficient being statistically significant, it indicates that it impacts external debt and exchange rate misalignments. Misalignments may raise the cost of debt servicing or lead to capital flight, necessitating additional borrowing. The IRF graph is illustrated in **Figure 5**, showing the impact of exchange rate misalignment shocks on the current account deficit over time.



**Figure 5.** Responses of the current account deficit on exchange rate misalignment.

With a shock in exchange rate misalignment, the intermediate period (2 years to 5 years) shows that the response peaks then begin to taper off gradually. The current account deficit still worsens but is less strongly than immediately after the shock. Later Periods (6 years and beyond) suggest the impact fades out over time, and the long-run effect becomes negligible. The current account begins to stabilize or revert to baseline. A shock in exchange rate misalignment (e.g., overvaluation of the currency) initially worsens the current account deficit, possibly by making exports less competitive and encouraging imports due to the artificially stronger currency. However, this impact diminishes over time, possibly due to market adjustments. Exchange rate misalignments can destabilize the current account in the short run, increasing external vulnerabilities.

The three variables are dynamically interlinked, with bidirectional feedback loops. Current account deficit influences exchange rate misalignment and budget deficit, showing a complex macroeconomic adjustment mechanism. This means that persistent budget deficits fuel both external imbalances and public debt. Misalignments not only worsen the current account but are themselves affected by fiscal and external indicators. Rising external debt is influenced by fiscal and external sector pressures, necessitating coordinated macroeconomic management. The link between budget deficit and current account deficit supports the theory that domestic fiscal imbalances translate into external deficits.

#### 4. Summary, Conclusion, and Policy Implications

The analysis reveals statistically significant and economically relevant relationships between the budget deficit and the key variables in the macroeconomy. Based on the estimation results, the Budget Deficit is a strong determinant of Exchange Rate Misalignments, Current Account Deficit, and External Debt. In addition, the three variables are dynamically interlinked, with bidirectional feedback loops. Current Account Deficit both influences and is influenced by Exchange Rate Misalignments

and Budget Deficit, showing a complex macroeconomic adjustment mechanism. This means that persistent budget deficits fuel both external imbalances and public debt. Misalignments not only worsen the current account but are themselves affected by fiscal and external indicators. Rising external debt is influenced by fiscal and external sector pressures, necessitating coordinated macroeconomic management. The link between Budget Deficit and Current Account Deficit supports the theory that domestic fiscal imbalances translate into external deficits.

The results emphasize the interconnectedness of fiscal, external, and monetary variables, underscoring the need for a cohesive macroeconomic strategy. Managing fiscal deficits, stabilizing the exchange rate, and reducing external borrowing risks will be crucial for improving Kenya's external balance and ensuring long-term economic stability.

Budget deficit leads to exchange rate misalignment. In Kenya, fiscal deficits often require external borrowing, which can lead to short-term exchange rate stability but long-term pressure on the shilling, especially if productivity and exports don't improve in parallel. There is a need for fiscal consolidation, better expenditure efficiency, and revenue enhancement to reduce deficit dependency and maintain macroeconomic stability. Fiscal sustainability is at risk if budget deficits are not managed as they cause immediate spikes in exchange rate misalignments, current account deficits, and external debt. There is a need for long-term deficit control measures, such as improving revenue mobilization or cutting non-essential expenditures.

Budget deficits significantly drive both the current account deficit and external debt levels. The government should prioritize fiscal consolidation by improving domestic revenue mobilization and rationalizing public expenditures. Limit reliance on external borrowing to finance recurrent spending, especially subsidies and wage bills.

Exchange rate misalignments have a significant and strong influence on the current account deficit and external debt. Maintaining a market-aligned, flexible exchange rate regime is important to allow for automatic adjustment of external shocks. Strengthen foreign exchange reserve buffers and monitor capital flows to manage volatility. Avoid artificially propping up of the currency, which could erode competitiveness and worsen trade deficits.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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