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# Determining the Twin Deficits Phenomenon in Kenya

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Aims:** This study examines whether the long-run relationship between fiscal and current deficits follows the tenets of twin-deficits, the Ricardian equivalence, the current account targeting, or the feedback linkages. It further reviews the effects of fiscal and current account deficits on economic growth. These have in recent years been debated both in developed and developing countries. In contributing to this ongoing debate, the authors applied unit root tests, cointegration analysis, a dynamic vector error correction model and Toda-Yamamoto Granger-causality representation using annual time series data from 1980 to 2016.

**Study Design:** The study employs quantitative time-series research design by utilizing Stata econometrics software.

**Place and Duration of Study:** Sample: Kenya, from 1980 to 2016.

**Methodology:** The study employs unit root tests, Johansen (1995) co-integration analysis, a dynamic vector error correction model and a multivariate Toda-Yamamoto (1995) Granger-causality representation.

**Results:** The paper provides evidence of unidirectional causality running from fiscal deficit to current account deficit in support of the twin-deficits phenomenon for Kenya. There is evidence that in the long-run fiscal deficits has significant negative effects while current account deficits had significant positive effects, on economic growth in Kenya.

**Conclusion:** Overall, the study concludes that the twin-deficits phenomenon fits for Kenya. The findings imply that the authorities need to pay more attention and promote policies that improve

investment efficiency arising from these deficits. Importantly, some of the key policy implications include promotion of policies that upscale fiscal discipline and reduce the size of fiscal deficits for external stability and long-term economic growth, in Kenya.

*Keywords: Twin-deficit; economic growth; cointegration; granger-causality.*

**JEL Classification:** C32, E60, E62, F32, H62.

## 1. INTRODUCTION

On a global perspective, debates on twin-deficits phenomenon have yielded great attention recently. Fiscal and current account deficits have also been at the center of macroeconomic adjustments for economic growth and stability. The outcome of the 2008 global financial crisis has also renewed this impetus. This has further necessitated policy debates and research interests on the subject [1]. In reference to [2], the two deficits have persisted in several countries that undertake deficit spending as a means of accomplishing macroeconomic objectives. In conventional terms, overspending by governments is perceived as a policy that is mainly applied to deal with macroeconomic problems [3].

Generally, fiscal and current account deficits tend to go hand in hand, ultimately impacting on long-run economic growth. Establishing the causality between the two deficits will therefore be important in formulating the much needed public policy responses, in Kenya. Generally, related literature has been broadly categorized into two: (i) the conventional (Keynesian); and (ii) the neoclassical (Ricardian), views. The conventional view provides evidence of a link between the two deficits but the neoclassicals opine that there exist no such linkages [1].

The Keynesian absorption view advocates that fiscal deficits expand domestic absorption. This causes import expansion and aggravates the deficit in the current account. In a Mundell-Fleming model, fiscal deficits lead to a rise in interest rates [4] which attracts capital inflows, and cause currency appreciation [5]. The appreciation of the local currency makes imports get cheaper and exports dearer. This deteriorates the current account deficit [6].

On the other hand, the Ricardian Equivalence Hypothesis (REH), foreseeing higher tax-liabilities (due to current fiscal expansions), people would save more and consume less. As a

result, an intertemporal shift between taxes and fiscal deficits would have no impact on the real interest, or the current account deficit [7]. Thus, if REH holds for a country, the explanation for persistent deficits in current account must be found somewhere else such as international competitiveness, capital mobility, among others [8]. However, if it does not, it may imply that the twin-deficits phenomenon holds. If the twin deficits hypothesis holds, then a public policy to tame one deficit based on the causality, will also tame the other.

The levels of fiscal and current account deficits in the United States of America (USA) have also yielded great concerns globally particularly on whether they are sustainable, given the design of the economy and the prevailing international and financial circumstances [9]. This has continued to generate debates on their global effects and the specific impact on developing economies in the event of an abrupt correction particularly for the economies that trade with the USA. In developing countries like Kenya, there are recent debates on whether or not the deficits are sustainable and their implications on macro economy and economic growth in particular. There are also growing concerns about the likelihood of easy reversibility of the inflows of capital which may increase the likelihood of a reversal or a 'abrupt break' [10].

In reference to [11], the associated risk could trigger depletion of reserves and abrupt currency depreciations. The impact could also trigger the relative prices to adjust suddenly and further aggravate the expansion of the Kenya's net liabilities. This was the case during the 2008 global financial crises. The effects of this global financial crisis and the macroeconomic status of many developing countries like Kenya continue to motivate empirical studies on the subject. Equally, in Kenya there is need to seek evidence on whether a reduction in fiscal deficit or current account deficit will help improve current account deficit or fiscal deficit that have been trending recently, for macroeconomic stability and economic growth in Kenya.

As it has been highlighted by [12], little is known about the macroeconomic variables that drives the balance of payments in Kenya. Perpetual deficits in the current account imply that government will always increase her stock of debt. Moreover, these imbalances cannot not be supported indefinitely especially when they are not in line with macroeconomic fundamentals. Intuitively, unsustainable twin deficits imply that the government will continue to increase the debt levels which may adversely impact on macroeconomic stability, overburden the current and future generation, and impact on the overall welfare of the citizens.

Arising from the significant increase in government debt in Kenya, the rating agencies such as Standard and Poor's; and the Moody's Investors Service have in the recent past (2017 to 2021) downgraded Kenya's credit rating [13]. The implication is that the authorities will have to pay more for internal and external borrowings. Additionally, combined with the existing state of public debt levels in the country, the impact may trigger significant deficits in future or heavy tax burden to the current and future generations. This could signal a looming further increase in debt servicing obligations, including interests and principal payments, whose ultimate effect is to increase recurrent expenditure and squeeze on development spending. This may ultimately impact on macroeconomic stability and economic growth.

