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Twin Deficits in Sub-Saharan African Countries: Evidence through debt

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Abstract

This article tests the twin deficits hypothesis using different debt regimes with a panel of 30 African countries over the period 2004-2017. To do so, a panel threshold regression (PTR) has been used. Our results reveal that the estimated debt thresholds, as a percentage of GDP, are 78.40 for total public debt, 65.25 for external debt and 13.15 for domestic debt. Below these debt thresholds, the fiscal balance has a positive effect on the current account. The twin deficits hypothesis is therefore validated. However, beyond these debt thresholds, the fiscal balance has no significant effect on the current account; the twin deficits hypothesis is rejected.

1. Introduction

The twin deficits originally concerned only the United States before being at the centre of theoretical and empirical debates. On the theoretical level, fiscal stimulus advocates are opposed to its detractors, who support on the one hand fiscal neutrality and on the other hand the depressive effects of fiscal stimulus. Indeed, according to Mundell (1963) and Fleming's (1962) approach, as well as the Keynesian absorption approach, current account deficit is caused by fiscal deficit. In addition, the neoclassical synthesis theory endorses the idea that fiscal deficit positively affects current account deficit, owing to the wealth effects caused by increased debt or lower taxes. Finally, based on the resource-job balance equation, the "behaviorist" theory of the New Cambridge School represented by Godley and Cripps (1974) argues that the financing gap in the private sector is a relatively stable and weak parameter. Consequently, any fiscal deficit results in a deterioration of the current account. However, there is no consensus among economists on the existence of the twin deficits hypothesis. The Ricardian theory of equivalence, for instance, advocates for the absence of any form of relationship between the two balances due to rational anticipations that lead households to integrate in their decisions the intertemporal fiscal balance constraint that the Government is to respect. Theoretically speaking, the intuition about the existence of a debt threshold that conditions the twin deficits hypothesis resides in the junction between the Ricardian approach of equivalence (Barro, 1989) and the existence a Laffer growth curve (Barro, 1990). This leads to a debt threshold beyond which, an increase in public debt is neutral or produces recessive effects, known as the Ricardian effect (or non-Keynesian effect) and the anti-Keynesian effect. The twin deficits hypothesis is then questioned. On the other hand, as long as this threshold is not reached, the economy behaves according to the Keynesian pattern and the existence of twin imbalances is confirmed.

An important empirical literature confirms those theoretical predictions in Sub-Sahara African countries. Indeed, several works on causality test, error-correction models and dynamic panels have confirmed the twin deficits hypothesis (Omoniyi, Olasunkanmi and Babatunde, 2012; Kouassi, 2016; Epaphra, 2017; Imimole, 2017; Ndiaye, 2018), while some others have rejected that hypothesis (Ogbonna, 2014; Sakyi and Opoku, 2016; Senadza and Aloryito, 2016; Ngakosso, 2016). Recently, new evidence on the existence of the twin deficits in developing countries has been provided by Furceri and Zdzienicka (2020). Based on shock analysis, the authors claim that a 1% improvement in the government budget balance improves, on average, the current account balance by 0.8 percentage point of GDP. Another study group examines the twin deficits hypothesis from a non-linear relationship perspective. This includes Antonakakis (2016) study that shows, based on a quantile estimation, the dynamics of the relationship between the fiscal balance and the current account balance. The results of this study suggest that private agents react in a Keynesian manner when fiscal deficits are below the median, but react in a Ricardian manner when the deficits are beyond the median. Similarly, some papers highlight the determining role of debt in explaining the twin deficits. Indeed, some studies conducted in developed countries attest that the twin deficits hypothesis is validated provided that debt thresholds exceed not 110% (Nickel and Tudyka, 2014), 96.6% (Šuliková and Tykhonenko, 2017) and, when debt thresholds are between 80 and 90% (Nickel and Vansteenkiste, 2008); 30.688% and 98.126% (Sinicakova, 2017). These studies therefore attempt to reconcile the different currents in economic literature, as well as literary works on the existence or not of twin deficits. Although several studies have contributed to fueling reflection on the role of debt as an important determinant in the analysis of the

relationship between fiscal and current account balances, there is, so far as we know, no studies on Africa. In other words, the debt threshold that conditions the existence of twin deficits in Africa is less known, given that the above studies focus mainly on developed countries. Moreover, to our knowledge, no study has tested the role of external debt and domestic debt as determinants of the existence of twin deficits.

