The Twin Deficits Hypothesis: Evidence from Kenya

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Abstract: This paper examines whether the long-run relationship between budget and external deficits follows the tenets of the twin-deficit hypothesis, the Ricardian equivalence hypothesis, the current account targeting hypothesis, or the feedback linkages. It also evaluates the effects of budget and trade deficits on economic growth. On a global perspective, these have been in the recent period debated in developed and developing nations. In contributing to this ongoing debate, the study applied unit root tests, cointegration analysis, a dynamic vector error correction model and a multivariate Toda-Yamamoto long -run Granger-causality representation using annual time series data for Kenya from 1980 to 2016. There is evidence of unidirectional causality running from budget deficit to external deficit in support of the twin-deficit hypothesis. In the long run, budget deficit had significant positive effects while trade deficit had significant negative effects, on real GDP growth. Overall, the findings suggest that the authorities should promote policies that upscale fiscal discipline, curb budget deficits for external stability and long-term economic growth, in Kenya. The evidence underscores the need for more country specific studies in sub-Saharan Africa.

Keywords: budget deficit, causality, cointegration, economic growth, Toda-Yamamoto, trade deficit, Twin-deficit.

I. INTRODUCTION

The 'twin deficits hypothesis' opines that there is a connection between budget and external deficits. The hypothesis was popularized by the 'New Cambridge School' in the 1970s, and advocates that with equilibrium in the private sector, the size of the government deficit was proportional to, and the principal determinant of the size of the external deficit. In some instances, private sector equilibrium is not assumed, but it is viewed that changes in the size of the budget deficit result in equivalent changes in the external balance. The twin deficits hypothesis has important policy implications (Bird et al., 2019). In reference to Sakyi and Opuku (2016), budget and external deficits have also been at the center of macroeconomic adjustments for economic growth and stability in many economies. The 2008 global financial crisis has also renewed these debates and research interests on the subject.

Globally, the levels of budget and external deficits in the United States of America (USA) have also yielded great concerns on whether they are sustainable, given the design of the economy and the prevailing international and financial circumstances (Laxton and Kumhof, 2013) . This has continued to yield great concerns on their global effects and specifically on the their effects on advancing economies in the event of an abrupt correction for the economies that trade with the USA. In Kenya for instance, there are recent debates on whether or not the deficits are sustainable and their implications on macroeconomy and economic growth. 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' (O'Connell et al., 2010). In reference to Mwega (2014), the associated risk could trigger depletion of reserves and abrupt currency depreciations. The impact could also trigger the relative prices to adjustment suddenly and aggravate the expansion of the Kenya's net liabilities. This was the case during the 2008 global financial crises.

In conventional terms, as pointed out by Miteza (2012), overspending by the public sector is perceived as a policy that is broadly applied to deal with macroeconomic problems. In economic theory, budget and external deficits tend to go hand in hand, ultimately impacting on long-run economic growth. Therefore, establishing their causality will be critical in

formulating the much needed macroeconomic policy responses. Generally, literature has been broadly classified into two. The Keynesian (conventional); and the Ricardian (the neoclassical) views. The Keynesian view advocates that there exists a link between the two deficits whilst the neoclassicals argue that there exists no such linkages (Sakyi and Opoku, 2016).

The Keynesian absorption view opines that budget deficits expand domestic absorption. This fuels import expansion and enlarge the external deficit. That in a Mundell-Fleming model, budget deficits triggers a rise in interest rates (Cebula, 2003) which attracts capital inflows, and lead to currency appreciation (Rosensweig and Tallman, 1993). The appreciation of the currency makes imports get cheaper and exports dearer. This deteriorates the external deficit (Bahmani-Oskooee and Ratha, 2004b). On the contrary, the Ricardian Equivalence Hypothesis (REH), foreseeing higher tax-liabilities arising from the government expansionary budgets, people would save more and consume less. Consequently, an intertemporal shift between taxes and budget deficits would have no impact on the real interest, or the external deficit (Enders and Lee, 1990). Thus, if REH holds, the explanation for persistent external deficits should be found elsewhere such as international competitiveness, capital mobility, among others (Veronica et. al., 2004). However, if it does not, it may imply that the twin-deficits hypothesis holds implying that a policy aimed at taming one deficit based on the causality, will also tame the other.

