

The Triple Deficit Hypothesis in Sub-Saharan African Countries (SSA)

AYANA ZEWDIE WORKNEH

University Of Macau
Addis Ababa, Ethiopia

Abstract

This paper aimed at examining the relationship among budget balance, current account balance and private saving-investment balance and the existence of triple deficit hypothesis over the period 1980 - 2018 for 35 Sub African countries. Secondary data from the World bank Development indicator Database (WBDI) and Africa Development Bank (AfDB) for the time period 1980 through 2018 were used. The study adopted Dynamic Common Correlated Effect Mean Group model, Dumitrescu-Hurlin panel granger causality and Panel Cointegration analysis that allows capturing of slope heterogeneity and cross-sectional dependency among each member. The granger Casualty test indicates that current account deficits being jointly explained by private saving-investment deficit, and budget deficits in our sample. The Panel co-integration test results also suggest that there is a long-run positive relationship between the government budget balance, the current account balance and private saving-investment balance for the sample. The results based on DCCE mean group estimator also indicate the three balances have a positive and significant long run relationship. Overall, the study findings revealed both private saving-investment balance (SIB), and Budget balance (BB) have a positive impact on current account balance for Sub African countries, supporting the existence of the triple deficit hypothesis in SSA.

Keywords: *Dynamic common correlated estimator, Granger Causality, Panel Cointegration, Triple deficit hypothesis. Sub-Saharan African Countries*

Date of Submission: 26-01-2021

Date of Acceptance: 11-02-2021

I. Introduction

Several studies analyzed the issue of twin deficits hypothesis, but nowadays, a “triple deficits” hypothesis has surfaced. The required investment to boost economic growth in developing countries is constrained by low savings and higher consumption. In this respect, developing countries need foreign savings and foreign capital inflow via foreign direct investment and external debts to finance investment and consumption (Hubbard,2006; Kuijs, 2006; and Gruber and Kamin,2007). Therefore, the rise of globalization and free capital mobility creates a good opportunity for those countries to attract foreign direct investment and to have access for external loan. This causes the saving-investment balance of the country in deficit. The deficit of all these three balances and its co-movement or causal linkage among them is called Triple deficit (Akbas et al., 2014). Such circumstance prompted the scrutinizing of twin deficit hypothesis in recent years. Accordingly, triple deficit hypothesis is an all-encompassing rendition of the twin deficit theory and turning into an issue examined in literature.

The discussion on the problem of triple deficits has been rekindled in recent years, and the resultant phenomenon of current account imbalance ,budget imbalances and private saving-investment imbalance in many countries, which have attracted serious attention from academics and policymakers in both developed and developing countries. The concern is centered on the extent to which internal imbalance adjustment (that is budget imbalance and net private saving imbalance) can contribute to resolving external imbalances.

Like twin deficit hypothesis, discussion over validity of triple deficit hypothesis in many countries has also gained momentum. Triple deficit hypothesis is an extension of the twin deficit hypothesis by addition of “savings-investment” component. It refers to the relationship between savings-investment balance, budget (fiscal) balance and current account (foreign trade) balance. In essence, triple deficits hypothesis refers to whether domestic imbalance, that is budget and private savings-investment deficits all together (simultaneously) result into trade/current account deficit (external imbalance), (Sancar, 2014;Şen & Kaya, 2018b).

Understanding the validity of triple deficit, the causal relationship between savings gap, fiscal and current account balances Sub-saharan African Countries is of valuable importance as it will help to reveal economic performances of each member country and the community as a whole. This will, on the other hand,

help policy makers to come up with sound policies that will help in economic stabilization thereby helping countries not to get up into unnecessary heavy burdens (debts).

Several studies cover the analysis of Asian, and Western European countries, leaving partially uncover Sub-Saharan African (SSA) countries. The aim of this paper is to provide new empirical evidence for the SSA case basing on dataset, over the period 1980-2018. The analysis looks to both the short run and the long run using Granger causality test and Panel Error Correction cointegration as well as dynamic common correlated estimation techniques to empirically support or not the two theoretical perspective. The remaining part is organized as follows. Section 2 provides an overview of the study area. Section 3. describes theoretical and empirical literature explaining the twin/ triple deficit hypothesis. Section 4. shows the theoretical framework which we based to make an analysis together with data. Section 5. presents the methodology we employ for the analysis and estimation to achieve our objectives. While empirical analysis and interpretation of the results are sum up within section 6. Finally, conclusion and recommendations described in section 7.

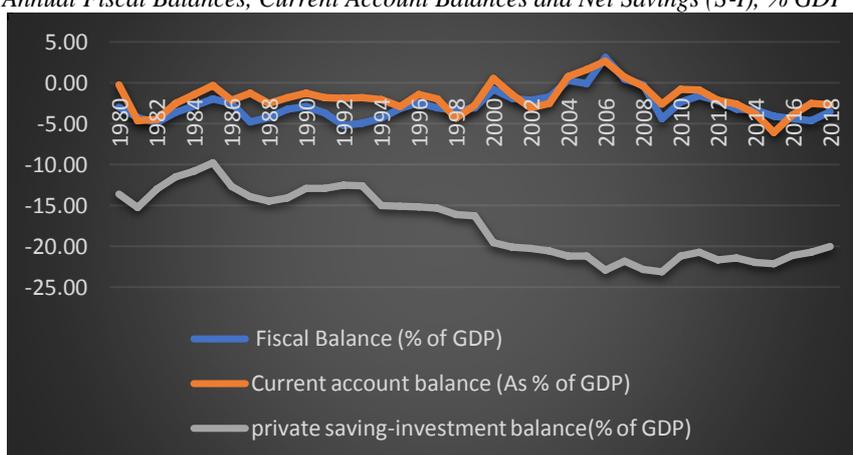
II. Overview of the study area

Sub-Saharan Africa (SSA) is the term that describes a significant part of Africa, which lies south of the Sahara Desert and is geographically demarcated by the southern edge of the Sahara Desert. SSA has 48 countries which are further divided into four sub-regions: namely, Central Africa, East Africa, Southern Africa, and West Africa. The region remains the least developed and poorest in the world. Recently, Sub Saharan African countries are geared towards achieving the macroeconomics targets, including but not limited to achieving full employment, economic and price stability, income distribution, economic growth, and balance of payments. Therefore, the inadequate domestic saving arising from a shortfall in national income leads low investment level, poor productivity, and low national income. As a result, insufficient savings cannot fully finance domestic investments, and therefore the fiscal deficit problem arises. For example, SSA's gross national savings rate (%GDP) stands at 11.578% far below the world average of 18.06%. In addition to saving deficits, Foreign exchange deficit is also an important external constraint in economic development. In order to increase the economic growth in a country, it first requires the importation of capital goods due to insufficient capital goods available in the country. while, level of foreign exchange revenue raised from the export of goods and services remains very low in developing countries like SSA countries, because the lion share of foreign exchange revenues is raised from the export of primary products (natural resources and agricultural products), which are more vulnerable to global commodity price shocks.

The inclusion of the savings-investment deficit and its interaction with the above deficits brings in the Triplet Deficits Concept. The reason for emergence of the Triplet Deficits Hypothesis in the literature is that in recent years current account deficits tend to increase, while both the budget deficit and private saving-investment deficits also increases in some developing countries. The need for domestic investment to be limited to domestic savings reduces global capital mobility and the opening up of the financial market in most economies. The financing of the resulting savings-investment (S-I) gap from outside causes the S-I balance to be a factor in economies where domestic investment is higher than domestic savings. In the literature, this scenario is referred to as the Triplet Deficits Hypothesis.

Policymakers can make better and more informed policy decisions to manage the deficits, going for either public or external borrowing or adjustment of tax rates, or promotion of a saving culture to finance the deficits. In this regard, the external debt is raising in SSA to finance its budgetary obligations and key flagship infrastructure projects. This risks a high external interest rate payment in the future, and a weakening of the currency during repayment.

Figure 1: Annual Fiscal Balances, Current Account Balances and Net Savings (S-I), % GDP (1980-2018)



Source: Africa Development Bank Database, 2020

2.1 TRENDS OF CURRENT ACCOUNT IMBALANCE

Sub-Saharan African countries ran relatively persistent current account deficits over the period covered by this analysis. The current account balance reached its peak in sub-Saharan Africa in 2015 when it amounted to US\$99.85 billion, representing approximately 6.08% of the GDP. From the Figure 1, it is evident that SSA experienced a protracted current account deficit (trade deficit) over the period of the study. Figure 2.4 shows that there were only five years which SSA attained a surplus in current account, 2000(0.54), and from 0.79 in 2004, 1.6 in 2005, 2.62 in 2006 and 0.66 in 2007 when the trade balance shows higher surplus, 4.97%,3.95%,5.42%,5.91% and 5.63% of GDP respectively. The trade surplus was buoyed by a significant rise in coffee prices attributable to the coffee boom. Countries experiencing on average a surplus were Botswana, Gabon and Nigeria. These countries have seen a fall in their current account surplus in recent years following the fall in oil prices.