This paper therefore addresses the role of debt as a determining factor in the analysis of the twin deficits hypothesis in sub-Saharan Africa. More specifically, we will examine the role of total public debt, external debt and domestic debt as determinants of the existence of twin deficits in sub-Saharan Africa. The sample covers 30 sub-Sahara African countries over the period 2004-2017[1]. This case seems particularly interesting given that private savings rate is low in sub-Saharan Africa (African Capacity-Building Foundation, 2015). Indeed, savings level would amount 20% of GDP, less than the 30% necessary to finance Africa's development (Le Noire, 2014). Similarly, Africa has a predominantly young population structure (ECA, 2016), implying an increase in the preference for the present (Collier, 2012), to the detriment of savings. In this context, Africa's fiscal deficit financing is essentially channeled through external debt. In addition, sub-Saharan African countries have several times applied structural adjustment programs, which are the barometer of the deterioration of external deficit, caused, among other things, by fiscal deficit. Indeed, in the late 1980s and early 1990s, sub-Saharan African countries undertook large adjustment and reform programs[2] that resulted in lower real per capita income and increased poverty (Calamitsis, 1999). In addition, the 2018 IMF report reveals that nine countries in sub-Saharan Africa were granted over-indebted countries status, and signed a new program with the IMF[3]. This article analyses the twin deficits hypothesis, which is conditional on debt level. We believe that the twin deficits hypothesis is proven when the level of public debt is low, but when debt level is high, the hypothesis is questioned. The contributions of this article can be summarized in three points. First, this is the first study attesting to the twin deficits hypothesis in Africa, conditional on debt level. In addition, studies that have discussed the role of debt in explaining twin deficits only focused on total public debt. This article is the very first study that examines both total public debt, external debt and domestic debt. In this perspective, it reconciles the works that have concluded on the existence of twin deficits on the one hand, and twin divergences on the other hand. Second, the contribution of this article is to have integrated benefits derived from natural resources as a current account determining factor. This variable seems to be ignored in studies on current account determinants in Africa, yet exports from these countries are mainly based on natural resources. Finally, in an original way, this paper integrates democracy as an explanatory factor for the current account imbalance.

To examine the twin deficits hypothesis, conditional on debt level, in the same vein as Baum et al. (2013), we use a panel threshold regression (PTR) model, which shows the possible existence of an endogeneity problem. The results reveal that the existence of twin deficits is conditional on the existence of a certain debt threshold. In other words, there is a debt level below which, the twin deficits hypothesis is accepted and, beyond which, it is questioned. Moreover, our results suggest that the external debt threshold that conditions the validity of the twin deficits hypothesis is higher than the domestic debt threshold.

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[1] Due to the availability of budget balance data, the sample does not cover all the 48 sub-Saharan African countries.
[2] These programs have often received support from the IMF and the World Bank.
[3] For example: Cameroon, Gabon, Chad and Congo signed a program with the IMF.

Section 2 specifies the estimation model. Section 3 presents the estimation results. We finally conclude in Section 4.

2. Model specification, variables and data sources

2.1. Model specification

In line with the main objective of this study, we estimate a threshold effect model. Adopting the same approach as Šuliková and Tykhonenko (2017), and Sinicakova (2017), our starting point is Hansen's (1999) PTR model. The process $(y_{it}, t \in Z \; et \; i \in Z)$ meets a PTR double-regime representation, only if:

$$y_{it} = \mu_i + \beta_1 x_{it} I(q_{it} \leq \gamma) + \beta_2 x_{it} I(q_{it} > \gamma) + u_{it} \tag{1}$$

Where, y_{it} represents the dependent variable, q_{it} is the threshold variable, γ refers to the threshold, $I(.)$ is an indicator function of transitional regimes, x_{it} the dependent variable of the different regimes, μ_t is a vector of individual fixed effects and ε_{it} is a iid while noise with zero mean and constant variance. Index $i = 1, \dots, N$ refers to the individual dimension and index $t = 1, \dots, T$ the temporal dimension.

By adopting equation 1 in our article, we obtain an endogenous threshold equation γ, which is

$$CAB_{it} = \mu_i + \beta_1 SB_{i,t} I(q_{i,t} \leq \gamma) + \beta_2 SB_{i,t} I(q_{i,t} > \gamma) + \theta_j X_{i,t} + e_{i,t} \tag{2}$$

CAB_{it} and $SB_{i,t}$ represent the current account balance and the fiscal balance, respectively (which corresponds to x_{it}). The threshold variable q_{it} is assimilated, in turn, to the total public debt, the external debt and the domestic debt. The X vector groups together other control variables that may influence the current account balance, such as investment, interest on external debt, population, GDP growth, exchange terms, democracy, benefit from natural resources and net foreign asset position.