A number of concerns that have been raised by the debt rating agencies and the IMF may be valid as the high debt levels are detrimental to the country in the medium and long term. Some of these risks that are associated with precariously high debt levels include but are not limited to the following: (i) The higher cost of debt servicing due to debt obligations in foreign currencies despite a weakening shilling, which may lead to higher taxation as the government tries to keep up with its debt obligations; (ii) The increased cost of further borrowing since lenders will price the new debt at higher rates considering the heightened risk which stifles the private sector and economic growth; (iii) Narrowing of the government fiscal space and further limiting resources for infrastructure and capital expenditure; (iv) Crowding out of the private sector by the government which largely leads to lower projected economic growth, subsequently impacting collections further; and, (v) Fiscal consolidation and austerity measures which undermine economic activity, development

objectives and decrease the government's ability to effectively respond to emergencies.

Recently, development needs in most developing economies have also continued to exert more burden resulting from the increase in population which to date continue to fuel more demand to invest in health, education and infrastructure. For this reason, most of these advancing countries including Kenya, have been addicted to fiscal and current account deficits. The difficulty of timely policy adjustment in public expenditure levels to changes in the government's resource envelop poses a serious threat and a risk to sound macroeconomic policy planning, management and may hamper economic growth in these economies.

The need for prudent and adequate public expenditure management has recently become paramount particularly at this period when the national government, the 47 county governments and the private sector are experiencing severe financial constraints. As such, many developing economies like Kenya continue to face the "fiscal trilemma" in an effort to balance between increased spending, containment of public debt and resistance to tax increments. Importantly, whereas an expansion of these deficits may not essentially be a source of concern for an advancing economy like Kenya, persistent fiscal and current account deficits combined with rising public debt could further de-escalate the country's sovereign ratings and precipitate a capital flight, nostalgic of the Asian crisis, or the recent turmoil in the Euro-area. Moreover, persistent deficits in the current account may trigger disequilibrium in the balance of payments, among others several chaos. To this end, the questions that remain unresolved are:

- (i) What is the direction of causality between fiscal and current account deficits in Kenya?
- (ii) What is the effect of fiscal deficit on economic growth in Kenya?
- (iii) What is the effect of current account deficit on economic growth in Kenya?

## 1.1 Policy Relevance

The available evidence on the subject is more conflicting and inconclusive for many Sub-Saharan economies including Kenya. Equally, there exists very scanty macroeconomic policy and economic growth related evidence on country specific studies for advancing economies

like Kenya. This is a research gap that has been ignored and needs to be urgently filled. This study attempts to fill this gap. The findings from this study are intended to provide useful macro-economic policy insights that can be used to redirect policy improvement measures for macroeconomic stability and sustained economic growth for shared prosperity in Kenya. This paper also provides key novelties that originates from the application of novel estimation techniques that include cointegration, application of structural breaks in the analysis, application of Toda-Yamamoto Granger-causality representation and a deeper analysis that appreciates the study objectives more exhaustively in terms of a developing economy specific time series variations. The study also takes into account the dynamism of country's macro-economy and considers changes induced by the recent rebasing of GDP in Kenya. As a result of the COVID-19 pandemic that has led to the global economy contracting by 3.6% in 2020, Governments globally have turned to debt to bridge fiscal and current account deficits resulting from reduced revenues and economic shocks from the pandemic. In the Fiscal monitor 2021 by the IMF, public debt as a percentage of GDP reached 97.0% in 2020 and is expected to reach 99.0% in 2021, underlining the difficult macroeconomic policy environment that many governments not only in Kenya, but also in Sub-Saharan Africa and around the world are in. The estimates establish not only stable but also robust causal relationships that validate the parameter estimates providing the much needed insights for macroeconomic policy analysis and economic growth in Kenya.

## 1.2 The Purpose and Structure of the Paper

The study is aimed at contributing to the ongoing debate on the twin deficits phenomenon in advancing economies. The evidence is aimed at providing crucial macroeconomic policy insights that can be employed to recalibrate policy adjustment measures for macroeconomic stability and long term economic growth in Kenya. Equally, the study builds upon on a crucial research data base for policy makers and academia in Kenya. Due to inadequacy of data in many developing countries like Kenya, scholars have shied away from country specific studies on the subject particularly in Sub-Saharan Africa. This study was instrumental in filling these research gaps. This paper details the following sub-sections: introduction; literature review;

methodology; results; discussion; and the conclusion of the study.

## 2. LITERATURE REVIEW

### 2.1 Theoretical Literature

A study by [14] identifies four causal linkages between fiscal and current account deficits. They include: (i) the twin deficit hypothesis; (ii) the current account targeting hypothesis; (iii) the feedback causation; and (iv) the Ricardian equivalence.

#### 2.1.1 Twin-deficits hypothesis

In reference to [15], an increase in the fiscal deficit pushes the interest rates up, which in turn attracts foreign capital and strengthens the domestic currency aggravating the current account deficit. This paper identifies two key approaches on the transmission mechanism in support of the twin-deficit hypothesis which are explained through the Keynesian income-expenditure approach and the Mundell- Fleming (FM) model that is founded on open-economy and high capital mobility [16]. The income-expenditure approach underscores that an increase in fiscal deficits will increase domestic absorption (C+I+G) and, in turn the domestic income. The increase in income will induce imports and eventually will reduce the surplus or increase the deficit in the trade balance which is a component of current account. As highlighted by the Keynesian open economy models with high capital mobility, an additional linkage will result to the deterioration of the trade balance due to a higher fiscal deficit.

Equally, a rise in the fiscal deficit will result in an increase in the aggregate demand and domestic real interest rates. The high interest rates will lead to net capital inflow from abroad and cause appreciation of the domestic currency. The strong currency will make imports cheap and domestic exportable less competitive in the global market and adversely affect net exports deteriorating the deficit in the current account. Although these channels may differ slightly, [17] advocate that the conclusion is valid. However, while admitting the harmful economic effects of large fiscal deficits, critics of the MF approach are doubtful of the sequence of causation. Studies in favor of the twin deficits phenomenon include [18] for Indonesia, [19] for Tanzania, among others.