In reference to Osoro (2013), little is known about the macroeconomic variables that drives the balance of payments in Kenya. Perpetual government deficits imply that government will always increase her stock of debt. Moreover, these two deficits cannot not be supported indefinitely especially when they are not in line with macroeconomic fundamentals. Intuitively, unsustainable public sector 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 (IMF, 2018). 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.

It is clear that the development needs in most developing economies have continued to exert more burden resulting from the increase in population which has continued to cause more demand to invest in health, education and infrastructure. Consequently, most of these developing countries including Kenya, have been addicted to internal and external deficits. The difficulty of timely policy adjustment in public expenditure levels to changes in the government's resource envelop poses a serious problem and a risk to sound macroeconomic policy planning and management in Kenya. The need for 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 have continued to face the "fiscal trilemma" in an effort to balance between increased spending, containment of public debt and resistance to tax increments. Notably, whereas an expansion of these deficits may not essentially be a source of concern for an advancing economy like Kenya, persistent internal and external 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. Equally, persistent external deficits 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 nature and direction of causality between budget and external deficits in Kenya?.

(ii) What is the effect of budget deficit on economic growth in Kenya?.

(iii)   What is the effect of trade deficit on economic growth in Kenya?.

II. LITERATURE REVIEW

The available theoretical and empirical evidence on the subject is more conflicting and therefore inconclusive. moreover, there exists very scanty evidence on country specific studies on the subject in Kenya. This is a research gap that has been ignored and needs to be urgently filled. This paper attempts to fill this gap. A study by Magazzino (2012) highlights four

causal linkages between budget and external deficits. They include: (i) the twin deficit hypothesis; (ii) the current account targeting hypothesis; (iii) the feedback causation; and (iv) the Ricardian equivalence. To start with, the twin deficit hypothesis as been documented by Feldstein (1986). An expansion of the budget deficit pushes the interest rates up, which in turn attracts foreign capital and strengthens the domestic currency aggravating the external deficit. Feldstein (1986) identifies two main approaches on the transmission mechanism in support of the twin-deficits hypothesis. These are explained through the Keynesian income-expenditure approach and the Mundell- Fleming (FM) model. The Mundell-Flemming model is founded on open-economy and high capital mobility (Mundell, 1963). The income-expenditure approach underscores that an expansion of budget deficits will increase domestic absorption and, in turn the domestic income. The expansion of income will induce imports and eventually reduce the surplus or increase the deficit in the trade balance. The trade balance 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 resulting from a higher budget deficit. Moreover, an increase in the budget deficit will expand the aggregate demand and domestic real interest rates. The high interest rates will trigger net capital inflow from abroad and lead to appreciation of the domestic currency making imports cheap and domestic exportable less competitive in the global market. This will adversely affect net exports and deteriorate the trade deficit. Even though these channels may differ slightly, Elif and Gul (2002) opine that the conclusion is valid. However, while admitting the harmful economic effects of large budget deficits, critics of the Mundell-Flemming approach are doubtful of the sequence of causation. Scholars in support of the twin-deficits hypothesis include Anisha and Tri (2017) and Epaphra (2017), among others.

Secondly, a number of scholars have also established reversed causation running from external deficit to budget deficit. In reference to Poterba and Summers (1986) this causation is termed as current account targeting hypothesis. Summers (1988) documents that the worsening of the trade deficit potentially leads to a slower pattern of growth resulting to increases in the budget deficits. That as government implements a policy on fiscal stimulus that is aimed at minimizing the negative effects of large trade deficits, on the flipside economic slowdowns resulting from large external deficits not only enlarge public spending, but also shrink tax revenues, aggravating the budget deficits. Many scholars including Magazzino (2012) and Nikiforos et al (2015) show evidence in support of this hypothesis. Despite the support by various authors, this approach has been critiqued in the sense that its policy implications of the research findings remain basically ambiguous and appear to be impracticable.