2.2. TRENDS OF FISCAL(BUDGET) IMBALANCES

Figure 1 also presents the annual budget balances for SSA. From the graph, it is evident that except for 2006 and 2007, SSA has been running chronic budget deficits. The exception was in 2006 and 2007 when it attained a surplus of 3.08, and 0.48 percent of GDP respectively (see Figure 1). According to IMF (2018) report, SSA has been running higher budget deficits in the last three decades. The Fiscal deficits in SSA are attributable to the macroeconomic policies adopted after 1980, which resulted in inefficient tax collection and administration, macroeconomic shocks such as the 1979/80 oil price shocks, the world recession in the 1980s and 2008, the droughts, the Post-Election violence, and deteriorating terms of trade for the country's export (Lesiit, 1990), as well as poor budgetary processes coupled with limited resources (Wawire, 2006).

2.3. TRENDS OF SAVING-INVESTMENT IMBALANCES

The levels of investment and savings are important determining factors of the attainable rates of employment and economic growth. Figure 1 shows that SSA has been running a savings- investment gap that has had to be offset by inflow of foreign capital through the financial account. As shown in Figure 1, SSA's savings investment deficit has steadily risen from about 13.6% of GDP in 1980 to 20.07% in 2018 making the economy become increasingly reliant on external funds to finance its capital formation. This attribute this widening gap to the slight fiscal deficits experienced by the public sector which has increased from 4.23% of GDP in 1980 to 4.6% in 2018 and higher foreign direct investment inflow from 0.84% of GDP in 1980 to 9.56% of GDP in 2018. High reliance on external funding would give rise to large outflows of investible resources in the form of debt repayments.

III. Review of Literature

3.1. THEORETICAL LITERATURE REVIEW

Twin deficit theory predicts that countries with large budget deficits must likewise have large trade deficits. However, some studies found evidence that both budget deficit and the private saving-investment deficit will lead to a current account deficit (Szokolczai,2006; and Gruber and Kamin,2007). This is referred to as a triple deficit hypothesis. The triple deficit hypothesis is an extension of the twin deficit theory. Therefore, theories on twin deficit implicitly explain the theory of triple deficit. In the literature the most common approaches to explain the relationship between budget balance, saving-investment balance and current account balance are "traditional Keynesian theory", "Ricardian equivalence hypothesis", Neoclassical Theory and the fiscal approach to the balance of payment.

3.1.1. Neoclassical View

The standard neoclassical theory has three main assumptions which are: the economy is always at full employment of resources, and the consumers are rational, farsighted, and have access to perfect capital markets. This would then mean that permanent deficits significantly depress capital accumulation, and temporary deficits have either a negligible or perverse effect on most economic variables (including consumption, saving, and interest rates). If many consumers are either liquidity constrained or myopic, the impact of permanent deficits remains qualitatively unchanged. However, temporary deficits should depress saving and raise interest rates in the short run.

On the other hand, the Neoclassical theory proposes an inverse relationship between budget deficits and current account deficit. This is known as the twin divergence hypothesis. According to this perspective, output fluctuations and an investment crowding out effect can have a major impact on the budget balance. An increase in budget deficit due to higher government expenditure financed by debt/loan leads a shortage of loanable funds and thereby causes a rise in interest rate. An increase in interest rate discouraged the private sector investment (crowding out effect) and thereby decreases aggregate demand and hence economic growth. As a result, the demand for goods and services including imports declined and thus decreasing the current account deficit.

3.1.2. Keynesian Theory

The Keynesian view made a number of assumptions which are: economic agents are either myopic or liquidity constrained, individuals have a high marginal propensity to consume out of current disposable income and that the economy has some resources which are under-employed. The combination of these three assumptions renders a positive relationship between budget deficits and current account deficit.

The traditional Keynesian theory on Twin Deficit Hypothesis is grounded within the traditional Mundell- Fleming paradigm and absorption capacity approach. Keynesian proponents argue that fiscal expansion has an effect of raising absorption. This will push up the appetite for foreign goods and ultimately diminish the surplus in the current account balance. Fiscal expansion has also a crowding – out effect on the domestic market which raises the interest rate and the resultant capital flows will lead to appreciation of currency. Domestic goods will appear to be expensive in the eyes of foreigners, thus exports will diminish, and the current account worsens.

3.1.3. The Fiscal Approach to Balance of Payments

The fiscal approach to the determination of balance of payments is based upon the national income identity which states that the current account is equal to government balance and the private sector balance between investment and savings (Bartoli: 1989). According to this approach, when domestic savings and investment are equal then the resulting variations in the current account balance will have been a consequence of variation in the fiscal budget deficit. Policymakers will thus have to use the fiscal policy or adjustment to domestic national savings and investment to adjust the national accounts. The fiscal approach is one-sided in that it only takes into account the causality running from fiscal deficit and the savings and investment relationship. According to Chu (1989), in highly open economies trade balance can be transmitted directly to the fiscal sector. However, fluctuations in the expenditures rather than in revenues were the immediate cause of unstable fiscal deficits only if government expenditures are based on anticipated future revenue which is also a function of future trade.

The conclusions of the Fiscal Approach to the Balance of Payments (Johnson, 1977) are similar to neo-Keynesian theory, but they are based on the idea that fiscal deficits may increase the money supply. When money holdings exceed the economic agents' desired long-term real monetary balances, spending and acquisition of foreign assets expand, which leads to the worsening of the current account (Harberger, 2008).

3.1.4. Ricardian Equivalence Hypothesis

The Ricardian Equivalence Hypothesis (REH) was introduced by Barro (1974) and its arguments arise from the Neoclassical school of thought. The Ricardian equivalence hypothesis assumes agents are rational and forward-looking, Lump-Sum taxes, perfect capital market and infinite lives of consumers. Based on these assumptions, this theory posits that there is no causality between budget deficit and current account deficit. Proponents of this theory argued that people understand that any rise in government expenditure financed by increased borrowing ultimately will be compensated by an increase in future taxes.

Therefore, despite the decrease in taxes in the current period, private sectors will not increase their consumption, instead, they save more today because they know that the tax will increase in the future to finance these debts. For this reason, the private sector savings increase, while government savings decreases due to tax decreases. So, the decrease in public savings will be offset by the rise in private savings, thus total savings do not change. Given a level of public expenditures, this does not affect the interest rate and thus consumption, savings, investment, and current account in that economy (Barro, 1989). In other words, the proposition states that the cuts in taxes are matched by an increase in savings since people look forward to the government increasing the taxes in future. This foresight gives rise to Say's Law for deficits that the demand for bonds always rises to match government borrowing.

The proposition is expected to hold under the following conditions: generational linkages, non-distortionary taxes, rational expectations (perfect foresight concerning the path of taxes and fiscal policies), identical planning horizons for both private and public sector agents, the availability of deficit financing as a fiscal instrument does not alter the political process and perfect capital markets with no borrowing constraint. However, much criticism has been raised concerning the realism of these assumptions.

3.2. EMPIRICAL LITERATURE REVIEW

The presence of triple deficits has also been highlighted for the role it plays in reducing the sustainability of the economy, and thus many studies have focused on testing the existence of a twin deficit hypothesis in their sample areas. However, studies on the triple deficits are not only rare but also their findings are inconclusive.

Some studies, for instance, Zaidi (1985), Akıncı and Yılmaz (2012), Shastri et al. (2017), Akbas & Lebe (2016), Hikko (1995), Roubini (1988) and have asserted the validity of triple deficit hypothesis. The budget deficit can also indirectly link to current account deficit via other macroeconomic variables. Especially in those

countries where there is relatively low domestic savings rate, a rise in huge budget deficit leads to higher interest rate and thus making the country relatively attractive for foreign direct investment/foreign capital inflow. Thus, led to finance the budget deficit, and encourages to import more, which makes the trading account to deteriorate as well as a rising saving-investment gap. This shows that there is co-movement of the three deficits (triple deficit hypothesis). In this regard, Bayoumi(1990) tested the capital mobility hypothesis for ten industrial countries by distinguishing private domestic saving from total national saving. He concluded that gaps between private saving and investment do affect current account deficits. Ahmad and Ansari (1994) also examined the relationship between the Canadian trade balance, federal deficit, and savings-investment gaps based on quarterly data. Over the period from 1973 to 1981, They found that the trade deficit is related to the other two balances. This implies that the triple deficit valid for Canada during the study period.

Tang (2014) conducted a study to test the validity of Triple deficit hypothesis in the United States during the period from 1960 (Q1) to 2013 (Q1) using the Autoregressive Distributed Lag (ARDL) and Toda-Yamamoto causality methods. He concluded that there is a long run positive relationship among budget deficits, trade deficits, and financial account deficits for the US economy during the study period.

Şen et al. (2014) also investigated the validity of triple deficit hypothesis for the Turkish economy during the period from 1980 to 2010 using the Vector Autoregressive (VAR) and Dolado-Lütkepohl causality test. They confirmed that the traditional Keynesian view of triple deficit hypothesis is valid for the Turkish economy. Similarly, studies by Akbaş et al. (2014) for Turkey during the period from 1960 to 2012 using Toda-Yamamoto causality test have found a positive causal relationship among the saving-investment deficit, budget deficit, and current account deficit. Therefore, they confirmed that the triple deficit hypothesis exists in G7 countries and Turkey during the study periods.