### 2.1.2 Current account targeting hypothesis

A number of scholars have also established reversed causation running from current account deficit to fiscal deficit. In reference to [20] this causation is termed as current account targeting hypothesis. In reference to [20,21], the worsening of the current account deficit potentially leads to a slower pattern of growth resulting to increases in the fiscal deficits. That as government implements a fiscal stimulus policy that is aimed at minimizing the negative effects of large current account deficit, on the flipside economic slowdowns resulting from large current account deficits not only enlarge public spending, but also shrink tax revenues, aggravating the fiscal deficits. Many scholars including [14] for Spain and [22] for Greece show evidence in support of this view. However, this approach has been critiqued in the sense that policy implications of research findings associated with this view remain basically ambiguous, time and space dependent and appear to be impracticable.

### 2.1.3 The feedback linkage (Bidirectional causality)

This causation is also termed as the bidirectional causality. In reference to [23], this view contends that in as much as fiscal deficits cause current account deficits, equally current account deficits can cause fiscal deficits. Moreover, [24] also established that savings and investments are highly correlated, and the linkage leads to bidirectional causality between fiscal and current account deficits. The studies that provide evidence of bidirectional causality include [25] and [26] for Togo, among others scholars.

### 2.1.4 The Ricardian equivalence

This is the neutrality view. The proponents of this view deny any connection between the fiscal deficit and the current account deficit. The view opines that since people are rational, they know that the reduction in taxes, as a result of the government expansionary fiscal policy of tax cut, is temporally and so they will therefore save the extra disposable income to pay for the future higher taxes. It posits that the national savings will not be affected because the decrease in government savings represented by increased fiscal deepening will be compensated by the additional precautionary private savings for expected future increase in taxes. In reference to [27], a tax cut has no effect on consumption

since rational individual, being aware of the intertemporal government budget constraint, base their consumption decision on permanent income and will hence anticipate increase in future tax liability by saving amount equivalent to the tax cut. However, this view has been critiqued on grounds that it is based on relatively strong assumptions that may render its practical relevance questionable.

## 2.2 Empirical Literature

Recent empirical investigations of the relationship have yielded mixed and inconclusive results. For instance, [28] considered four variables and applied the VAR technique to examine the relationship in USA. The findings revealed that only the fiscal deficit explained the evolution of the current account and the twin deficit hypothesis was confirmed. It is noted that [29] analyzed a sample of over 100 countries and found out that an improvement in the fiscal balance of 1 % of GDP improved the current account balance by 0.2 %. The impact was longer-lasting in emerging than in advanced countries.

Equally, [30] analyzed the causal dependencies between economic growth, fiscal and trade deficits of ten new European Union countries. The study applied annual data from 2000 to 2009 using panel datasets. They established that fiscal deficits were significantly slowing down the GDP growth rates. The results also established a unidirectional causality running from fiscal to trade deficits that confirmed existence of twin deficits hypothesis for the countries in question. From a mixed of countries, [25] applied cointegration analysis to investigate the nexus between current account and fiscal deficits. They used annual time series data from five developed and five developing countries. They show that the link between the two deficits in the long-run is more likely to occur in the developing countries than the developed ones. They provide evidence of Granger-causality test in support of bidirectional linkages for developing countries.

Moreover, [31] applied cointegration technique with regime shifts and established a long-run relationship between the variables employed in 13 out of 23 OECD countries. They observed that when structural breaks were applied in the analysis, it significantly impacted the on the causality results. Their study confirms that the application of structural breaks in macroeconomic data is essential in the

determination of the direction of causality between fiscal and current account deficits. Narrowing to Africa, [26] used annual data for 1970 to 1999. The study employed OLS and Granger-causality method and examined the twin deficits hypothesis. Their study provides evidence of a positive relationship between the two deficits for all nations under review except for Cameroon, Cote d'Ivoire, Gambia, Guinea-Bissau and Mali. The twin deficit hypothesis was confirmed for Benin, Burkina Faso, Ghana, Nigeria and South Africa and bi-lateral causality for Togo while current account targeting hypothesis was confirmed for Kenya.

In Kenya, [32] observed that about ten years after Kenya got independence (in 1963), the country experienced the first fiscal and external deficits that led to the BOP problems. This was attributed to expansionary government spending. Equally, [33] examined the relationship between current account and budget balances in Kenya from 1963 to 2012. The study considered other variables such as growth, interest rates, money supply (M3) and applied cointegration, error correction model and Granger-causality approach. Evidence show that the direction of flow is from budget deficit to current account deficit.

In reference to [34], the overall impact of each channel on twin-deficit phenomenon hinges mainly on the features of each economy. Generally, literature provides great insights to modelling in relation to twin deficit and economic growth approach in developing economies. This study notes that there exists very scanty evidence that is mixed and inconclusive particularly for country specific studies and specifically for Kenya. Equally, none of the identified previous studies in Kenya considered the application of structural shocks in the determination of causal linkages. It is also clear that there exist country heterogeneities across the globe. By applying a different analytical model, methodology, variables and sample period, the study may yield fresh economic policy insights for Kenya.