The third broad is the feedback linkages. This is also termed as the bidirectional causality. In reference to Sobrino (2013), this view contends that in as much as budget deficits cause trade deficits, equally trade deficits can cause budget deficits. That Feldstein and Horioka (1980) provide evidence that savings and investments are highly correlated, and the linkage leads to bidirectional causality between budget and trade deficits. This paper identifies a number of studies that show evidence of bidirectional causality. They include Khalid and Guan (1999) and Egwaikhide et al., (2002) for Togo, among many others.

The fourth and the last view is the Ricardian equivalence. It is also referred to as the neutrality view. The proponents of this view deny any connection between the budget deficit and trade deficit. It opines that since people are rational, they know that the reduction in taxes resulting from the government expansionary fiscal policy or tax cut, is temporally. Consequently, they will 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 will be compensated by the additional precautionary private savings for expected future increase in taxes. As claimed by Gerhard and Jesus (2004), 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. This being the case, they will anticipate an increase in future tax liability by saving amount equivalent to the tax cut. In the literature, this view has been critiqued on grounds that it is based on relatively strong assumptions that may render its practical relevance questionable.

Recent related empirical investigations on the subject have yielded mixed and inconclusive results. For instance, Bachman (1992) employed the VAR technique to analyze the case for USA. The study provides evidence that only the budget deficit explained the evolution of the external deficit. The study confirmed that the twin deficits hypothesis existed for the USA. Abbas et al. (2010) applied a sample of over 100 countries. The study established that an improvement in the budget balance of 1 % of GDP improved the external balance by 0.2 %. The effect was longer-lasting in emerging than in advanced countries. Moreover, Gurgul and Lach (2012) analyzed the causal dependencies between economic growth,

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budget and trade deficits of ten new European Union countries. The study used annual data from 2000 to 2009. The study documents that budget deficits were significantly slowing down the GDP growth rates. They established a unidirectional causality running from budget to trade deficits in support of twin deficits hypothesis. From a mixed of countries, Khalid and Guan (1999) used cointegration analysis to examine the nexus between current account and budget deficits. They employed annual time series data from five developed and five developing countries. The study established 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 also provide evidence in support of the bidirectional linkages for developing countries.

Based on cointegration technique, Daly and Siddiki (2009) employed regime shifts in their study and established a long-run relationship between the variables in 13 out of 23 OECD countries. They show that when structural breaks were applied in the analysis, it significantly impacted the on the results of the direction of causality confirming that the application of structural breaks in macroeconomic data is essential in the determination of the direction of causality between budget and trade deficits. In Africa, Egwaikhide et al., (2002) employed annual data for 1970 to 1999 and applied OLS and Granger-causality method and analyzed the twin deficits hypothesis. They provide evidence of a positive relationship between the two deficits for all nations considered except for Cameroon, Cote d'Ivoire, Gambia, Guinea-Bisau and Mali. They also confirmed the twin deficits phenomenon 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, Bigstein and Ndung'u (1992) argue that about ten years after Kenya got independence (in 1963), the country experienced the first budget and external deficits that led to the BOP problems. This was attributed to expansionary government spending. Equally, Osoro et al., (2014) analyzed 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 Opeyemi (2012), the overall impact of each channel on twin deficit hypothesis hinges mainly on the features of each economy.

Generally, literature provides great insights to modelling in relation to twin deficits hypothesis 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 in developing economies like 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.

III. METHODOLOGY

(i) Conceptual Framework

The conceptual framework on the links between budget and external deficits can be shown in a diagram highlighted by Sadoulet and Janvry, (1995).
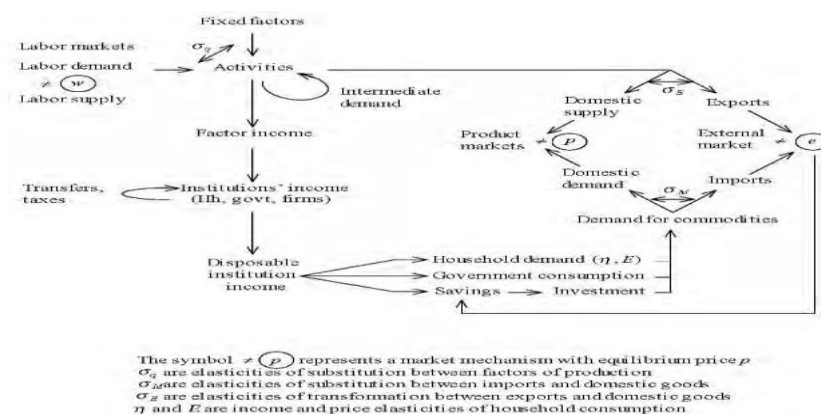
Source: Sadoulet and Janvry (1995)