Two regression coefficients emerge from this model. First, coefficients depending on the debt regime. In other words, fiscal balance coefficients (β_1 and β_2). Then, the coefficients θ_j (j=1,…,8) related to explanatory variables, which make up the X vector, are identical in each of the debt regimes. To address the problem of endogeneity, was extended by the introduction of the lagged dependent variable with reference to Hansen and Caner (2004). The application of their approach is done in three steps. First, they estimate the parameter of the form reduced by OLS. Then, they estimate the threshold, using the predicted values of the endogenous variable. Thirdly, the coefficients are estimated by 2SLS or GMM. In the same vein, we find the approaches of Cimadomo (2007) and Baum et al (2013), which integrate the lagged dependent variable and consider all the explanatory variables with a time lag of one period. We adopt the latter method which appears to be more improved in that it estimates the threshold and solves the endogeneity problem in a single step (Sinicakova, 2017; Šuliková and Tykhonenko, 2017). The integration of the lagged dependent variable as an explanatory variable makes it possible to capture the effect of inertia that may exist in the evolution of the current account. Equation 3 can therefore be rewritten as follows:

$$CAB_{it} = \mu_i + \beta_1 SB_{i,t-1} I(q_{i,t-1} \leq \gamma) + \beta_2 SB_{i,t-1} I(q_{i,t-1} > \gamma) + \theta_0 CAB_{i,t-1} + \theta_j X_{i,t-1} + e_{i,t} \qquad (3)$$

Non-linear approach used is advantageous for two reasons: First, it provides precisions on the endogeneous thresholds that divide the model into different regimes. Then, it tests the nonlinearity of the model and the influence of explanatory variables on the explained variable in each regime.

2.2. Description of variables and data sources

In order to examine the existence of the twin deficits hypothesis through the debt channel, we use a set of data from a cylindrical panel, covering 30 sub-Saharan African countries (listed in Annex 1), over the period 2004-2017. As in previous studies testing the twin deficits hypothesis (Forte and Magazzino, 2013; Sinicakova, 2017; Šuliková and Tykhonenko, 2017), the current account variable, expressed as a percentage of GDP (CAB), is a dependent variable; and the fiscal balance, expressed as a percentage of GDP (SB), is an independent variable. The variables total public debt, external public debt and domestic public debt, expressed as a percentage of GDP, play a key role as they are defined as threshold variables. The datasets on current account balance, fiscal balance, total public debt (DEBT), external public debt (EXDEBT) et domestic public debt (INDEBT) are extracted from IMF database. Additional control variables to explain the current account are added. In this regard, to capture the impact of domestic demand, investment is taken into account, because according to the Keynesian approach, an increase in investment leads to increased absorption, which deteriorates the current account. The total investment dataset expressed as a percentage of GDP (INV) is extracted from the IMF database. Likewise, since imports are an increasing function of the GDP, we take into account real GDP growth, for its increase results in a deterioration of the current account (Forte and Magazzino, 2013). The real GDP growth (CPIBR) dataset is extracted from the IMF database. Interest rate is added because a rise in the international real interest rate leads to a current account deficit in developing countries (Calderon, Chong and Loayza, 2000). A high external debt interest rate increases debt level, causing the current account deficit. In the framework of this study, the average interest rate on new external debt commitments (INTDEBT) is used as a proxy for public debt interest rate. The interest rate dataset is extracted from the World Bank database (World Development Indicators). The terms of trade are added, insofar as they make it possible to apprehend the effects of the fluctuations of exports and imports prices on the current account. Decreased export prices or increased import prices result from a decline in the terms of trade and a deterioration in the current account balance. In accordance with Calderon et al. (2000), we incorporate the terms of trade. More specifically, we consider the fluctuations in the terms of trade (VTERME). The latter is considered here as the relative deviation of the terms of trade index (basis 100 in 2010) compared to its trend level (Jeanneney and Tapsoba, 2009). The trend level of the terms of trade is obtained using Hodrick and Prescott (1997) filter with 100 as the smoothing parameter. It should be noted that the terms of trade dataset is extracted from the IMF database. The demographic variable has been chosen, because the population growth induces an increase in consumption at the expense of savings, which deteriorates the current account. Considering on the one hand, the fact that Africa displays a predominantly young population structure (CEA, 2016), and on the other hand, the fact that the weight of the young population tends to increase time preference rate (Collier, 2012), we use the dependency ratio (IPOP) as a proxy. The latter is assimilated to the share of young (under 15) and elderly (over 65) people relative to the working age population (between 15 and 64) (Allegret and Mignon, 2016). The

above-mentioned dataset on population by age category is extracted from the World Bank database (World Development Indicators). We are integrating democracy (DEMO), because it results in a significant reduction in the debt of commodity exporting countries (Arezki and Bruckner , 2012) and, consequently, an improvement in the current account balance. On the other hand, higher public debt leads to lower growth for countries with undemocratic regimes (Kourtellos et al., 2013), which implies lower imports for countries with a high marginal propensity to import. Polity IV is the democracy indicator used in this article. More specifically, we use the democracy indicator revisited from dictatorship, namely polity 2. It should be emphasized that the polity IV democracy indicator is produced by the Center for International Development and Conflict Management (CIDCM). The democracy index produced by polity IV is between 0 and 10, where 0 is the absence of democracy and 10 is the existence of full democracy. The autocracy indicator is between -10 and 0, where -10 corresponds to absolute dictatorship. The combination of democracy and autocracy provides the polity 2 indicator, varying from -10 to 10. Finally, the benefits from natural resources (BENRES) are approximated by the natural resource dependence indicator. Its increase is the barometer for the improvement in exports, and consequently in the current account. The dataset on this variable is extracted from the World Bank database. The net foreign assets position (PEXT) is added to the model, insofar as a country that has a current account surplus accumulates foreign assets or reduces its net external debt. Therefore, the current account balance can be defined as the change in the net foreign assets position. The net foreign assets position data are taken from the Lane and Milesi-Ferreti (2017) database.