### 3. METHODOLOGY

#### 3.1 Theoretical Framework

This paper adopts [35] study on the twin deficits hypothesis. The study derives the link between fiscal and current account deficits from the national accounts identity shown in equation 1.

$$Y = C + I + G + TB + NFI + NCT \quad (1)$$

where  $Y$  is gross domestic product (GDP),  $C$  is private consumption,  $I$  is investment,  $G$  is government consumption,  $TB$  is trade balance,  $NFI$  is net factor income (from abroad), and  $NCT$  is net current transfers. The sum of  $TB + NFI + NCT$  describes the current account balance ( $CAB$ ) as shown in equation 2.

$$CAB = TB + NFI + NCT \quad (2)$$

Abstracting from 2, trade balance is a component of current account balance. Since the difference between income ( $Y$ ) and total consumption ( $C + G$ ) depict national saving ( $S$ ), identity 2 can be rewritten as,

$$S - I = CAB \quad (3)$$

From equation 3 and excluding the net foreign income from abroad and transfers from equation 2, in a narrow definition Equation 3 transforms to 4,

$$S - I = TB \quad (4)$$

National saving results from two components which include the public saving and private saving, as shown by equation 5 and 6,

$$S_{Public} = T - G \quad (5)$$

$$S_{Private} = Y - T - C \quad (6)$$

where  $T$  depicts taxes by the government. Rearranging equation 3 yields equation 7,

$$(T - G) + S_{Private} - I = CAB \quad (7)$$

where  $(T - G)$  shows the government balance ( $GB$ ). It is a surplus if  $T$  is larger than  $G$ . Similarly, if  $CAB > 0$ , the nation experiences a surplus in current account. If taxes are less than government spending, a country records a fiscal deficit. If  $CAB < 0$ , there is a current account deficit.  $S - I$  shows the savings-investments balance of the private sector. In case the difference between private saving and investment is stable, then fiscal and current account balances will move together. However, if changes in the fiscal deficit are fully offset by changes in savings in reference to the neutrality view, then the movement of fiscal and current account balances is unrelated. In reference to Kenya, [33] observes that if a current account deficit is large and persistent, it can be

dangerous as could lead to sharp reversals that may be disruptive and ultimately affect economic growth. To this end, this study further adopts [36] growth model that incorporates the fiscal and current account deficits in economic growth analysis.

$$(\dot{Y}) = A/B \tag{8}$$

where equation 8 is an inclusive form of several predictors of economic growth.  $(\dot{Y})$  depicts real GDP growth,  $A$  is decomposed into measures of; (i) the impact of foreign demand on domestic growth; (ii) the effect of relative prices on growth; (iii) the effect of current account deficit on growth of real GDP; and (iv) the effect of fiscal deficits on growth of the economy. Lastly,  $B$  shows the effects of the disaggregated import elasticities of the demand components on economic growth.

## 4. RESULTS AND DISCUSSION

### 4.1 Descriptive Statistics

This paper applied annual time series data from 1980 to 2016 for Kenya. The study period also coincides with the time when many countries in Sub-Saharan Africa, Kenya included experienced persistent fiscal deficits, current account deficits and volatile economic performance. The data was sourced from the Government of Kenya, [37] and [38]. The estimated economic growth model was specified as in 9;

$$\dot{Y}_t = \alpha_0 + \alpha_1 FD_t + \alpha_2 CAD_t + \alpha_3 DS_t + \alpha_4 RER_t + \vartheta_t \tag{9}$$

Where  $\dot{Y}_t$  depicts growth of real GDP in time  $t$ ,  $FD_t$  represents the fiscal deficit as a share of

GDP,  $CAD_t$  is the current account deficit expressed as a share of GDP,  $DS_t$  denotes total debt service expressed as a share of exports and primary income, while  $RER_t$  is the foreign exchange rate as depicted by Kenya official exchange rate in Kenya shillings per US dollar  $\vartheta_t$  is the white noise error term and  $\alpha_i$  shows the coefficient of the variables estimated in the economic growth model. This paper includes foreign exchange rate in the analysis because of its role in international trade. Moreover, [39] notes that recently the level of public debt in several sub-Saharan countries doubled and the IMF is strongly urging these countries including Kenya to raise taxes and to provide more scope for paying interest. To this end the study employed real exchange rate and debt service variables in the analysis.

The study applied Stata econometrics software to analyze the data. Table 1 indicates that all variables had complete observations for the entire period. Economic growth variable was found to be on average 3.85% with the minimum value being below zero by 1% with the maximum being 8.4%. The fiscal deficit had a mean of 3.9% with the minimum being below zero by 0.81% and a maximum of 11.48%. Current account deficit had a mean of 6.03% with the minimum being below zero by 0.89% and a maximum of 18.7%. The rest of the variables were as indicated in Table 1.

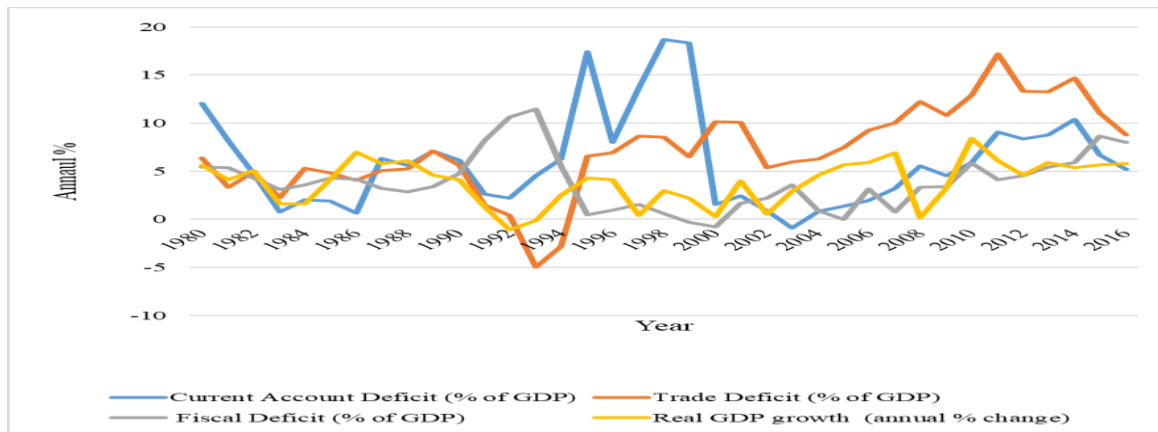
### 4.2 Trend Analysis

The study examined the movement and behavior of the data series for all the variables overtime prior to proceeding to analyze the data as presented in Figs. 1, 2 and 3.