Figure 1: Conceptual Framework

The link is very crucial in the analysis of the twin deficits hypothesis for Kenya. The World Bank (2014) report for Kenya notes that the Kenyan economy has been experiencing several shocks and therefore policy measures to reduce the susceptibility of the economy to various macroeconomic shocks is instrumental.

(ii) Theoretical Framework

This study adopts Algieri (2013) study on the twin deficits hypothesis. The study derives the link between budget and trade deficits from the national accounts identity shown in equation 1.

$$Y = C + I + G + TB + NFI + NCT \qquad\qquad 1$$

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.

$$CAB = TB + NFI + NCT \qquad\qquad 2$$

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,

$$S - I = CAB \qquad\qquad 3$$

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

$$S - I = TB \qquad\qquad 4$$

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

$$S_{Public} = T - G \qquad\qquad 5$$

$$S_{Private} = Y - T - C \qquad\qquad 6$$

where T depicts taxes by the government.

Rearranging equation 3 yields equation 7,

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

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, Mwega (2014) observes that if the trade 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 also adopts Soukiazis et al. (2015) growth model that incorporates the budget and trade deficits in economic growth analysis.

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

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 trade deficit on growth of real GDP; and ((iv) the effect of budget deficits on growth of the economy. Lastly, B displays the effects of the disaggregated import elasticities of the demand components on economic growth.

IV. RESULTS

(i) Descriptive Statistics

This study employed annual time series data from 1980 to 2016 for Kenya. The study period coincides with the time when many countries in sub-Saharan Africa, Kenya included experienced persistent budget and trade deficits and volatile

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economic performance. The applied data was sourced from the Government of Kenya, World Bank (2017) and IMF (2018). The estimated economic growth model was specified as in 9;

$$\dot{Y}_t = \alpha_0 + \alpha_1 FD_t + \alpha_2 TD_t + \alpha_3 DS_t + \alpha_4 CPI_t + \vartheta_t \qquad 9$$

Where, $\dot{Y}_t$ displays the growth of real GDP in time t, FD_t represents the budget deficit as a share of GDP, TD_t is the trade deficit as a proportion of GDP, DS_t denotes total debt service as a share of exports and primary income, while CPI_t is the denotes the percentage change in consumer price index as a key control variable based on macroeconomic theory. ϑ_t is the white noise error term and α_i shows the coefficient of the variables estimated in the economic growth model. As affirmed by Ndung'u (2018), recently the level of public debt in several sub-Saharan countries doubled and the IMF has strongly urged these countries including Kenya to raise taxes and to provide more scope for paying interest. In reference to World Bank (2019), advancing economies including Chad, Republic of Congo, Mozambique and South Sudan have moved to "debt distress". Equally, risk of external debt distress has increased from low to moderate "debt distress" for Kenya. Moreover, in the previous studies (Osoro et al., ,2014; Egwaikhide et al., 2002; and Njoroge et al., 2012) done in Kenya, the authors did not consider the application of structural shocks in the analysis. In reference to Daly and Siddiki (2009), when structural breaks were considered in the analysis, it significantly impacted the on the results of the direction of causality. To this end this study applied structural breaks in the analysis.