With regard to the main variables used in this study, their statistical characteristics defined in Annex 3 (Table A1) suggest that the average levels of total public debt, external debt and domestic debt are 51.067% of GDP, 33.328% of GDP and 17.739% of GDP, respectively. The average fiscal balance is -5.49% of GDP. This deficit level is higher than the standard established in the Central African Economic and Monetary Community (CAEMC) and the West African Economic and Monetary Union (WAEMU) convergence criteria. The average level of the current account balance is in deficit; which deficit is 5.06% of GDP.

3. Empirical Results and Discussion

The linearity tests carried out using two approaches confirm that the fiscal balance has a non-linear effect on the current account balance (see Annex 3). First, the LM and LMF tests proposed by González et al (2005), to which Colletaz and Hurlin (2006) add the LRT test, reject the null hypothesis of absence of non-linear effect at the 5% threshold. Then, the presence of non-linearity is also confirmed by single, double and triple threshold panel linearity tests. The results obtained show that the single threshold model is preferable to the double and triple threshold model, since the second and the third thresholds are not significant (see appendix 3).
Estimation results for the threshold effect model (defined by equation 3), using the Stata Software are reported in Table 1.

Table 1: Twin deficits hypothesis conditional on total public debt threshold

Independent variables		Dependent variable: CAB_{it}
		Coefficient
CAB_{it-1}	θ_0	0.271***
		(0.055)
INV_{it-1}	θ_1	-0.277***
		(0.072)
$INTDEBT_{it-1}$	θ_2	-0.495*
		(0.295)
SB_{it-1} $(DEBT_{i,t-1} \leq \gamma)$	β_1	0.501***
		(0.087)
$SB_{it-1}(DEBT_{i,t-1} > \gamma)$	β_2	0.066
		(0.097)
Threshold	γ	78.40
R^2		0.62
$F(29, 355) = 2.58$	Prob> F = 0.000	

Note: Standard errors in parentheses. ***, **, * denote significance at the 1 %, 5 % and 10 % level, respectively.

The results of the estimations presented in table 1 show that there is a public debt threshold of 78.40% of the GDP, which implies the presence of two regimes describing the dynamics of the relationship between the fiscal and current account balance.

To test the robustness of our results, we estimate a model that takes into account the current account lagged by a period as the only explanatory variable. Then, the variables controlling the dependent population index, real GDP growth, fluctuating terms of trade, democracy and the benefits derived from resources are successively integrated. This approach was also used by Baum et al. (2013), who estimated debt threshold effects on growth. The objective of this exercise is to investigate whether the nonlinear single threshold structure persists. The estimation results of the different models can be found in table 2.

Table 2: Twin deficits hypothesis conditional on total public debt threshold: robustness to successive introduction of control variables

Independent variables		Dependent variable: CAB_{it}							
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
CAB_{it-1}	θ_0	0.373**	0.274***	0.272***	0.272***	0.294***	0.296***	0.289***	0.264***
		(0.049)	(0.055)	(0.055)	(0.055)	(0.065)	(0.056)	(0.057)	(0.058)
INV_{it-1}	θ_1		-0.273***	-0.277***	-0.278***	-0.241***	-0.210***	-0.199***	-0.248***
			(0.072)	(0.072)	(0.072)	(0.074)	(0.075)	(0.075)	(0.076)
$INTDEBT_{it-1}$	θ_2			-0.495*	-0.405**	-0.488*	-0.510*	-0.493*	-0.514*
				(0.295)	(0.164)	(0.295)	(0.294)	(0.292)	(0.299)
$IPOP_{it-1}$	θ_3				-0.023**	-0.025**	-0.029***	-0.029***	-0.029***
					(0.010)	(0.010)	(0.010)	(0.010)	(0.008)
$CPIBR_{it-1}$	θ_4					-0.251***	-0.207*	-0.250**	-0.246*
						(0.119)	(0.120)	(0.123)	(0.127)
$VTERME$	θ_5						-0.089**	-0.081***	-0.082**