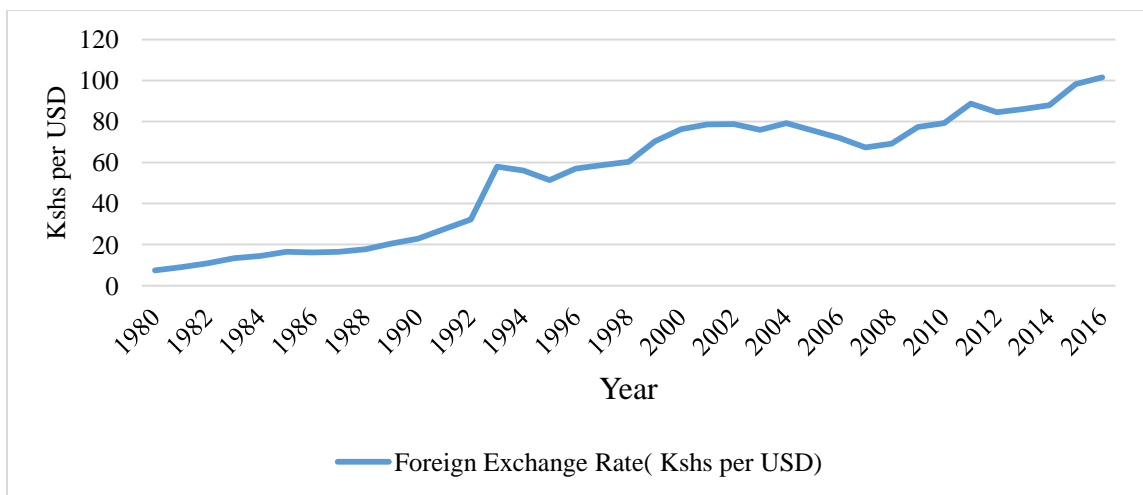
**Table 1. Descriptive statistics**

| Variables               | Obs | Mean   | Std. Dev. | Min     | Max    | Skewness | Kurtosis |
|-------------------------|-----|--------|-----------|---------|--------|----------|----------|
| Real GDP Growth         | 37  | 3.8514 | 2.3235    | -1.1    | 8.4    | 0.2878   | 0.3397   |
| Fiscal Deficit          | 37  | 3.8962 | 2.8930    | -0.814  | 11.475 | 0.0640   | 0.3746   |
| Current Account Deficit | 37  | 6.0343 | 4.9762    | -0.8885 | 18.68  | 0.0071   | 0.2081   |
| Debt Service            | 37  | 19.692 | 11.901    | 4.3194  | 39.766 | 0.4087   | 0.0008   |
| Foreign Exchange Rate   | 37  | 54.422 | 29.902    | 7.42019 | 101.5  | 0.3964   | 0.0001   |

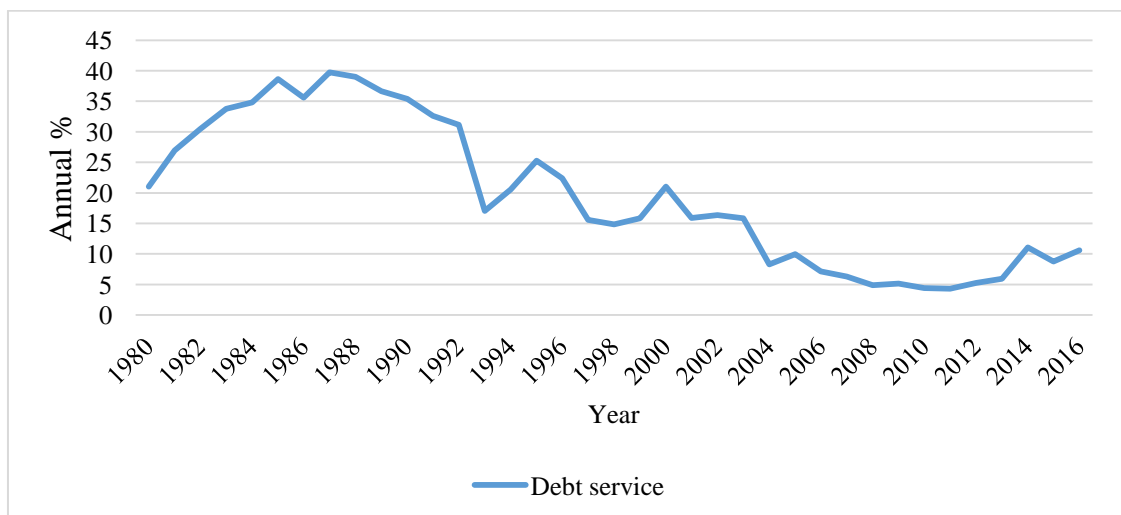
Source: Author's



**Fig. 1. Kenya's fiscal deficit, trade deficit, current account deficit and real GDP growth**  
Source: Author's



**Figure 2. Foreign exchange rate (Kshs per US dollar)**  
Source: Author's



**Fig. 3. Debt service (annual % of exports and primary income)**  
Source: Author's



Fig. 1 highlights the growth in real GDP, the fiscal deficit, trade deficit and the current account deficit from 1980 to 2016. In 1980s economic growth was at 5.6% while in 1990 it declined to 4.1% further declining to 0.3% in 2000. However, it recorded an impressive positive 6.9% in 2007 but after the 2007 post-election violence it declined to 0.2% in 2008 and was at the peak point of 8.4% in year 2010, mainly due to macroeconomic stability and declined to 5.8% in 2016. The minimum value of economic growth was recorded in year 1992 attributed to economic and political shocks whereby real GDP growth was -1.1%.