The study used Stata econometrics software to analyze the data. Table 1 indicates that all variables employed in the analysis had complete observations for the entire period. Real GDP growth was found to be on average 3.85 % with the minimum value being below zero by 1.1 % 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 %. Trade deficit had a mean of 7.1 % with the minimum being below zero by 4.9 % and a maximum of 17.2 %. The rest of the variables were as indicated in Table 1.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std Dev.	Min	Max	Skewness	Kurtosis
Economic growth	37	3.8514	2.3235	-1.100	8.4000	0.2878	0.3397
Budget deficit	37	3.8962	2.8930	-0.814	11.475	0.0640	0.3746
Trade deficit	37	7.1466	4.5947	-4.949	17.197	0.3873	0.2876
Debt service	37	19.692	11.901	4.319	39.766	0.4087	0.0008
Inflation growth	37	11.304	8.6178	1.554	45.979	0.0000	0.2081

Source: Authors

(ii) Trend Analysis

The paper ascertained the movement and behavior of the data series for all the variables employed in the estimated growth model overtime prior to proceeding to analyze the data as presented in Figures 2, 3 and 4.
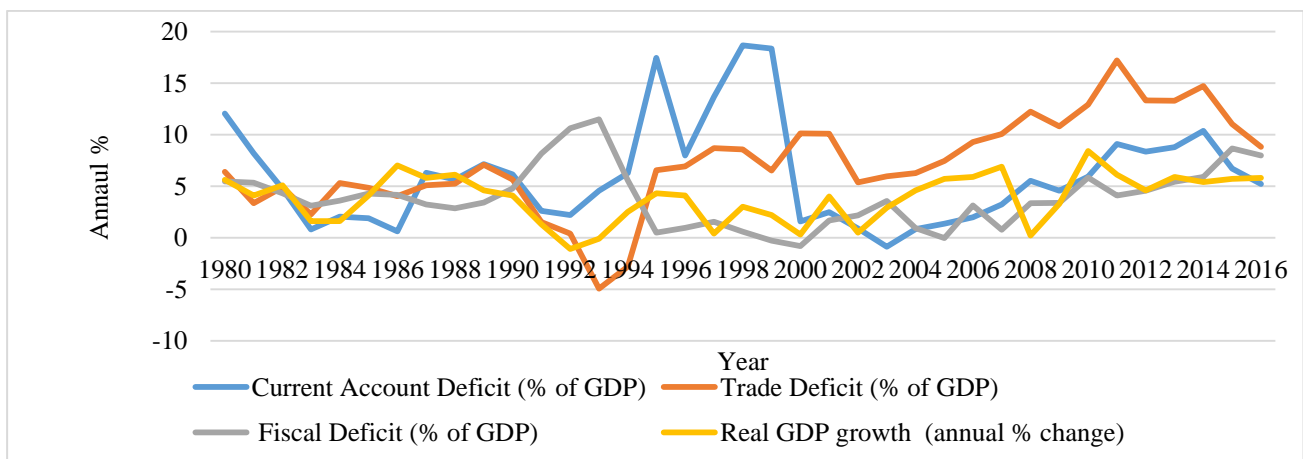