However, to the contrary of the above findings, Çoban and Balıkcıoğlu (2016), and other few studies do not seem to confirm the triple deficit hypothesis. In addition, Bayramoğlu and Öztürk (2018) found mixed results in their investigation on the validity of twin and triple deficit hypotheses for 15 developing countries for the period from 2000 to 2015 using Dumitrescu and Hurlin panel causality approach. They found evidence that asserts the validity of the twin deficit hypothesis, but they do not have evidence on the validity of the triple deficit hypothesis.

Bolat, S., et.al. (2014) also tested the validity triple deficit for EU countries for the period from 2002: Q1 to 2013: Q3 using Hacker and Hatemi-j bootstrap causality test. They found mixed results. Triple deficit valid for Poland, Portugal, Spain, and Sweden. However, twin deficit was valid for Austria, Denmark, France, and Germany, whereas, Ricardian Equivalence theory was valid for Finland, Italy, and Netherland.

Walker (2002) studied the extent to which Japanese households conform to Ricardian equivalence. The study employed VAR techniques on national accounts data and the results suggested that the Ricardian Equivalence hold. Moreover, there was some form of private savings off-setting to change in fiscal policy.

Yi (2003) considered South Korea data, the study found no cointegration relationship between the variables (real exchange rate, current account, and consumption). This implies Ricardian equivalence holds.

Giorgioni and Holden (2003) used a sample of ten developing countries (Burundi, El Salvador, Ethiopia, Honduras, India, Morocco, Nigeria, Pakistan, Sri Lanka, and Zimbabwe) to test the Ricardian equivalence. The study applied Bernheim(1987)'s framework of private consumption across the panel of countries and the conclusion was that there was some presence of Ricardian equivalence. However, they were cautious and unconvinced given the diversity of countries and data limitations within the group.

IV. Theoretical Framework (Model)

The macroeconomic theory of national income accounting identity can better describe and provides the basic basis for examining the validity of twin/triple deficit hypothesis (the relationship among current account deficit, budget deficit and private savings investment balance).

This study is similar to the work of Lam (2012), and Senadza and Aloryito(2016)which is based on national income accounting identity. The analytical framework is mainly based on the national income identity in the context of an open economy (Ravinthirakumaran, et.al. ,2016; p. 79; Senadza and Aloryito,2016, p. 55, and Dornbusch et al. ,2011, p. 26). They derive the analytical framework that explain the nexus among the budget balance, private saving- investment balance and current account balance by equating the expenditure approach and the use(purpose) of national income. Thus, National income(Y or GDP) is measured as the sum of the expenditure on private Consumption (C),investment(I),government spending(G), and net exports (X - M), that is, exports minus imports as in equation (3.1);, and mathematically;

$$Y = C + I + G + (X - M) \quad (1)$$

On the other hand, GDP(Y) is allocated for different purposes like consumption (C), savings (S), taxes (T) and transfer payment (R), as follows:

$$Y=C+T+R \quad (2)$$

Equating (3.1) and (3.2), ignoring the transfers and rearranging terms yields:

$$X-M= (Sp-I) +(T-G) \quad (3)$$

Equation (3), indicates that (X - M) is equivalent to the current account (CA) balance, strictly speaking, X-M, is the trade balance. Although, the current account balance is the trade balance plus net income from services and net transfers, these particular sub-accounts usually represent a small fraction of the total transactions in the current account for many developing countries, including SSA. (S - I) is private savings and (T - G) represents public savings.

Theoretically, three possible scenarios can be deduced from equation (3); First, as long as private savings (Sp) and investment (I) remain constant over time, changes in the budget balance (T - G) are likely to cause a change in current-account balance, that is. the presence of a twin deficit hypothesis (see Kim and Roubini, 2008) – as the budget deficit and current-account deficit are correlated.

Secondly, assuming that private savings and investment does not remain stable over time, fluctuation in the budget balance and private net saving balance will lead to a change in the current account, that is , the existence of a triple deficit hypothesis (see Sarlvatore, 2006) – where the budget deficit , private saving-investment deficit and current account deficit are co-integrated.

The third theoretical inference is rooted in the Ricardian Equivalence Hypothesis, which assumes that changes in fiscal operations will be perfectly balanced by changes in the difference between savings and investment. When this happens, the twin deficit hypothesis will not hold, implying that fluctuations in the fiscal balance are uncorrelated with the current account deficit (Suresh and Tiwari, 2014; Barro, 1989).

To understand the degree of association between budget deficit, private saving-investment gap and current account deficit the above equation provides a basic context. Therefore, the study attempts to explore the twin/triple deficit hypothesis/twin divergent/current account targeting/Ricardian equivalence hypothesis by applying cointegration analysis, causality test and error correction estimation technique as well as Through dynamic common correlated effect (DCCE) modelling on annual fiscal, private saving-investment balance, and external balances for 35 SSA countries.

V. Methodology

5.1. EMPIRICAL MODEL SPECIFICATION

The analysis was therefore aimed at exploring the relationship between current account imbalance, private savings-investment imbalance, and budgetary imbalance. Accordingly, following Basu & Datta(2005); and Chowdhury and Saleh (2007), the study used various estimation models to analyze the short-term and long-term causal relationship between these deficits. The model is as follows:

$$CAB_t = \alpha_0 + \sum \alpha_{1i} CAB_{t-i} + \sum \alpha_{2i} BD_{t-i} + \alpha_{3i} SI_{t-i} + \mu_i \quad (4)$$

Where, CAB_i is current account balance, BB_i is budget balance, SIB_i is private savings and investment balance (S^p - I), and μ_i is an error term. The coefficient of private saving-investment balance and budget balance is expected to be positive and significant if the triple deficit hypothesis holds, it will be positive; otherwise it would be negative and/or insignificant. Thus, the signs of the coefficients are best determined empirically. Given the coexistence of high current account deficit, private saving-investment deficit and budget deficit and the consequent adjustment lags, however, it appears that the Keynesian model better characterizes the SSA economies.

5.2. ESTIMATION METHOD

The study tries to examine the relationship between internal and external balances in SSA for the period from 1980 to 2018 using the dynamic common correlated effect (DCCE) modelling, which is developed by Ditzén (2018). This analysis is carried out within a panel data estimation framework. The preference of this estimation method is not only because it enables a cross-sectional time series analysis which usually makes provision for broader set of data points, but also because of its ability to control for heterogeneity and endogeneity issues.

In addition, the study attempts to explore the twin/triple deficit hypothesis/twin divergent/current account targeting/Ricardian equivalence hypothesis by applying the granger causality test using Durmin and Batquic(2012), Panel cointegration analysis, and error correction estimation technique on annual fiscal, private saving-investment balance, and external balances for 35 SSA countries.

5.2.1. CAUSALITY ANALYSIS

we use the granger causality test, which is proposed by Durmin and Batquic(2012), for short run analysis of variables. Such Granger causality test has been applied using the following set of equations:

$$\Delta CAB_t = \alpha_0 + \sum \alpha_{1i} \Delta CAB_{t-i} + \sum \alpha_{2i} \Delta BD_{t-i} + \alpha_{3i} \Delta SI_{t-i} + \epsilon_t \quad (5)$$

$$\Delta BD_t = + \sum \alpha_{1i} \Delta BD_{t-i} + \sum \alpha_{2i} \Delta CAB_{t-i} + \sum \alpha_{3i} \Delta SI_{t-i} + \epsilon_t \quad (6)$$

$$\Delta SI_t = + \sum \alpha_{1i} \Delta SI_{t-i} + \sum \alpha_{2i} \Delta CAB_{t-i} + \sum \alpha_{3i} \Delta BD_{t-i} + \epsilon_t \quad (7)$$

5.2.2. PANEL COINTEGRATION TEST

After the time series properties of the data are evaluated then, the possible existence of a long-term relationship between the variables was analyzed using Error based Panel cointegration test. Since our sample data size is small, we construct and test the restricted Westerlund error correction test (Westerlund & Edgerton, 2007) with short-run dynamics for all series with a single lag and lead.

5.2. 3.. DYNAMIC COMMON CORRELATED EFFECTS (DCCE) ESTIMATORS

Given the nature of our dataset, we resort to employ the Dynamic Common Correlated Effects (DCCE) estimator which is developed by Chudik and Pesaran (2015). The DCCE estimator is particularly useful when the dimensions of both the cross-section and the time-series remain large enough. While the analysis of macro-panel data continues to be guided by micro-dataset estimators (especially Arellano and Bond (1990) and Blundell and Bond (1998), for panels where T is small relative to N. Nevertheless, our sampling period is 39 years, which helps us to leverage temporal variability and heterogeneity across countries.

Another advantage of the DCCE estimator is that, unlike the regular estimators, it is a reliable estimator if the presence of specific shocks and unobserved components causes unknown forms of error cross-sectional dependence. As explained by Phillips & Sul (2007), not taking in to account the cross-sectional dependency in dynamic panel settings can lead to severe biases. Moreover, the assumption of slope homogeneity across countries will also lead inconsistent estimation and biased conclusion. Thus, DCCE estimator addresses these potential sources of inconsistency and biases arises from unreal assumptions (see Pesaran and Smith, 1995).