On the other hand, the current account recorded an average deficit of 8% of GDP in 1981 and 6% in 1990. In 2000, it narrowed to 1.6% and was attributed to foreign aid in Kenya. Kenya's current account balance continued to improve recording a surplus of 0.89% of GDP in 2003 mainly due to improvement in trade balance. It reached a deficit of 9.1% in 2011, a deficit of 10.4 % in 2014 and averaged 6% of GDP in 2015 and 2016. The fiscal deficit was at 5.35% in 1981 reaching a peak point of 11.48% in 1993. It was at negative 0.81% in 2000, 0.78% in 2007 and 7.99% in 2016. Fig. 1 shows persistent fiscal deficits in all the years under review except 1999/2000. Equally, the high and persistent current account deficit in the country is mainly financed by short-term net capital inflows. This is a major source of potential vulnerability for the Kenyan economy and for financial stability [10,11,40]. There is also evidence of fluctuations in economic growth overtime which may also be attributed to political and economic shocks in the Kenya. The trend of the rest of the variables is as reflected in Figs. 2 and 3.

### 4.3 Unit Root Tests

The motivation to apply the unit root tests in time-series data is to confirm non-stationarity in the

variables. When the variables are found to be non-stationary, successful differencing is applied to the data series until the bias is eliminated. It was noted from the trend analysis that the data series was likely to be I (1) process. Thus the paper analyzed the time series properties of the data. Firstly, the study applied the Phillips-Perron (PP) unit-root test in the analysis. If the test statistic was more than the critical value (at 5%), the null hypothesis was rejected. In all cases, the hypothesis of stationarity was rejected. The study established that the variables were integrated of order one but transformed to stationary after first difference. However, prior to drawing conclusions based only on results of the PP unit root tests, this study conducted further stationarity tests to establish the presence or absence of structural shocks in the data series. This study affirms [31] analysis that structural breaks are essential in predicating the direction of causality in the analysis of twin deficit hypothesis. In reference to [41], structural breaks for most of macroeconomic variables in Kenya coincide with shocks in terms of trade, economic policy changes and political shocks in the economy. This study applied [42] tests for structural breaks. In the identified related studies for Kenya, none considered the application of structural breaks in the analysis. Table 2 displays the results.

The results of Zivot and Andrews tests show that all variables were non-stationary but transformed to stationary at first difference, further confirming the results of the PP unit-root tests. The next stage of analysis required that we subject the data to Johansen (1995) test for cointegration in order to determine if the variables were cointegrated or not. The procedure was very necessary to guide on the selection of the technique of estimation.

**Table 2. Results of zivot-andrews unit-root tests**

| Variables               | Year of structural break | Level        |                   | First difference |                   | Order of integration |
|-------------------------|--------------------------|--------------|-------------------|------------------|-------------------|----------------------|
|                         |                          | t-statistics | 5% critical value | t-statistics     | 5% critical value |                      |
| Real GDP Growth         | 1991                     | -4.383       | -4.80             | -6.140           | -4.80             | I(1)                 |
| Fiscal Deficit          | 1994                     | -4.644       | -4.80             | -6.699           | -4.80             | I(1)                 |
| Current Account Deficit | 2000                     | -4.968       | -4.80             | -7.672           | -4.80             | I(1)                 |
| Foreign Exchange Rate   | 1993                     | -4.284       | -4.80             | -6.118           | -4.80             | I(1)                 |
| Debt Service            | 1993                     | -4.506       | -4.80             | -7.201           | -4.80             | I(1)                 |

Source: Author's

#### 4.4 Cointegration Analysis

The study applied [43] test for cointegration. The trace and the maximum statistic established that the variables were cointegrated implying that the vector error correction model (VECM) was appropriate to estimate the economic growth model in line with the objectives of the study and further to examine the short run and long run model parameter estimates. The variables employed in the model are limited to five as highlighted in equation 9. This is in light of time series properties of the data as they were all confirmed to be integrated of order one  $I(1)$  and were cointegrated validating the choice of the estimation technique of analysis in line with economic theory.

#### 4.5 VECM Regression Results

The residual LM test for serial correlation predicted no serial correlation in the residuals of the estimates. The model stability test satisfied all the stability conditions. Equally, the results of the diagnostics tests suggested that the model was best suited for the analysis of the data. The short-run and long-run results are shown in Tables 3 and 4, respectively.

The parameter estimates for the short-run relationship are in differenced variables as shown in Table 3, whereby D. represents the first difference. The essence of VECM Short-run relationship is to establish the speed of adjustment of the error correction term (the amount of disequilibrium transmitted each year). The negative coefficient of the error correction term confirms that economic growth and the explanatory variables have indeed a long-run relationship. This paper shows that the

coefficient of error correction term [U (-1)] is negative 0.1994 which is less than one and significant at 1 % ( $p < 0.01$ ). The significance implies that *ceteris paribus*, whenever there are deviations in real GDP growth from an equilibrium path, the model corrects at the rate of 19.9% annually.

In the short-run, the current account deficit has positive and significant ( $p < 0.1$ ) effect on economic growth as highlighted by the first and second lag. During the first lag, a 1% rise in the current account deficit is associated with a positive growth of real GDP by 0.5 %, at 1% significant level, *ceteris paribus*. At the second lag, this effect reduces but remains positive whereby a 1% rise in current account deficit has the potential to increase growth of real GDP by 0.2%, at 10 % significant level. This positive effect of current account deficit on economic growth implies that the government should utilize these deficits to strictly finance public investment to foster gross capital formation and continue to drive economic growth in Kenya.

During the first and second lag, fiscal deficits had asymmetric effects albeit non-significant. The effect of the debt service variable was positive for the first and second lag but this positive effect was not significant. Lastly, the foreign exchange rate variable had positive and largely significant effect ( $p < 0.1$ ) on real GDP growth. *Ceteris paribus*, a 1 unit appreciation of the Kenya Shillings against the US Dollar has the potential of boosting the growth of real GDP by 0.21 % and 0.23 % in the first and second lag, respectively. This implies that adequate policies aimed at supporting the Kenyan exchange rate to function as a shock absorber to the economy should be continuously promoted.