Variable	Symbol	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
							(0.04)	(0.037)	(0.037)
DEMO	θ_6						0.113** (0.053)	0.118** (0.055)	0.115** (0.045)
BENRES	θ_7							0.101*** (0.027)	0.197*** (0.068)
PEXT	θ_8								0.016*** (0.006)
HIPCDUM	θ_9								0.027* (0.014)
SB_{it} ($DEBT_{i,t} \leq \gamma$)	β_1	0.504*** (0.089)	0.495*** (0.087)	0.502*** (0.088)	0.509*** (0.088)	0.525*** (0.088)	0.525*** (0.088)	0.519*** (0.088)	0.471*** (0.092)
SB_{it} ($DEBT_{i,t} > \gamma$)	β_2	0.094 (0.089)	0.061 (0.097)	0.066 (0.097)	0.060 (0.097)	0.086 (0.098)	0.082 (0.097)	0.068 (0.098)	0.073 (0.10)
Threshold	γ	78.47	78.40	78.40	78.40	78.40	78.40	78.40	78.40
R^2		0.59	0.64	0.62	0.65	0.68	0.80	0.82	0.83
F test		$F_{(29, 357)}$ = 1.95 Prob > F = 0.003	$F_{(29, 356)}$ = 2.48 Prob > F = 0.000	$F_{(29, 355)}$ = 2.58 Prob > F =0.000	$F_{(29, 354)}$ = 2.45 Prob > F = 0.000	$F_{(29, 353)}$ = 2.38 Prob > F = 0.000	$F_{(29, 351)}$ = 2.45 Prob > F = 0.000	$F_{(29, 350)}$ = 2.49 Prob > F = 0.000	$F_{(29, 349)}$ = 2.07 Prob > F = 0.001

Note: A dummy variable that takes the value 1 for the year in which the country reaches the completion point under HIPC and 0 if not. Standard errors in parentheses. ***, **, * denote significance at the 1 %, 5 % and 10 % level, respectively. The different models are estimated using the Stata software.

The results of the robustness test show that the successive introduction of other explanatory variables does not affect the signs and significance of estimated coefficients β_1 and β_2 (fiscal balance coefficient), that depend on the public debt regime. The same applies for independent coefficients of the public debt regime (θ_0, θ_1, θ_2), that turn out to be consistent (see table 2). The estimated public debt thresholds (γ) is also consistent, as it remains almost stable (78.40% of the GDP) across all models. Consequently, our threshold effect model (model 8) is consistent and can be interpreted.

The results of the different estimations summarized in table 2 indicate that there is a debt threshold beyond which the twin deficits hypothesis is affirmed. Our working assumption that supports the existence of the twin deficits hypothesis according to the level of debt is therefore confirmed. Indeed, the relationship between fiscal balance and current account can be differentiated in two regimes according to the level of debt. When the level of debt is inferior to 78.40% of the GDP, the results of the estimations reveal that the fiscal balance has a significantly positive effect on the current account. In other words, below this threshold, the keynesian approach supporting the twin deficits hypothesis is evidenced. Implicitly, the dilemma of growth and external balance is observed. Indeed, public debt can have a positive impact on growth, but the fact remains that external imbalance resulting from accelerated imports is inevitable in a growing economy. However, beyond this debt threshold, the effect of the fiscal balance on the current account is not significant. The ricandian approach, rejecting the assumption of the existence of twin deficits is approved. In other words, the effect of fiscal deficit on the current account is neutral. An explanation underlying the neutrality of debt is the existence of the high level of debt. Thus, restoring the efficiency of a fiscal stimulus requires anti-Keynesian fiscal policies that will restore

the level of debt on a sustainable trajectory, conducive to growth and, consequently, to consumption.

Taking into account debt threshold effects in the relationship between fiscal balance and current account enables us to limit the bias, implying a wrongful contestation of the validity of the twin deficits hypothesis. The coexistence of twin deficits and twin divergence, subordinated by the existence of a debt threshold, reconciles works that have approved on the one hand the twin deficits hypothesis (Bakarr, 2014; Imoh et Ikechukwu, 2015; Epaphra, 2017) and, on the other hand, rejected it (Ngakosso, 2016; Sakyi and Opoku, 2016) in African countries.

However, the debt threshold that conditions the twin deficits hypothesis in Africa is higher than the debt level of 70% of GDP, established as debt sustainability threshold for member countries of CAEMC and the WAEMU. This observation testifies that even beyond the conventional threshold established in African economic and monetary unions, public debt can restore growth and, consequently, consumption. The increase in domestic demand following the acceleration of growth, is accompanied by a degradation in the current account balance due to an increase in imports. This confirms that the efficiency of a fiscal stabilization policy can be limited by leaks out of the economic circuit, resulting in an increase in external demand.