Our choice of a dynamic framework is motivated by the literature on current account dynamics, which suggests that there is considerable persistence in current account balance. In this vein, in order to estimate the relationship between current account deficit, budget deficit and private saving-investment deficit, while controlling for variables that are known to affect current account deficit, we adopt as our baseline specification of the following heterogeneous dynamic panel model with a multifactor error structure: Therefore, we consider a dynamic version of Equation (8) below, which includes one lag of the dependent variable (CAB_GDP_{i,t-1}).

$$CAB_GDP_{it} = \beta_0 + \beta_1 CAB_GDP_{it-1} + \beta_1 BB_GDP_{it} + \beta_2 SIB_GDP_{it} + \eta_{it} + \varepsilon_{it} \quad (8)$$

$$\eta_{it} = \alpha_i + \lambda'_i f_t + \varepsilon_{it} \quad (9)$$

where CAB_GDP is the current account balance for country i in year t, BB_GDP is a government budget Balance for country i in year t and SIB_GDP is private saving-investment Balance for country i in year t. α_i represents for time-invariant unobserved country specific effects, f_t is an unobserved common factors with corresponding country-specific factor loading λ'_i , and ε_{it} represents the idiosyncratic errors, possibly correlated across countries. This is an extremely flexible specification that, with suitable restrictions on the parameters, encompasses several approaches used in empirical practice, For example. static and/or (partially) pooled panels can lead to bias estimates, particularly in the presence of common unobserved factors. while the Dynamic Common Correlated Effects estimator is reliable estimator, which approximates the unobserved common factors by augmenting the estimation equation with additional terms containing cross-section averages (Chudik and Pesaran ,2015). Mean Group (MG) estimates can then be obtained by averaging estimated coefficients across countries, with the corresponding standard errors computed non-parametrically.

VI. Estimation And Interpretation Of Results

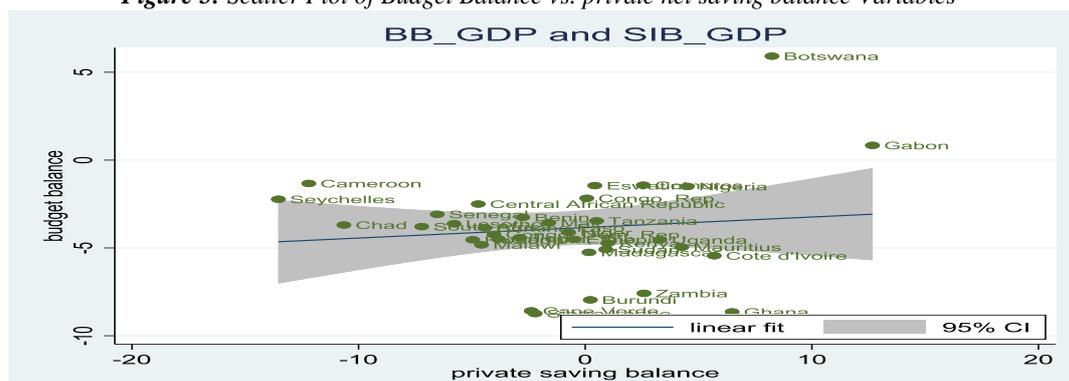
This section presents the results of the empirical estimation and gives an economic interpretation of the results. We start with preliminary tests that include data description, test for cross sectional dependency, and non-stationarity, and go on to examine the Granger causality test and panel error cointegration test and estimate DCCE.

6.1. PRELIMINARY ANALYSIS

6.1.1. DATA DESCRIPTION AND DESCRIPTIVE STATISTICS

To examine the relationship between budget balance, private savings-investment balance, and current account balance in SSA, we use panel data based on the availability of comparable data. Therefore, we limit the scope of our data to the period 1980 to 2018 and 35 of the SSA economies. All the data related to the variables have been directly taken from the World Bank World Development Indicators Database, IMF, Africa Development Bank, and country's reports in proportion to GDP. The current account balance refers to the difference between exports and imports of goods and services plus net transfers as a percentage of GDP, To construct data series on private savings-investment balance, we draw on the African development Bank Database to obtain data on both domestic savings and gross capital formation (a proxy for gross domestic investment). Using these data, it is essential to describe the panel time series characteristics of the data employed in the estimation of the panel regression models (equation 11)

Figure 5: Scatter Plot of Budget Balance vs. private net saving balance Variables



Source: Computations from research data, 2020

The descriptive analysis of SSA’s data highlights two econometric issues. First, it identifies a concern that the individual country series are characterized by cross-sectional correlation or dependence. Figure 2. indicates a high degree of correlation between country- level explanatory variables. This is to be expected as these variables are linked by a country’s trade and economic relations, and financial institution status. One would expect that countries that share these common factors would likewise have systematic error correlations.

Second, as we have seen on Figure 3-5, while few countries align along a linear relationship between CAB_GDP and the other variable such as SIB_GDP, BB_GDP, there are a disproportionate number of countries that lie outside the 95% confidence interval for this linear relationship. This suggests that there may be heterogeneity in the CAB_GDP slope parameter across countries.

These two econometric issues have potential implications for model specification and efficiency of standard panel data estimators. In subsequent sections, the procedures adopted in addressing the aforementioned issues are discussed in detail.

6.1.2. TEST OF CROSS-SECTION DEPENDENCE AND SLOPE HOMOGENITY

The empirical work in this study is based on the annual data of 1980 up to 2018 and all of the variables, that is, current account balance, budget balance and private saving-investment balance are taken as the ratio of GDP. To begin the analysis with, first, we start by examining cross-sectional dependence among the series in our panels. Most of the recent theoretical and applied panel data econometric studies have emphasized the need to address the methodological issue related to cross-section or “between groups” dependence in error terms when dealing with panel data models.

A) Cross-Sectional Dependence Test Results

Cross-sectional correlation often emanates from unobserved common “shocks” and unobserved, time-invariant heterogeneous error components (Eberhardt & Teal, 2011; Pesaran & Tosetti, 2011; Sarafidis & Wansbeck, 2012). This error component is a sub-component of the error term, incorporating spatial dependence and idiosyncratic pairwise dependence in the disturbance (De Hoyos & Sarafidis, 2006). The existence of cross-sectional correlation between error terms can have severe implications for the estimation of both coefficients and standard errors using standard panel data estimators. This can lead to poor policy decisions based on biased parameter estimates. For this purpose, the three most often used cross-sectional dependence test procedures- Pesaran (2004), Friedman (1937), and Frees (2004) cross-sectional dependence (CD) tests- were employed to examine the between-group correlation in error terms (as a post-estimation diagnostic test) and panel time series variables (as a pre-estimation diagnostic test). Pesaran’s cross-sectional dependence test is more applicable for pre- and post-estimation testing, unlike other tests that are more appropriate as post-estimation tests (De Hoyos & Sarafidis, 2006). Accordingly, we test for cross-sectional independence in the data used to estimate models as reported in Tables.2 below. Table.2 presents the test results for cross-sectional correlation. It shows the average, country-specific correlation coefficients for the panel series full matrix and off-diagonal matrix elements, as well as Pesaran’s cross-sectional dependence test statistics. The results indicate positive, pairwise cross-sectional correlation of panel time series for current Account balance, Budget balance, and Private saving-investment balance (all are as % of GDP). The results Pesaran’s CD test also indicate the presence of cross-sectional dependence for each variable.

Table 2.: Panel Time Series Cross-Sectional Dépendance Test Results

Variable	CD-test	p-value	corr	abs(corr)
CAB_GDP	9.640	0.000	0.063	0.248
BB_GDP	20.770	0.000	0.136	0.229
SIB_GDP	6.470	0.000	0.042	0.308

Notes: Under the null hypothesis of cross-section independence $CD \sim N(0,1)$
 abs(corr)-Average absolute value of the off-diagonal elements correlation(corr)

Source: Computations from research data, 2020

As a result of the tests statistics above, the null hypothesis of cross-sectional independence is rejected for all variables under consideration. This indicates that the individual country, panel data series employed in this study are cross sectionally dependent and correlated, likely due to similar patterns of common macroeconomic shocks. The standard (or parametric) average absolute correlation indicates positive pairwise correlation coefficients of all the estimated residuals from replicated models. Also, the pairwise average Spearman rank correlation estimates from the models are found to be positive and low (below 0.5). This indicates that the upper-diagonal has low positive and negative elements of country-specific pairwise correlations coefficients, which cancel each other out during averaging. This problem invalidates Friedman’s cross-sectional dependence (CD) test. In contrast, Frees’ CD test, based on the average sum of squares of the rank of pairwise correlations, rejects the null hypothesis of cross-sectional independence at the 1% significance level. Similar results are obtained using Pesaran’s CD test. As a result, we conclude that the models’ error terms are characterized by significant cross-sectional dependence.