**Table 3. VECM short-run relationship**

| Variable  | Dependent Variable – Real GDP Growth |              |           |             |         |
|---|--------------------------------------|--------------|-----------|-------------|---------|
|   | Lag                                  | Coefficient  | Std Error | t-statistic | p-value |
| Constant  |                                      | 0.553824     | 0.515840  | 1.07        | 0.283   |
| D.Current Account Deficit (-1)                            | LD                                   | 0.5022494**  | 0.1597794 | 3.14        | 0.002   |
| D.Current Account Deficit (-2)                            | L2D                                  | 0.2268495*** | 0.1304705 | 1.74        | 0.082   |
| D. Fiscal Deficit (-1)                                    | LD                                   | 0.2976300    | 0.2359869 | 1.26        | 0.207   |
| D. Fiscal Deficit (- 2)                                   | L2D                                  | -0.0146271   | 0.2395602 | -0.06       | 0.951   |
| D. Foreign Exchange Rate (-1)                             | LD                                   | 0.2105914**  | 0.0916344 | 2.30        | 0.022   |
| D. Foreign Exchange Rate (-2)                             | L2D                                  | 0.2277231**  | 0.1092504 | 2.08        | 0.037   |
| D.Debt Service (-1)                                       | LD                                   | 0.1948525    | 0.1267807 | 1.54        | 0.124   |
| D.Debt Service (-2)                                       | L2D                                  | 0.1090487    | 0.1677579 | 0.65        | 0.516   |
| Speed of Adjustment of the Error Correction Term [U (-1)] |                                      | -0.1994**    | 0.054991  | -3.63       | 0.000   |

\*\* Indicate significance at 5% significance level

Source: Author's

**Table 4. VECM long-run relationship**

| Dependent Variable – Real GDP Growth |              |           |             |         |
|--------------------------------------|--------------|-----------|-------------|---------|
| Variable                             | Coefficient  | Std Error | t-statistic | p-value |
| Constant                             | 24.70726     |           |             |         |
| Current Account Deficit              | -1.695380 ** | 0.362420  | -4.68       | 0.000   |
| Fiscal Deficit                       | 2.234128**   | 0.701602  | 3.18        | 0.001   |
| Foreign Exchange Rate                | -0.4286162** | 0.120271  | -3.56       | 0.000   |
| Debt Service                         | 0.7751052**  | 0.269661  | 2.87        | 0.004   |

\*\* Indicate significance at 5% significance level

The results of long-run relationship show that current account deficit, fiscal deficit, foreign exchange rate and debt service significantly predicts economic growth in Kenya. The coefficients of current account deficit, fiscal deficit and foreign exchange rate were largely significant at 1% significant level ( $p < 0.01$ ), while that of debt service was significant at 5% significant level ( $p < 0.05$ ).

There is evidence that in the long-run, current account deficit has positive and largely significant ( $p < 0.01$ ) effect on economic growth. *Ceteris paribus*, a 1% increase in the current account deficit is associated with 0.338% increase in the real GDP growth. The results suggest that the authorities should utilize current account deficit to strictly finance public investment to continue boosting the growth of the economy. The effect of fiscal deficit on growth of the economy was negatively and statistically significant at 1% significant level. This illustrates that a 1% rise in fiscal deficit is associated with a decline in economic growth by 0.445%, in the long-run underscoring the need for fiscal discipline in Kenya. In order to minimize on the fiscal deficits and boost growth of real GDP, the government should fully operationalize and remove bottlenecks to Private Public Partnerships (PPPs) and joint ventures to attract more private sector involvement. Further, policies aimed at implementing robust fiscal consolidation would further help the government bridge the fiscal deficit gap. This can be achieved by reducing expenditure by introducing austerity measures and reducing amounts extended to recurrent expenditure. Capital spending should also be limited to projects with either high social impact or have a high economic rate of return and those whose economic benefits outweigh costs. This can be achieved by implementing a robust Public Investment Management (PIM) framework in Kenya.

The parameter estimate for foreign exchange rate is also positively and significantly associated with economic growth variable at 1% significant

level. The estimates establish that all else equal, an appreciation of the Kenya shilling by 1 Kenya shilling per USD, is associated with expanding the growth of the economy by 0.085%, implying that the government should promote policies that are aimed at supporting the exchange rate to function as a shock absorber to the economy, for long term growth of the economy. Lastly, the parameter estimate for the debt service is negative and significant at 5% significance level. The estimate suggests that *ceteris paribus*, 1% increase in debt service is associated with 0.15% decline in economic growth, in the long run. This reinforces the need to promote debt restructuring to minimize the debt service related costs in order to boost long term economic growth in Kenya. The authorities should aim to enhance revenue collection as it forms a huge part in reducing the debt burden. This can be done by streamlining the revenue collection process and conducting frequent tax audits to help seal loopholes that lead to loss of revenue. There is also need to promote policies aimed at reducing the share of commercial borrowing as compared to concessional borrowing so as to reduce amounts paid in debt service. Concessional loans also have longer repayment periods and lower interest rates.

#### 4.6 A Multivariate Long-run Toda and Yamamoto [44] Causality

The study specifically determined whether one - time series predicts another. According to [45], the Toda and Yamamoto [44] technique applies an additional lag order  $k + d_{max}$  with that of optimal lag. The technique has comparative superiority in respect to the pre-testing of cointegration estimation. It also overcomes any form of biasness that may emerge from unit root and cointegration tests. This technique minimizes the cumbersomeness of implementation and the risk of identifying correct order as it is performed regardless of cointegration orders [46].