Figure 2: Kenya's Fiscal Deficit, Trade Deficit, Current Account Deficit and Real GDP Growth
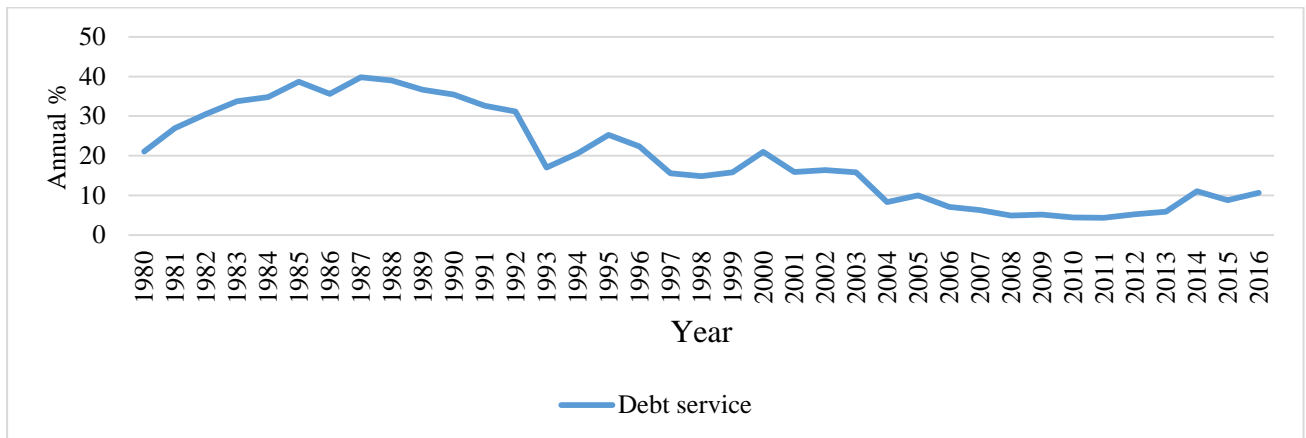
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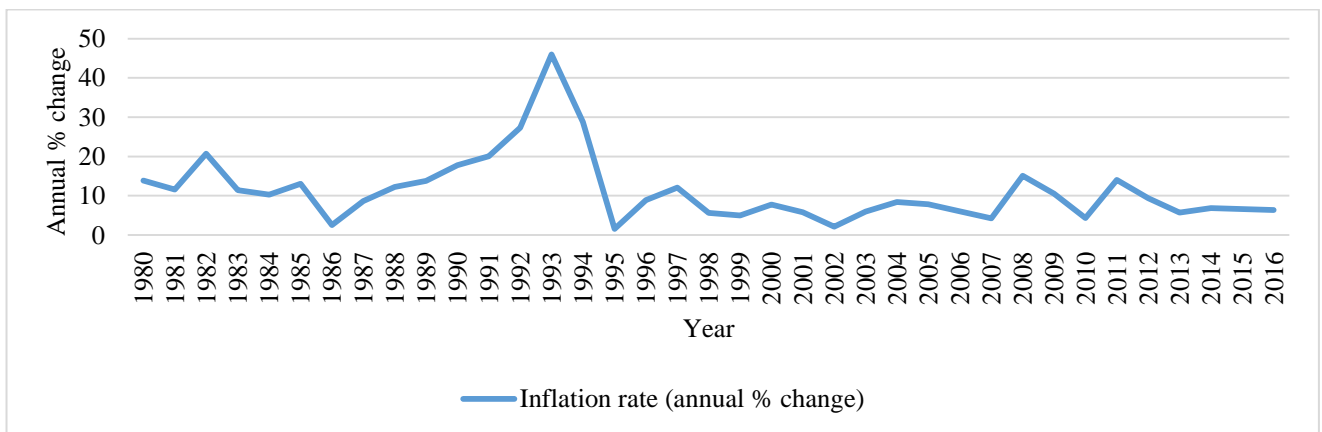**Figure 3: Kenya's Debt Service (annual percentage of exports and primary income)**

Figure 4: Inflation Growth rate in Kenya

Figure 2 displays the real GDP growth, 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. It 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%. 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. The current account balance continued to improve recording a surplus of 0.89 % of GDP in 2003. This was mainly attributed to improvement in trade balance. It recorded 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.

Figure 2 shows persistent budget deficits in all the years under review except 1999/2000. Equally, the high and persistent current account deficit that has been largely attributed to trade 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 (O'Connell et al. 2010; Mwega, 2014; World Bank, 2016). 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 Figures 3 and 4.

(iii) Unit Root Tests

The essence of employing the unit root tests in time-series data is to ascertain non-stationarity in the variables. In instances where the variables are detected to be non-stationary, successful differencing is applied to the data series until the bias is eliminated. The study noted from the trend analysis that the data series was likely to be I (1) process. Thus we analyzed the time series properties of the data. Firstly, the study applied the Phillips-Perron (PP) unit-root test in the

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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 the results of the PP unit root tests, the authors conducted further stationarity tests to confirm the presence or absence of structural shocks in the data series. As affirmed by Daly and Siddiki (2009), structural breaks are essential in predicating the direction of causality in the analysis of the twin deficit hypothesis. Moreover, in reference to Ndirangu and Gitau (2014), structural breaks for most of macroeconomic variables in Kenya coincide with economic policy changes and political shocks in the economy. Consequently, this study applied Zivot and Andrews (1992) tests for structural breaks. Table 2 highlights the results.