Table 3.;Estimated residual Cross sectional dependence test results

	CD tests	P-value	abs(corr)
Pesaran's test	6.9	0.0000	0.221
Friedman's test	94.24	0.0000	0.221
Frees' test	2.27	0.0000	0.221

Source: Computations from research data, 2020

In our empirical analyses, it is essential to employ Dynamic Common Correlated Effect analysis (CCE) approach to address cross sectional dependency and heterogeneity, because our sample countries are highly integrated and heterogeneous characteristics that lead cross sectional dependency and slope heterogeneity. In this regard, the Dynamic Common Correlated Effect analysis (DCCE) approach is more efficient than the OLS estimator.

B) Heterogeneous SlopeEstimators

The preceding exploratory data analysis has determined that the relationship between current account balance, budget balance, and private saving-investment balance in SSA countries is likely heterogeneous due to differential macroeconomic policies, and prices across countries. To account for heterogeneous effects, we next consider some recent panel data estimators that are designed to address these econometric issues A test of slope homogeneity was performed as a robustness check using the test statistic suggested by Swamy (1970). A test of slope homogeneity in panels with a large number of observations of the cross-sectional (N) and time (T) dimension, which is based on Pesaran & Yamagata (2008) and Blomquist & Westerlund (2013) is performed. The test results are reported as follows. The result in Table 4 shows that the existence of heterogeneous slope.

Table 4. Test for slope homogeneity

	Delta	P value
	-3.38	0.00
adj.	-3.48	0.00

(H0: slope coefficients are homogenous)

Source: Computations from research data, 2020

6..1.3. STATIONARITY TEST

The Fisher’s combined p-values test proposed by Maddala and Wu (1999) and the Pesaran (2007) cross-sectionally augmented Im, Pesaran and Shin (2003) (henceforth, CIPS) MultiPurt employed in this study. The Multipurt panel unit root diagnostic results in Table 3.5 indicates that all variables are stationary in levels, and in first difference. This also confirms the stationarity of those series at levels and first difference.

Table 5: Panel Unit root test

Variables	Lag	Maddala and Wu (1999) Panel Unit Root test (MW)				Pesaran (2007) Panel Unit Root test (CIPS)			
		Levels		Difference		Levels		difference	
		Without trend	With trend	Without trend	With trend	Without trend	With trend	Without trend	With trend
CAB_GDP	0	289.87***	281.01***	1708.02***	1455.35***	-8.11***	-8.10***	-27.21***	-26.39***
CAB_GDP	1	210.35***	196.68***	990.41***	819.51***	-4.45***	-4.10***	-21.86***	-19.45***
BB_GDP	0	377.70***	304.11***	1871.34***	1605.69***	-12.18***	-10.40***	-27.12***	-26.45***
BB_GDP	1	238.37***	181.52***	902.48***	735.70***	-8.03***	-5.95***	-21.35***	-19.24***
SIB_GDP	0	360.43***	371***	1968.4***	1689.35***	-13.28***	-11.86***	-26.89***	-26.03***
SIB_GDP	1	199.8***	192.35***	993.65***	808.58***	-8.6***	-5.85***	-20.44***	-18.09***

NB> Null for MW and CIPS tests: series is I(1). MW test assumes cross-section independence.
 CIPS test assumes cross-section dependence is in form of a single unobserved common factor -multipart- uses Scott Merryman's -xtfisher- and Piotr Lewandowski's -pescadf-. ***-p<1%, **-p<5% and *-p<10%

Source: Computations from research data, 2020

In conclusion, based on these robustness checks presented in this section accounted for the aforementioned issues we selected and employ the robust and less restrictive panel data estimators that account for slope heterogeneity, cross-sectional dependence, stationarity of series, and endogeneity emanating from common, unobservable shocks. It should also be noted that the cointegration test, and dynamic Common correlated estimator are the robust and less restrictive estimator to examine the current account sustainability based on the error correction model.

6.2. COINTEGRATION TEST

After testing the stationarity of the variables, the possible existence of a long-term relationship between the variables was analyzed in the following section using panel cointegration test. Since our sample data size is small, we construct and test the restricted Westerlund error correction test (Westerlund & Edgerton, 2007) with short- run dynamics for all series with a single lag and lead.

Table 6. Westerlund Panel Cointegration Test

restricted case with single lag and lead									
	constant				constant and trend				
Statistic	Value	z-value	P-value	Robust P-value	Value	Z-value	P-value	Robust P-value	
Gt	-2.60	3.63	0.00	0.00	-3.19	4.67	0.00	0.00	
Ga	-12.44	3.12	0.00	0.00	-16.36	2.20	0.01	0.00	
Pt	-14.83	4.55	0.00	0.00	-17.78	4.71	0.00	0.00	
Pa	-10.97	5.40	0.00	0.00	-15.02	3.96	0.00	0.00	

Source: Computations from research data, 2020

According to these results of restricted case without and with trend, the null hypothesis of no cointegration of the group- mean tests (Ga and Gt) and of the panel tests (Pt and Pa) is rejected at 1% significance level by simple and robust p value, implying that all variables are cointegrated or they have long run relationship. The fact that the variables are cointegrated and thus we find the first evidence of the validity of triple deficit in the panel.

6.3. CAUSALITY ANALYSIS

After establishing co-integrating relationships between budget deficit, current account deficit, Private saving-investment gap, we next tested the direction of the causal relationships between these variables. Regarding different approaches of the Granger causality tests for panel data, the first approach which based on a panel vector corrections model, heterogeneity or cross sections dependence cannot be taken into account. Hurlin & Dumitrescu (2008) developed the second approach considers the slope heterogeneity but does not take cross-sectional dependency into consideration. The third approach developed by Kónya (2006) takes into account both heterogeneity and cross-sectional dependence. Therefore, we use the third approach of Granger causality test due to the presence of cross-sectional dependence and heterogeneity across countries in our data sample. Table 7 reports the results of Dumirescu & Hurlin (2012) Panel Granger Causality (PGC) test. The results are reported for lag augmentations from P=1 to P=3 (inclusive).

Table 7.. Dumirescu & Hurlin (2012) Panel Granger Causality (PGC) test

	Lag 1			Lag 2			Lag 3		
	W	Zb	Zt	W	Zb	Zt	W	Zb	Zt
CAB_GDP BB_GDP	1.19	0.78	0.47	3.20	3.56 ***	2.78***	3.66	1.59	0.89
BB_GDP CAB_GDP	2.16	4.84***	4.13***	2.64	1.88*	1.31	3.19	0.47	-0.06
BB_GDP SIB_GDP	2.70	7.13***	6.19***	3.73	5.11***	4.13***	5.13	5.13***	3.91***
SIB_GDP BB_GDP	1.43	1.80*	1.39	2.63	1.86*	1.29	3.41	0.99	0.38
SIB_GDP CAB_GDP	2.32	5.53***	4.75***	3.99	5.91***	4.84***	5.03	4.89***	3.70***
CAB_GDP SIB_GDP	1.55	2.30**	1.84*	3.24	3.68***	2.88***	4.68	4.05***	2.99***

***-p<1%, **-p<5% and *-p<10%

Source: Computations from research data, 2020

As shown in Table 3.7, the null hypothesis of the one-way Granger causality test between BB_GDP and CAB_GDP was rejected at 1%. Hence there is unidirectional causation between two balances that runs from BB_GDP to CAB_GDP under first lag order. In addition, a null hypothesis on one way Granger causality running from saving gap % GDP(SIB_GDP) to CAB_GDP was also rejected and confirms the existence of the triple deficit hypothesis in the sense that BB_GDP and SIB_GDP jointly determine CAB_GDP. The saving gap also causes BB_GDP but the causation is bit weaker in terms of statistical significance. These results are in conformity with those of Akbas and Lebe (2014) who also find saving gap to play a role in determination of both budget and CAB for G7 countries.

The causation may imply that inadequate savings have a negative effect on investments, which leads to a decrease in both the export revenues and the tax revenues to be taken from these investments. Therefore, BB and the CAB are negatively affected (Akbas and Lebe, 2014). The results also showing that there is a bidirectional relationship between CAB_GDP and SIB_GDP at 1% significant level. The outcome of the PGC tests reveals that CAB_GDP on average, can be used to predict SIB_GDP and vice versa, and supports the notion that there, on average, are short-term(inter) dependencies. The null hypothesis of that CAB_GDP does not homogeneously cause BB_GDP is rejected regardless of the number of lags included. whereas the SIB_GDP granger cause CAB_GDP regardless of the number of lags. This revealed that both budget and private saving-investment balance on, average, can be used to predict CAB_GDP and thus the three variables have a causal relationship. Therefore, the PGC test confirms the validity of triple deficit hypothesis in SSA countries during the study period.

To examine the validity of twin deficit, or triple deficit or twin divergence, or Ricardian equivalence in each country of the panel in SSA, we performed the bootstrap panel Granger causality analysis and the results from the test are presented in appendix 1. The results show that there exists a significant, and positive relationship between budget deficit and current account, Granger causality running from budget deficit to current account deficits at 10% level of significance only for Benin, Cameroon, central Africa, Congo Democratic, Gambia, Kenya, Rwanda, Sudan for the first lag order, and for Benin, Botswana, Cape Verde, Congo democratic, Kenya, Rwanda, Senegal for second order lag, But we do not find any significant relationship for the remaining countries in the sample in the first lag.