Furthermore, our results indicate that coefficient of the current account balance lagged by one period (CAB_{it-1}) is positive and significant, constituting therefore an important determinant of the current account. This variable identifies the inertia in the dynamics of the current account. It indicates the persistence of the previous deficit in the current deficit. Investment is also an important determinant of the current account. In accordance with the expected effect, its increase leads to the current account deficit. The same applies for debt interest rate, which plays a crucial role in explaining the current account. Indeed, the increase in the interest rate causes a degradation of the current account. Our results are consistent with those of Calderon et al. (2000), who conclude that a 1 percent point increase in the global real interest rate leads to around 0.18 percentage point reduction in the current account in developing countries. The dependency ratio has a negative influence on the current account. This result is consistent with the life-cycle hypothesis, which implies that an increase in the dependency ratio reduces savings in the economy, hence its negative impact on the current account. An increase in real GDP growth translates into a deterioration in the current account. This result also corroborates that of Calderon et al. (2000), who find that a 1-point increase in the growth rate translates into an increase of around 0.21 percentage points in the current account deficit. The coefficient on the terms of trade presents a positive sign. In other words, an increase in the price of exports or a fall in the price of imports leads to an improvement in the terms of trade and, consequently, an improvement in the current account balance. This result confirms that of Allegret and Mignon (2016), who found a positive effect of the terms of trade on the current account. Democracy has a positive impact on the current account. This can be explained by the fact that democracy leads to a reduction in debt in commodity exporting countries (Arezki and Bruckner , 2012), which has a positive effect on the current account. The benefit from natural resources has a positive effect on the current account. Indeed, the surplus related to the rise in the price of natural resources improves exports from producing countries. The net foreign asset position has a positive effect on the current account balance. Indeed, a 10% increase in the net foreign asset position translates into a 0.16% improvement of the current account. This can be explained by the fact that a country with a current account surplus accumulates foreign assets or reduces its net external debt, which reflects an improvement in the current account balance.

Finally, debt cancellation under the HIPC initiative results in an improvement in the current account. To this end, the request for debt cancellation by African countries, which has received renewed interest following the economic crisis caused by the Covid-19 pandemic, seems legitimate.

The results reported in Tables 3 and 4 show that the twin deficits hypothesis is also conditional on external and domestic debt thresholds.

Table 3: Twin deficits hypothesis conditional on external debt

		Dependent variable: CAB$_{it}$					
Independent variables		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
CAB$_{it-1}$	θ_0	0.288*** (0.056)	0.296*** (0.057)	0.287*** (0.056)	0.274*** (0.058)	0.273*** (0.057)	0.256*** (0.059)
INV$_{it-1}$	θ_1	-0.229*** (0.074)	-0.221*** (0.075)	-0.231*** (0.074)	-0.221*** (0.075)	-0.258*** (0.076)	-0.246*** (0.076)
INTDEBT$_{it-1}$	θ_2	-0.501* (0.298)	-0.237* (0.123)	-0.502* (0.298)	-0.503* (0.298)	-0.402** (0.179)	-0.407* (0.246)
IPOP$_{it-1}$	θ_3	-0.122** (0.048)	-0.121*** (0.032)	-0.123** (0.054)	-0.115* (0.059)	-0.125* (0.067)	-0.113*** (0.028)
CPIBR$_{it-1}$	θ_4	-0.246** (0.120)	-0.215* (0.125)	-0.215* (0.125)	-0.281** (0.119)	-0.212* (0.119)	-0.237* (0.129)
VTERME	θ_5		-0.021*** (0.007)				-0.026*** (0.008)
DEMO	θ_6			0.033** (0.016)			0.035** (0.015)
BENRES	θ_7				0.142** (0.068)		0.185*** (0.069)
PEXT	θ_8					0.015** (0.006)	0.018*** (0.006)
HIPCDUM	θ_9						0.032** (0.015)
SB$_{it}$ ($EXDEBT_{i,t} \leq \gamma$)	β_1	0.454*** (0.085)	0.450*** (0.085)	0.441*** (0.086)	0.448*** (0.085)	0.525*** (0.088)	0.525*** (0.088)
SB$_{it}$ ($EXDET_{i,t} > \gamma$)	β_2	0.062 (0.108)	0.064 (0.108)	0.046 (0.110)	0.054 (0.109)	0.086 (0.098)	0.082 (0.097)
Threshold	γ	65.25	65.25	65.25	65.25	65.25	65.25
R^2		0.66	0.68	0.69	0.71	0.75	0.80
F test		F(29, 353) = 2.44 Prob > F = 0.000	F(29, 352) = 2.36 Prob > F = 0.000	F(29, 352) = 2.36 Prob > F = 0.000	F(29, 352) = 2.45 Prob > F = 0.000	F(29, 352) = 2.28 Prob > F = 0.000	F(29, 348) = 2.15 Prob > F = 0.001

Note: A dummy variable that takes the value 1 for the year in which the country reaches the completion point under HIPC and 0 if not. Standard errors in parentheses. ***, **, * denote significance at the 1 %, 5 % and 10 % level, respectively. The different models are estimated using the Stata software.