**Table 5. Toda-yamamoto granger-causality wald tests**

| Equation                | Excluded                | Chi2   | Df | Prob  |
|-------------------------|-------------------------|--------|----|-------|
| Real GDP Growth         | Current Account Deficit | 29.465 | 4  | 0.000 |
| Real GDP Growth         | Fiscal Deficit          | 7.9095 | 4  | 0.095 |
| Real GDP Growth         | Foreign Exchange Rate   | 15.888 | 4  | 0.003 |
| Real GDP Growth         | Debt Service            | 21.899 | 4  | 0.000 |
| Real GDP Growth         | ALL                     | 41.924 | 16 | 0.000 |
| Current Account Deficit | Real GDP Growth         | 10.545 | 4  | 0.032 |
| Current Account Deficit | Fiscal Deficit          | 15.626 | 4  | 0.004 |
| Current Account Deficit | Foreign Exchange Rate   | 21.843 | 4  | 0.000 |
| Current Account Deficit | Debt Service            | 32.185 | 4  | 0.000 |
| Current Account Deficit | ALL                     | 97.458 | 16 | 0.000 |
| Fiscal Deficit          | Real GDP Growth         | 9.0274 | 4  | 0.060 |
| Fiscal Deficit          | Current Account Deficit | 3.5714 | 4  | 0.467 |
| Fiscal Deficit          | Foreign Exchange Rate   | 3.599  | 4  | 0.463 |
| Fiscal Deficit          | Debt Service            | 8.0469 | 4  | 0.090 |
| Fiscal Deficit          | ALL                     | 35.83  | 16 | 0.003 |
| Foreign Exchange Rate   | Real GDP Growth         | 9.2996 | 4  | 0.054 |
| Foreign Exchange Rate   | Current Account Deficit | 31.937 | 4  | 0.000 |
| Foreign Exchange Rate   | Fiscal Deficit          | 33.642 | 4  | 0.000 |
| Foreign Exchange Rate   | Debt Service            | 3.279  | 4  | 0.512 |
| Foreign Exchange Rate   | ALL                     | 78.796 | 16 | 0.000 |
| Debt Service            | Real GDP Growth         | 7.824  | 4  | 0.098 |
| Debt Service            | Current Account Deficit | 1.5121 | 4  | 0.824 |
| Debt Service            | Fiscal Deficit          | 8.1387 | 4  | 0.087 |
| Debt Service            | Foreign Exchange Rate   | 8.7753 | 4  | 0.067 |
| Debt Service            | ALL                     | 31.948 | 16 | 0.010 |

*H<sub>0</sub>: Implies Rejection of Granger non-causality*

*Source: Author's*

The first row of Table 5 indicates that lagged values of current account deficit cause real GDP growth as p-value is equal to 0.0000 which is less than 5%. Similarly, since the p value 0.032 is less than 5% (in the sixth row), lagged values of real GDP growth cause current account deficit. The estimates suggest a bidirectional causality between current account deficit and growth of real GDP. There is need for the authorities to pay more attention and improve investment efficiency arising from these deficits. The bidirectional causality further imply that the decrease in growth of real GDP can upsurge current account deficit through budget deficit because the government would have to spend more in attempt to recover economic growth. Therefore, it is crucial for the government to control strictly the level of budget deficit, while promoting policies that can boost the growth of real GDP.

In the eleventh row, that lagged values of real GDP growth do not cause fiscal deficit as p-value is equal to 0.06 which is greater than 5%. Equally, since the p value 0.095 is greater than 5% (in the second row), lagged values of fiscal deficit do not cause real GDP growth. Therefore, the null cannot be rejected. The estimates

suggest that there exists no causality between fiscal deficit and real GDP growth in estimated growth model.

Lastly, in the seventh row the estimates show that lagged values of fiscal deficit cause current account deficit as p-value is equal to 0.004 which is less than 5%. However, because the p value 0.467 is greater than 5% (in the twelfth row), lagged values of current account deficit do not cause fiscal deficit. Therefore, the null cannot be rejected. The direction of causality is therefore from fiscal deficit to current account deficit confirming the existence of twin deficits hypothesis in the period 1980 to 2016, for Kenya. These results support the empirical findings of [18] for Indonesia, [19] for Tanzania, [30] for ten European Union countries, and [33] for Kenya.

## 5. CONCLUSION

This paper examined the twin deficits phenomenon in Kenya from 1980 to 2016. It also reviewed the effects of fiscal and current account deficits on economic growth in Kenya. The

parameter estimates provide evidence of unidirectional causality running from fiscal deficit to current account deficit. The current account had positive effect while fiscal deficit had negative effect on real GDP growth. The findings also suggest a bidirectional causality running from current account deficit to economic growth and vice-versa. Importantly, the level of deficits and growth rate of real GDP of one year may significantly influence the growth rate of the next year (time lag of one). If one period experiences lower growth rate, the growth rate of the following period will be affected. It is therefore important to control and supervise each period in order to prevent long-run problems.

Lastly, the evidence of twin deficits phenomenon in the country underscores the need to promote policies that upscale fiscal discipline, reduce the size of the fiscal deficits for external stability and long-term economic growth, in Kenya. Lastly, the limits of this research include unavailability of high frequency (quarterly) data for the variables applied and data on real effective exchange rate for Kenya. However, the econometrics results were confirmed to be reliable because the alternative data applied certainly provided credible findings that yielded valid policy responses in line with the study objectives. Importantly, future research is suggested on the nexus between budget deficit on one side and international transfers and incomes of international investments on the other, since this literature is lacking. Moreover, with availability of high frequency (quarterly) data, it would be crucial to confirm the robustness of different measures of macroeconomic stability and how they impact on economic growth particularly in Sub-Saharan African countries. Other robustness checks would include robustness of twin deficits phenomenon to different estimation techniques like the dynamic stochastic general equilibrium framework of analysis, among others to validate and make comparisons of the research findings for individual economies in Sub-Saharan Africa.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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