Table 2: Results of Zivot-Andrews Unit Root Tests

Variable	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)
Debt Service	1993	-4.506	-4.80	-7.201	-4.80	I(1)
Inflation Growth	1995	-4.530	-4.80	-8.696	-4.80	I(1)

Source: Authors

The Zivot and Andrews tests results show that all variables were non-stationary but transformed to stationary at first difference. These results indeed confirmed the results of PP unit-root tests. The next stage of analysis required that the data series be subjected 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.

(iv) Cointegration Analysis

The study employed the Johansen (1995) tests for cointegration. The trace and the maximum statistic confirmed that the variables were cointegrated. This implied that the vector error correction model (VECM) was appropriate to estimate the economic growth model in accordance with the objectives of the study. Moreover, the study examined the short run and long run model parameter estimates.

(v) 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 Jerque-Bera test also confirmed that all the disturbances were normally distributed. To this end the short-run and long-run estimation results are presented in Tables 3 and 4, respectively.

Table 3: VECM Short-run Relationship

Dependent Variable – Growth of Real GDP					
Variable	Lag	Coefficient	Std Error	t-statistic	P-value
Constant		-0.26355	0.390396	-0.68	0.500
D.Fiscal Deficit (-1)	LD	-0.33787	0.277074	-1.22	0.223
D.Fiscal Deficit (-2)	L2D	-0.45829	0.277605	-1.65	0.099
D. Trade Deficit (-1)	LD	0.61811**	0.234637	2.63	0.008
D. Trade Deficit (- 2)	L2D	0.32877	0.209212	1.57	0.116
D.Debt Service (-1)	LD	0.16676	0.125667	1.33	0.185
D.Debt Service (-2)	L2D	-0.12779	0.114390	-1.12	0.264
D.Inflation Rate (-1)	LD	0.273263**	0.102634	2.66	0.008
D.Inflation Rate (-2)	L2D	0.250086**	0.084027	2.98	0.003
Speed of Adjustment of the Error Correction Term [U (-1)]		-0.8610462**	0.250634	-3.44	0.001
** Indicate significance at 5% significance level					

Source: Authors

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The estimates for the short-run relationship are in differenced variables as shown in Table 3, whereby D. represents the first difference. The main 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 a long-run relationship. This paper shows that the coefficient of error correction term [U (-1)] is negative 0.8610 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 86.1 % annually.

Table 4: VECM Long-run Relationship

Dependent Variable – Growth of Real GDP				
Variable	**Coefficient**	**Std Error**	**t-statistic**	**P-value**
Constant	-8.680973			
Fiscal Deficit	-1.197490 ∗∗	0.1927764	-6.21	0.000
Trade Deficit	0. 3839721 ∗∗	0.1352404	2.84	0.005
Debt Service	0.0436986	0.0315625	1.38	0.166
Inflation Rate	0.4793849∗∗	0.884487	5.42	0.000
∗∗ **Indicate significance at 5% significance level**				

Source: Authors

The results of long-run relationship establish that fiscal deficit, trade deficit and inflation growth significantly predicts economic growth in Kenya. The coefficients of these variables were largely significant at 1% significant level (p<0.01), while that of debt service was not statistically significant.

The study provides evidence that in the long-run, budget deficit has positive and largely significant (p<0.01) effects on economic growth. *Ceteris paribus*, a 1 % increase in fiscal deficit is associated with 1.031 % increase in the real GDP growth. The results suggest that the authorities should utilize budget deficit to strictly finance public investment to continue boosting the growth of the economy. The effects of trade deficit on growth of the economy was negatively and statistically significant at 1 % significant level. The long run results show that a 1 % increase in trade deficit is associated with a decline in economic growth by 0.331 %. The parameter estimate for the inflation growth is also negatively and significantly associated with economic growth variable at 1 % significant level. The estimates establish that all else equal, an a 1 % rise in inflation growth rate is associated with retarding the growth of the economy by 0.412 %. This implies that the government should promote policies such as inflation targeting that maintain inflation rate at the desired thresholds, for long term economic growth in Kenya. Lastly, debt service had negative effect on economic growth in the long run, albeit non-significant.