Table 4: Twin deficits hypothesis conditional on domestic debt

Independent variables		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
CAB$_{it-1}$	θ_0	0 .308*** (0.057)	0.318*** (0.057)	0.308*** (0.057)	0.293*** (0.058)	0.291*** (0.057)	0.271*** (0.059)
INV$_{it-1}$	θ_1	-0.240*** (0.077)	-0.232*** (0.077)	-0.241*** (0.077)	-0.232*** (0.077)	-0.25*** (0.077)	-0.235*** (0.077)
INTDEBT$_{it-1}$	θ_2	-0.517* (0.303)	-0.325** (0.138)	-0.318* (0.186)	-0.331* (0.192)	-0.335** (0.156)	-0.511* (0.303)
IPOP$_{it-1}$	θ_3	-0.103* (0.055)	-0.083** (0.038)	-0.083** (0.038)	-0.087** (0.036)	-0.086** (0.044)	-0.085** (0.039)
CPIBR$_{it-1}$	θ_4	-0.271** (0.121)	-0.249** (0.122)	-0.248* (0.127)	-0.218** (0.088)	-0.251** (0.121)	-0.290** (0.131)
VTERME	θ_5		-0.038** (0.015)				-0.038** (0.015)
DEMO	θ_6			0.063* (0.033)			0.065** (0.033)
BENRES	θ_7				0.145*** (0.041)		0.141** (0.07)
PEXT	θ_8					0.016*** (0.005)	0.020*** (0.006)
HIPCDUM	θ_9						0.039** (0.015)
SB$_{it}$ (*INDEBT$_{i,t}$* $\leq \gamma$)	β_1	0.452*** (0.095)	0.457*** (0.095)	0.441*** (0.096)	0.449*** (0.095)	0.505*** (0.126)	0.501*** (0.127)
SB$_{it}$ (*INDEBT$_{i,t}$* $> \gamma$)	β_2	0.161 (0.110)	0.172 (0.111)	0.180 (0.112)	0.175 (0.111)	0.094 (0.098)	0.173 (0.113)
Threshold	γ	13.15	13.15	13.15	13.15	13.15	13.15
R^2		0.62	0.65	0.63	0.66	0.75	0.74
F test		F(29, 353) = 2.26 Prob > F = 0.000	F(29, 352) = 2.17 Prob > F = 0.001	F(29, 352) = 2.21 Prob > F = 0.001	F(29, 352) = 2.30 Prob > F = 0.000	F(29, 352) = 2.50 Prob > F = 0.000	F(29, 348) = 2.19 Prob > F = 0.001

Note: A dummy variable that takes the value 1 for the year in which the country reaches the completion point under HIPC and 0 if not. Standard errors in parentheses. ***, **, * denote significance at the 1 %, 5 % and 10 % level, respectively. The different models are estimated using the Stata software.

Our results show that the threshold levels of debt, expressed as a percentage of GDP, are estimated at 65.25 for external debt and 13.15 for domestic debt. Below these debt thresholds, the fiscal balance has a positive effect on the current account; the hypothesis of the existence of twin deficits is validated. Beyond these debt thresholds, the fiscal balance has no significant effect on the current account; the hypothesis of the existence of twin deficits is questioned. However, the external public debt threshold is much higher than the domestic debt threshold. Such an observation suggests that the fiscal illusion economic agents may be victims of, as a result of the financing of budget deficit, disappears at a later stage when the deficit is financed by external debt, and earlier when it is

financed by domestic debt. The small size of domestic debt that conditions the existence of twin deficits in Africa can be explained by the small size of the domestic debt markets of African countries (Christensen, 2005). However, the large size of external debt is indicative of the fact that current account deficits are offset by capital borrowing from abroad, leading to a capital account surplus (Généreux, 1996). Our results appear robust, since the successive inclusion of external debt (Table 3) and domestic debt (Table 4) as threshold variables did not significantly alter the influence of explanatory variables on the current account (obtained in Table 2).

4. Conclusion and Policy Implications

This article aimed at examining the relationship between fiscal and current account deficit in various debt regimes. To do so, we referred to Baum et al. (2013) panel threshold regression with 30 Sub-Saharan African countries over the period 2004-2017. Our results testify that there is an optimal debt threshold that reconciles the Keynesian and Ricardian approaches in the relationship between fiscal balance and current account balance. Thus, the estimated threshold levels of debt, as a percentage of GDP, that condition the existence of twin deficits are 78.40 for total public debt, 65.25 for external debt and 13.15 for domestic debt. Below these debt thresholds, the economy behaves in a Keynesian manner and the existence of twin imbalances is confirmed; but beyond these debt thresholds, the hypothesis of budgetary neutrality, supported by the Ricardian approach, is tested. In this case, the policy necessary to regulate external deficit consists in reducing the government's budget. This will reduce households and business demand, consequently, imports and deficits fall.