On the other hand, the results also suggest that there exists a significant, and positive, Granger causality running from current account deficit to budget deficits at 10% level of significance only for Congo republic, Eswatini, Senegal, South Africa, and Ugandain the first lag, and for three countries Comoros, Ghana, Mali, and Senegal for lag 3 but we do not find any significant relationship for the remaining countries in the sample. Therefore, we find an evidence for the validity of twin deficit divergence in these countries. These findings could be explained by the potential decrease in aggregate demand and thus a decline in output and employment is due to a widening of current account deficit in these countries. Thus, these current account deficits may reflect budget deficits financed by foreign borrowing.

The Granger causality test results for the null hypothesis show that BB_GDP and SIB_GDP do Granger cause CAB_GDP for Cameroon, and Sudan under first order lag, and Benin, Botswana under second order lag as indicated in the Wald test column of appendix 1. In other words, the null hypothesis of non-causality is rejected for Benin, Botswana, Cameroon, Sudan SSA countries under consideration. This result confirms the existence of triple deficits hypothesis for Benin, Botswana, Cameroon, Sudan.

As can be seen from appendix 1, the empirical results do not support the validity of the twin or triple deficits hypotheses for Burkina Fast, Burundi, Cote devoire, Ethiopia, Lesotho, Malawi, Mauritius, Nigeria, Seychelles, Sierra Leon, Tanzania, Togo Zambia of our sample countries, meaning that internal balance does not Granger-cause external balance (current account balance), during the study period. This reveals that there is Ricardian relationship among budget deficit, current account deficit and private saving-investment deficit in those countries, meaning Ricardian equivalence hypothesis holds in these countries.

6.4. DYNAMIC COMMON CORRELATED EFFECT ESTIMATION RESULTS

After confirming cointegration and granger causality tests, the next step is to estimate the significance level of the coefficients of short run and long-run relationship using dynamic common correlated effect estimators. As shown in Table 8, the DCCE mean group estimator indicate a positive and statistically significant impact of BB_GDP and SIB_GDP on CAB_GDP at 1% significance level.

According to the results of the mean group Dynamic common corrected effect estimator, both the budget deficit and the net savings gap are positive and statistically significant. The error correction term (ECT) estimated by inserting the long run coefficients in the short run dynamic specification of the model turns out to be negative and statistically significant under all estimation techniques. The negative ECT shows that the system is driven to its long run cointegration path. The speed of adjustment (error correction term) is estimated to be around 59% per year. These statistics (ECT) indicate that all the series (BB_GDP; SIB_GDP and CAB_GDP) are co-integrated in the long run and hence, there is strong evidence on the existence of the triple deficit hypothesis in SSA.

In addition, the triple deficit hypothesis pertaining to fiscal deficit(FD), current account deficit(CAB_GDP), and net private saving deficit(SIB_GDP) has also been validated in the long run through the Granger causality test of the lagged ECM, This suggests that the three deficits have a long run and positive relationship. The mean group DCCE estimator suggests that, on average, a strengthening (deterioration) in BB-to-GDP ratio of 1% point is associated with an improvement (deterioration) in the current account-to-GDP ratio of about 0.695% in the long run. The coefficient of saving gap is consistently positive and significant at 1% significance level. The private saving gap exerts a positive effect on CAB_GDP though the impact is weaker compared to BB_GDP. A strengthening (deterioration) in saving gap ratio of 1% point is associated with an improvement (deterioration) in the current account-to-GDP ratio of 0.52% in the long run. Based on these results, it can be said that the triple deficit hypothesis and traditional approach are valid in SSA countries in the long run. Similarly, an increase of 1% in the budget deficit % GDP increases the current deficit % GDP on average by a rate of 0.20% in the short run. A 1% increase in net savings % GDP increases the current deficit % GDP on average by a rate of 0.18%, in the short run.

Table 8.. Estimated long-run relationship and short run adjustment

Dynamic) Common Correlated Effects Estimator Mean Group							
D.CAB_GDP	Coef.		Std. Err.	z	P>z	[95% Conf.	Interval]
Short Run Est. Mean Group							
D.BB_GDP	0.20		0.04	4.5	0.000	0.112615	0.286083
D.SIB_GDP	0.18		0.03	6.27	0.000	0.12253	0.233855
trend	-0.04		0.03	-1.38	0.168	-0.10338	0.017965
Long Run Est. Mean Group							
ec	-0.59		0.04	-14.79	0.000	-0.66677	-0.5107
BB_GDP	0.69		0.13	5.52	0.000	0.448036	0.941557
SIB_GDP	0.52		0.08	6.62	0.000	0.363872	0.670156

Source: Computations from research data, 2020

As stated earlier, in order to conclude that there is long run relationship between current account deficit, budget deficit and private saving-investment deficit, meaning triple deficit hypothesis hold both the error-correction term should be negative and less than one as well as statistically significant and the long-run coefficient should also be statistically significant and positive. As shown in Table 8 above, both the negative value of the error-correction terms and the long run and short run positive coefficients of net government saving, and net private saving are statistically significant at 1% significance level. This result indicates that there is a long run linear combination among current account deficit, budget deficit and private saving-investment deficit and thus triple deficits exist for the whole sample in SSA countries. In addition, the null hypothesis of cross-sectional dependence is rejected for estimation model of dynamic mean group without cross sections.

As stated earlier, to validate the existence of twin deficits or triple deficit or Ricardian equivalence hypothesis in SSA both the error-correction and the long-run coefficient should be statistically significant and negative. As the results of panel error correction analysis is shown on Appendix 2 for 35 sample countries, the error correction coefficient is negative but statistically insignificant for 31 countries out of 35 SSA countries, but it is statistically significant, negative in sign and less than one in value for four countries (Ghana, Kenya, Mauritius, and Uganda). Hence, our results indicate that long run relationship between current account, net government saving, net private saving and exists for Ghana, Kenya, Mauritius, and Uganda. However, for the remaining 31 countries, these do not hold. Thus, we suggest that we do not find empirical evidence on the

validity of triple deficit hypothesis for 31 countries in SSA for the period, however, we find that triple deficit holds in four countries in SSA Ghana, Kenya, Mauritius, and Uganda.

On the other hand, appendix 2 presents that there is a short run relationship between budget deficit and current account deficit, meaning we find an evidence that twin deficit hold in 5 countries Benin, Comoros, Mauritius, Nigeria, Rwanda, Sierra Leon in SSA in the short run at 1% significance level, whereas budget deficit and current account deficit have an inverse relationship (twin deficit divergence) in 5 countries Central Africa, Congo Democratic, Ethiopia, Lesotho, Madagascar, Senegal, South Africa, Sudan, Tanzania in SSA. In addition, we find an evidence that budget deficit and current account deficit have a positive long run relationship at 5% significance level only in Kenya, however, these deficits have an inverse relation (twin divergence) in the long run at 5% significance level in Ghana countries. We also find the three deficits have a long run positive relationship at 10% significance level in Ghana, Kenya, Mauritius, and Uganda during 1980-2018, meaning that triple deficits hold only in Ghana, Kenya, Mauritius, and Uganda.

VII. Conclusions And Recommendations

7.1. CONCLUSION

The study was interested in investigating the triplet deficits hypothesis for SSA by investigating the Fiscal, Current and Private saving-investment deficit nexus. The overall finding is that an increase in internal balance (budget balance and private saving-investment balance) leads to an increase in current account balance in SSA. Similar results were found using Granger causality test. These findings evidence on the existence of the Triplet Deficit Hypothesis in SSA region. It is worth mentioning that our findings are broadly parallel to the empirical findings of several earlier studies, including Kuijs (2006) triple surplus for China, Tang (2014), and Eisner (1994) for US, Roubini (1988) for 18 OECD countries, Ackinci and Yilmaz (2012), Sen et al. (2014) and Akbas et al. (2014) for Turkey, Akbaş & Lebe, (2016) for G7 countries, Chowdhury and Saleh (2007) for Sri Lanka, Bolat et al. (2014) for Poland, Portugal, Spain, and Sweden in their study of European Union countries, Gruber and Kamin (2007) for 61 countries, and Shruti et al. (2017) for South Asian countries.

Similarly, Fischer and Easterly (1990), Higgins and Klitgaard (1998), Hubbard (2006), Salvatore (2006), Szakolczai (2006), Cooper (2001), Mann (2002), Labonte (2005), and Elwell (2008) discussed the theoretical arguments on the link among budget, current account and private saving-investment deficit. These findings may be justified based on several arguments. First, following expansionary fiscal policy increases the aggregate demand by substituting imported goods with domestically produced goods and services, leading to an improve in current account deficit.

Secondly, there is a significant increase in private investment. technological progress and successful market-oriented reforms. Third, these countries received high foreign assistance and grants from international financial organizations and developed countries improving foreign exchange to import capital goods. Fourth, the revenue earned from exporting goods is declined since most SSA countries are the major primary commodity-exporting countries, which are vulnerable to global commodity price decrease. This implies that external factors play an important role in the export earnings of these countries and leading to an increase in trade deficit.