Table 5: Results of Toda-Yamamoto Granger-Causality Tests

Toda-Yamamoto Granger Causality Wald Tests				
Equation	**Excluded**	**Chi2**	**Df**	**Prob**
Growth of real GDP	Trade Deficit	20.895	4	0.000
Growth of real GDP	Fiscal Deficit	39.525	4	0.000
Growth of real GDP	Debt service	19.014	4	0.001
Growth of real GDP	Inflation	46.626	4	0.000
Growth of real GDP	ALL	66.926	16	0.000
Trade Deficit	Growth of real GDP	83.731	4	0.000
Trade Deficit	Fiscal Deficit	44.436	4	0.000
Trade Deficit	Debt service	78.365	4	0.000
Trade Deficit	Inflation	33.02	4	0.000
Trade Deficit	ALL	293.35	16	0.000
Fiscal Deficit	Growth of real GDP	7.826	4	0.098
Fiscal Deficit	Trade Deficit	7.1325	4	0.129
Fiscal Deficit	Debt service	9.6638	4	0.046
Fiscal Deficit	Inflation	4.4819	4	0.345
Fiscal Deficit	ALL	42.164	16	0.000

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Debt service	Growth of real GDP	10.32	4	0.035
Debt service	Trade Deficit	18.406	4	0.001
Debt service	Fiscal Deficit	23.843	4	0.000
Debt service	Inflation	11.737	4	0.019
Debt service	ALL	56.195	16	0.000
Inflation	Growth of real GDP	13.508	4	0.000
Inflation	Trade Deficit	1.963	4	0.743
Inflation	Fiscal Deficit	13.079	4	0.011
Inflation	Debt Service	3.1817	4	0.528
Inflation	ALL	40.339	16	0.001
H0: Implies Rejection of Granger non-causality				

Source: Authors

Lastly, in the seven row of Table 5, it is shown that lagged values of budget deficit Granger-cause trade deficit as p-value is equal to 0.0000 which is less than 5 percent . However, since the p value of 0.129 (in the twelfth low) is greater than percent, lagged values of trade deficit do not cause budget deficit. The estimates suggest a unidirectional causality running from budget deficit to trade deficit confirming the existence of twin deficits hypothesis. The first row of Table 5 indicates that lagged values of trade deficit cause real GDP growth as p-value is equal to 0.0000 which is less than percent. Similarly, since the p value 0.000 is less than 5 precent (in the sixth low), lagged values of real GDP growth also cause trade deficit. The estimates suggest a bidirectional causality between trade deficit and economic growth. In the second row, that lagged values of budget deficit cause economic growth as p-value is equal to 0.000 which is less than 5 percent. However, since the p value 0.098 is greater than 5 percent (in the eleventh row), lagged values of budget deficit do economic growth. Therefore, the null cannot be rejected. The estimates suggest that there exists unilateral causality running from budget deficit to economic growth in Kenya.

V. CONCLUSION

This study examined the twin deficits hypothesis and also reviewed the effects of budget and trade deficits on economic growth in Kenya. It provides evidence of unidirectional causality running from budget deficit to trade deficit for Kenya. The budget deficit had positive effects while trade deficit had negative effect, on economic growth. The findings also suggest a bidirectional causality running from trade deficit to economic growth and vice-versa. The results also confirmed a unilateral causality running from budget deficits to economic growth in Kenya. Lastly, the evidence of twin deficits hypothesis in the country underscores the need to promote policies that upscale fiscal discipline, curb budget deficits for external stability and long-term economic growth, in Kenya. This evidence reinforces the need for more country specific studies in sub-Saharan Africa.

The novelties of this paper originates from the application of novel estimation techniques that include cointegration, application of structural breaks in the analysis, application of a multivariate 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. The estimates establish not only stable but also robust causal relationships that validate the parameter estimates. The evidence is aimed at providing crucial macroeconomic policy insights that can be applied to recalibrate policy adjustment measures for macroeconomic stability and long term economic growth in Kenya. Lastly, the study builds upon 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. This study was instrumental in filling these research gaps.

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