Our results remained robust while introducing new control variables, as the thresholds for total debt, external debt, and domestic debt remained constant across the estimates. The presence of a debt threshold influencing the dynamics of the relationship between fiscal and current account balance provides a plausible explanation to the works that, on the one hand, questioned the twin deficits hypothesis and, on the other hand, approved its presence in African countries.

Furthermore, the results indicate that the current account is explained by its value lagged by one period. So, the results confirm the presence of an internia effect in the dynamics of the current account, implying the persistence of the current account deficit on the previous period in the current account. The study also reveals that investment, public debt interest rate, the dependent population, real GDP growth, terms of trade, democracy and the benefits derived from natural resources are important determinants of the current account.

In view of the results obtained, two major economic policy implications can be formulated. First, African countries that produce exhaustible natural resources should save a significant part of the benefits derived from higher commodity prices in order to improve the current account balance. Then, African commodity-exporting countries should apply the rule that a large part of the benefits derived commodities should be used to finance investment in order to keep the level of consumption constant over time. Secondly, to operationalize the existing dilemma between growth and external balance, which is a barometer of the effectiveness of economic stabilization policies, African countries are required to keep the levels of total public debt, external public debt and domestic public debt below the above-mentioned thresholds. Finally, when the dynamics of debt accumulation become unsustainable or are perceived to be unsustainable, fiscal consolidation may be necessary in order to put debt dynamics on a sustainable path.

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Appendix

Appendix 1. List of 30 Sub-Saharan African countries included in our analysis

1-Angola, 2-Bénin, 3-Botswana, 4-Burkina Faso, 5-Burundi, 6-Cabo Verde, 7-Cameroun, 8-Tchad, 9-Comores, 10-République du Congo, 11-Côte d'Ivoire, 12-Eswatini, 13-Éthiopie, 14-Gabon, 15-Gambie, 16-Ghana, 17-Guinée, 18-Guinée-Bissau, 19-Lesotho, 20-Libéria, 21-Madagascar, 22-Malawi, 23-Niger, 24-Nigéria, 25-Rwanda, 26-Sierra Leone, 27-Afrique du Sud, 28-Tanzanie, 29-Togo, 30-Ouganda.
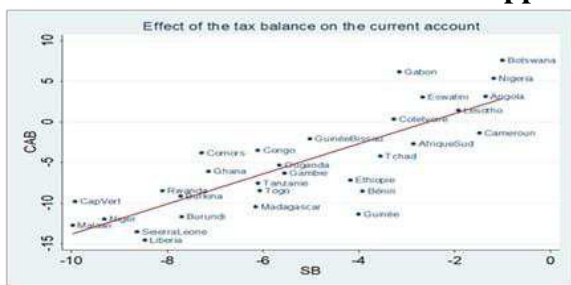
Appendix 2. Charts

Chart 1: Relationship between current account and debt from 2004 to 2017

Chart 2: Relationship between debt and current account from 2004 to 2017

Source: IMF, prepared by the author.

Appendix 3: Descriptive Statistics and Linearity test results

Table A1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
CAB	420	-5.06	10.13	-65.03	24.02
DEBT	420	51.07	48.22	5.51	266.25
EXDEBT	420	33.33	43.94	2.73	435.40
INDEBT	420	17.74	13.98	-7.09	118.94
SB	420	-5.49	6.80	-27.73	26.47

Table A2: Linearity test results

H0: Linear Model		
H1: PTR model with at least one Threshold Variable (r=1)		
Wald Tests (LM)	W = 19.53***	pvalue = 0.00
Fisher Tests (LMF)	F = 23.50**	pvalue = 0.01
LRT Tests (LRT)	LRT = 19.09 ***	pvalue = 0.00

***, ** denote significance at the 1 % and 5 % level, respectively.

Table A3: Tests to determine the number of regimes

Statistics	Threshold	F stat	Prob	Crit10	Crit5	Crit1
Single Endogeneous Threshold Model (a)						
H$_0$: Linearity against H$_a$: single threshold	78.40***	24.29	0.00	9.30	10.86	14.00
Double endogeneous threshold model (b)						
H$_0$: Linearity against H$_a$: single threshold	78.40***	24.29	0.00	10.30	11.56	15.81
H$_0$: Single threshold against Ha : double threshold	78.40	5.71	0.37	9.45	11.11	18.60
Triple endogeneous threshold model (c)						
H$_0$: Linearity against H$_a$: single threshold	78.40***	24.29	0.00	8.86	12.04	14.62
H$_0$: Single threshold against Ha : double threshold	78.40	5.71	0.31	9.81	12.43	16.79
H$_0$: Single threshold against Ha : triple threshold	37.78	4.88	0.65	15.87	19.21	27.07

Note: The threshold variable is debt/*** indicates significance at 1% level.