Fifth, another potential justification may be the coexistence of increases in private savings and crowding-in effect due to budget deficit, resulting in a triple deficit effect. Another argument could be that the increase in imports of intermediate goods in the sample countries has resulted in an increase in trade deficits (current account deficit). Furthermore, an increase in government spending on infrastructure and other projects leads to crowding in effect and results in higher budget deficits. Due to all these facts, the link between internal and external deficits may have exist in SSA.

Overall, based on our empirical findings, it may be argued that if the triple deficit holds true, fiscal policy and monetary policy are higher in its ability to influence trade deficits and private saving and investment. In addition, an increase in the budget deficit due to higher government spending on infrastructure and other investment projects encourages private investment. Based on the results of this study, the current account deficit is explained by both the budget deficit and the private savings-investment deficit, resulting in the existence of a triple deficit in SSA. This requires sound fiscal and monetary policies to create a favorable business and investment environment and to ensure macroeconomic stability in order to attract viable investment and thus achieve sustainable economic growth in the SSA

The outcome of the empirical studies suggests that, monetary policy guided by rules improves capital mobility thereby guaranteeing a regular inflow of foreign savings to finance domestic investment. Our empirical results suggest that a move to a rules-based monetary policy alleviates the burden of the twin/triple-deficit effect for an effective fiscal policy. Hence, the study concludes that the state should formulate fiscal and monetary policies that manage the government's revenue and expenditure and create conducive environment to encourage export and import substitution as well as private sectors' saving and investment. Addressing budget deficit through proper and efficient tax collection and administration systems; good budgetary processes, improving the terms of trade for SSA's exports, putting mechanisms to safeguard the economy from macroeconomic shocks will improve the economy's current account balance; while at the same time reduce the country's overreliance

on external funding and thereby improves the country's Savings-Investment imbalance. Also, the Private saving-investment imbalance can be addressed by promoting economic growth, which will allow for increased savings and the promotion of a saving culture.

The improvement in capital mobility is a prerequisite for effective fiscal policy and how the policy affects external balance. This implies that inflation targeting as a monetary policy regime enhances the effectiveness of fiscal policy and how it can be used to affect changes in the external balance of an economy. However, the effectiveness of inflation targeting in doing this depends on how well it deals with inflation expectations. Introducing inflation targeting during times of high and volatile inflation could result in a persistent fall in inflation expectations, short-circuiting the link from fiscal policy to external equilibrium or even creating reverse causality from changes in the external balance to output, and thus the government budget balance and public debt. If policy is aimed at attracting foreign capital, inflation targeting helps to boost investor confidence by its ability to control inflation and its volatility.

Controlling inflation variability puts inflation expectations in check which is a powerful incentive for investment. If government intends to use fiscal policy to effect changes in the external balance and debt, monetary policy should be geared towards controlling inflation expectations and improving capital mobility. Though monetary policy guided by rules is believed to help achieve other objectives, such as ensuring higher output and employment, the emphasis should be laid on its ability to control inflation if it is to be coordinated with fiscal policy. The policy rule should be transparent and known to the public to avert any form of speculation regarding the form of the policy rule being used. These efforts will assist the monetary policy authority to build a credible monetary rule which will affect the expectations of actors of the economy. Improvement in current account balance in the SSA countries requires fiscal policy but it by itself cannot rectify the current account deficit because budget deficits are not fully exogenous, and policy controlled. Since saving gap has a significant effect on both current account and budget balance, policy makers need to give importance to policies such as increase in per capita income growth and improved access to financial system etc.

In addition, a negative and bi-directional causal relation between current account and private saving-investment deficits indicates that the two accounts offset each other, in such a way that they promote a balance of payment equilibrium. More importantly, the government need to adopt sound fiscal policy that will ensure the dramatic reduction in budget deficits, while creating a conducive environment for attracting foreign remittances and foreign investment, helping to generate healthy current account balance. Moreover, exchange-rate stability can promote exports, and thus minimize current account imbalances by implementing comprehensive fiscal and monetary policies which enable macroeconomic stability and ensure economic growth sustainability

7.2. POLICY RECOMMENDATIONS

In the light of above conclusions and explanation, following policy recommendations are summarized and suggested by the study. These are. First, the government should promote greater integration of the capital market by strengthening its relations with other economies. In order to achieve macroeconomic stability and increase economic growth, the Government should therefore adopt effective fiscal policy.

Second, the results of this analysis indicate a unidirectional relationship between the budget deficit and the current account deficit, while the budget balance and the current account balance have a bidirectional relationship with the private saving-investment balance. This suggests that policymakers can use fiscal and monetary adjustments which also address private saving, investment and external imbalances. SSA which have shown evidence of the twin/triple deficit imply that policymakers must consider fiscal consolidation (reducing deficit and debt accumulation). Fiscal consolidation includes measures such as efficient spending monitoring; proficient revenue collection apparatus and restructuring the civil service. Fiscal consolidation has proved to be helpful in many countries where it has been fully implemented. However, lax fiscal adjustments are destined to fail. Fiscal strain can be controlled by reducing non-priority expenditure, strengthening the revenue base and where feasible allowing flexible exchange rate.

Third, there is need for the government to put in place policy measures that encourage domestic savings. Increasing total savings will play a significant role in ensuring a sustainable budget and Trade deficit. Policies that can help encourage domestic savings include reducing the amount of credits by use of interest rates, which is an important instrument for raising the savings rate, and monetary policy instruments such as rediscount ratios and reserve ratios. In addition, the state should prioritize practices such as financial sector restructuring especially with reference to sectorial credits and credit arrangements.

Fourth, the central banks need to carry counter measures to manage either interest rate or exchange rates in response to increase in government expenditure. For instance, when budget deficit increases, central bank can increase money supply to reduce interest rate as counter measure. High interest rate can negatively impact economic growth by way of reducing investment and consumer spending, and in parallel with increasing savings. In this context, there can occur the saving paradox. Thus, any austerity measures or cutback in expenditures should be undertaken via consumer spending to reduce the trade deficit. This shrink in consumer

spending in the short run makes significant contribution in reducing trade deficit by boosting investments in the long run.

Fifth, the governments can be encouraged to borrow money on concession rates offshore to reduce the need for domestic borrowing. Increased domestic borrowing crowds out domestic investment resulting in a drop in GDP growth. Lastly, there are also a number of factors which need to be improved such as addressing inadequate infrastructure, high transport costs, product quality issues, regulatory and other constraints limiting supply responses, and which improve the business environment. The other two options (drawing down international reserves and external borrowing) are not feasible since the country is saddled with a large international debt. In the long run there is need for government to develop new exports, primary products beneficiation (value addition), use of nanotechnology and nurturing them.

Overall, evidence on the relationship between current account balance, private saving-investment balance and budget balance is not exact hence complex and unclear for the majority of countries. This relationship evolves over time depending on the dynamics of the economy. Bartlett (1999) also supports the notion that the relationship between these balances is not consistent overtime. Again, given the complexities that are intrinsic in mixed economies, it may not be probable to verify a firm and unwavering relationship between these balances. However, there is neither a one-size fits all explanation for selected countries nor ‘a silver bullet’ stratagem for any country. The solution might be a mixture of policies that tackle the binding constraints faced by countries.

REFERENCES

- [1]. Akbas, Y. E., Fuat, L., & Zeren, F. (2014). Testing the validity of the triplet deficit hypothesis for Turkey: Asymmetric causality analysis. *Eurasian Journal of Business and Economics*, 7(14), 137-154.
- [2]. Akbas, Y. E., & Lebe, F. (2016). Current Account Deficit, Budget Deficit and Saving Gap: Is the Twin or Triplet Deficit Hypothesis Valid in G7 Countries? *Prague Economic Papers*, 2016(3), 271-286.
- [3]. Akbaş, Y.E., Lebe, Z. And Zeren, F. (2014) “Testing the Validity of the Triplet Deficit Hypothesis for Turkey: Asymmetric Causality Analysis”, *Journal of Business and Economics* 2014, 7 (14), 137-154.
- [4]. Akinci, M., & Yilmaz, Ö. (2012). Validity of the Triple Deficit Hypothesis in Turkey Bounds Test Approach. *Istanbul Stock Exchange Review*, 13(50), 1-28.
- [5]. Barro, R. J. (1974). Are government bonds net wealth? *Journal of Political Economy*, 82(6), 1095-1117.
- [6]. Barro, R. J. (1989). The Ricardian approach to budget deficits. *Journal of Economic Perspectives*, 3(2), 37-54.
- [7]. Bartlett, B. (1999). Are Budget Surpluses Equivalent to Tax Cuts? *Idea House. National Center for Policy Analysis*, 1-3.
- [8]. Bartoli, G. (1989). Fiscal expansion and external current account imbalances, In: Blejer, M.I. and K. Chu (eds). *Fiscal Policy, Stabilization and Growth in Developing Countries*. International Monetary Fund, Washington, D.C..
- [9]. Basu, S., & Datta, D. (2005). Does fiscal deficit influence trade deficit?: An econometric enquiry. *Economic and Political Weekly*, 3311-3318.
- [10]. Bayoumi, T. (1990). Saving-investment correlations: immobile capital, government policy, or endogenous behavior?. *IMF Staff Papers*, 37(2), 360-387.
- [11]. Bayramoğlu, A. T., & Öztürk, Z. (2018). Assessing the twin and triple deficit hypotheses in developing economies: A panel causality analysis. In *Global Approaches in Financial Economics, Banking, and Finance* (pp. 209-225). Springer, Cham.
- [12]. Bernheim, B. D. (1987). Ricardian equivalence: An evaluation of theory and evidence. *NBER macroeconomics annual*, 2, 263-304.
- [13]. Blomquist, J., & Westerlund, J. (2013). Testing slope homogeneity in large panels with serial correlation. *Economics Letters*, 121(3), 374-378.
- [14]. Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics*, 87(1), 115-143.
- [15]. Bolat, S., Değirmen, S., & Şengönül, A. (2014). Does triple deficits have (UN) stable causality for the EU members? Evidence from bootstrap-corrected causality tests. *Procedia Economics and Finance*, 16, 603-612.
- [16]. Chowdhury, K. and Saleh. A.S. (2007). Testing the Keynesian Proposition of Twin Deficits in the Presence of Trade Liberalisation: Evidence from Sri Lanka. *University of Wollongong Economics Working Paper Series. WP 07-09*, 1-33..
- [17]. Chudik, A., & Pesaran, M. H. (2015). Common correlated effects estimation of heterogeneous dynamic panel data models with weakly exogenous regressors. *Journal of Econometrics*, 188(2), 393-420.
- [18]. Chu, Y.-h. (1989). State structure and economic adjustment of the East Asian newly industrializing countries. *International Organization*, 43(4), 647-672.
- [19]. Çoban, H., & Balıkcıoğlu, E. (2016). Triple Deficit or Twin Divergence: A Dynamic Panel Analysis. *International Journal of Economic & Social Research*, 12(1).
- [20]. Cooper, R.N.(2001).“Is the U.S. Current Account Deficit Sustainable? Will it be Sustained?” *Brookings Papers on Economic Activity* 2001(1): 217-226.
- [21]. De Hoyos, R. E., & Sarafidis, V. (2006). Testing for cross-sectional dependence in panel-data models. *The stata journal*, 6(4), 482-496.
- [22]. Ditzgen, J. (2018). Estimating dynamic common-correlated effects in Stata. *The Stata Journal*, 18(3), 585-617.
- [23]. Dornbusch, S. Fischer and R. Startz(2011).*Macroeconomics*(eleventh ed.), McGraw-Hill Companies, Inc, New York.
- [24]. Dumitrescu, E.-I., & Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. *Economic Modelling*, 29(4), 1450-1460.
- [25]. Eberhardt, M., & Teal, F. (2011). Econometrics for grumblers: a new look at the literature on cross-country growth empirics. *Journal of Economic Surveys*, 25(1), 109-155.
- [26]. Eisner, R. (1994). “National Saving and Budget Deficits.” *The Review of Economics and Statistics* 76(1): 181-186.
- [27]. Fischer, S., & Easterly, W. (1990). The economics of the government budget constraint. *The World Bank Research Observer*, 5(2), 127-142.
- [28]. Frees, E. W. (2004). *Longitudinal and panel data: analysis and applications in the social sciences*. Cambridge University Press.
- [29]. Friedman, M. (1937). The use of ranks to avoid the assumption of normality implicit in the analysis of variance. *Journal of the American statistical association*, 32(200), 675-701.

- [30]. Gabrisch, H. (2015). On the twin deficits hypothesis and the import intensity in transition countries. *International Economics and Economic Policy*, 12(2), 205-220.
- [31]. Giorgioni, G., & Holden, K. (2003). Does the Ricardian equivalence proposition hold in less developed countries? *International Review of Applied Economics*, 17(2), 209-221.
- [32]. Gruber, J. W., & Kamin, S. B. (2007). Explaining the global pattern of current account imbalances. *Journal of International Money and Finance*, 26(4), 500-522.
- [33]. Hakkio, C.S. (1995). "The U.S. Current Account: The Other Deficit." *Economic Review* 80:1124.
- [34]. Harberger, A., (2008). "Lessons from Monetary and Real Exchange Rate Economics". *Cato Journal*, 28 (2), 225-235.
- [35]. Hausman, J. A., & Taylor, W. E. (1981). Panel data and unobservable individual effects. *Econometrica: Journal of the Econometric Society*, 1377-1398.
- [36]. Higgins, M. & Klitgaard, T. (1998). "Viewing the Current Account Deficit as a Capital Inflow." *Current Issues in Economics and Finance* 4(13): 1-6.
- [37]. Hubbard, R. G. (2006). The US current account deficit and public policy. *Journal of Policy Modeling*, 28(6), 665-671.
- [38]. Hurlin, C., & Dumitrescu, E. (2008). Testing for Granger non causality in heterogeneous panels. Department of Economics, University of Orleans Working Paper.
- [39]. International Monetary Fund (2018). *World economic outlook*. In: IMF Washington, DC.
- [40]. International Monetary Fund (2016). *Regional Outlook; Sub-Sahara Africa-Multispeed Growth*. Washington, DC, PP.31-52.
- [41]. Im, K. S., Pesaran, M. H., & Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of econometrics*, 115(1), 53-74.
- [42]. Johnson, H., (1977). "The Monetary Approach to the Balance of Payments: A Non-technical Guide". *Journal of International Economics*, 7 (3), 251-268.
- [43]. Kim, S., & Roubini, N. (2008). Twin deficit or twin divergence? Fiscal policy, current account, and real exchange rate in the US. *Journal of International Economics*, 74(2), 362-383.
- [44]. Kónya, L. (2006). Exports and growth: Granger causality analysis on OECD countries with a panel data approach. *Economic Modelling*, 23(6), 978-992.
- [45]. Kuijs, L. (2006). *How will China's saving-investment balance evolve? : The World Bank*.
- [46]. Labonte, M. (2005). "Is the U.S. Trade Deficit Caused by a Global Saving Glut?", CRS Report for Congress.
- [47]. Lam, N. X. (2012). Twin deficits hypothesis and Feldstein-Horioka puzzle in Vietnam. *International Research Journal of Finance and Economics*, 101, 169-179.
- [48]. Lesit, M. (1990). Determinants of the current account of the balance of payments: an analysis for Kenya, 1973-88'. MA research paper, University of Nairobi.
- [49]. Maddala, G. S., & Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and statistics*, 61(S1), 631-652.
- [50]. Mann, C.L. (2002). "Perspectives on the U.S. Current Account Deficit and Sustainability." *Journal of Economic Perspectives* 16(3): 131-152.
- [51]. Marinheiro, C. F. (2008). Ricardian equivalence, twin deficits, and the Feldstein-Horioka puzzle in Egypt. *Journal of Policy Modeling*, 30(6), 1041-1056.
- [52]. Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of applied econometrics*, 22(2), 265-312.
- [53]. Pesaran, H. M. (2004). General diagnostic tests for cross-sectional dependence in panels. University of Cambridge, Cambridge Working Papers in Economics, 435.
- [54]. Pesaran, M. H., & Smith, R. (1995). Estimating long-run relationships from dynamic heterogeneous panels. *Journal of econometrics*, 68(1), 79-113.
- [55]. Phillips PC and Sul D (2007) Transition modelling and econometric convergence tests. *Econometrica* 75(6): 1771-1855.
- [56]. Pesaran, M. H., & Tosetti, E. (2011). Large panels with common factors and spatial correlation. *Journal of Econometrics*, 161(2), 182-202.
- [57]. Pesaran, M. H., & Yamagata, T. (2008). Testing slope homogeneity in large panels. *Journal of econometrics*, 142(1), 50-93.
- [58]. Ravinthirakumar, N., Selvanathan, S., & Selvanathan, E. A. (2016). The twin deficits hypothesis in the SAARC countries: an empirical investigation. *Journal of the Asia Pacific Economy*, 21(1), 77-90.
- [59]. Roubini, N. (1988). "Current Account and Budget Deficits in an Intertemporal Model of Consumption and Taxation Smoothing: A Solution to the Feldstein-Horioka Puzzle?" NBER Working Paper, No. 2773, Cambridge, MA.
- [60]. Roubini, N., Wachtel, Paul (1999). "Current-Account Sustainability in Transition Economies" IN: *Balance of Payments, Exchange Rates, and Competitiveness in Transition Economies*, Kluwer Academic Publishers, pp. 19-93
- [61]. Salvatore, D. (2006). Twin deficits in the G-7 countries and global structural imbalances. *Journal of Policy Modeling*, 28(6), 701-712.
- [62]. Samadi, A. H. (2006). The twin deficits phenomenon in some MENA countries. *Iranian Economic Review*, 10(16), 129-140.
- [63]. Sarafidis, V., & Wansbeek, T. (2012). Cross-sectional dependence in panel data analysis. *Econometric Reviews*, 31(5), 483-531.
- [64]. Szakolczai, G. (2006). The triple deficit of Hungary. *Hungarian Statistical Review*, 10, 40-62.
- [65]. Seater, J. J. (1993). Ricardian equivalence. *Journal of Economic Literature*, 31(1), 142-190.
- [66]. Senadza, B., & Aloryito, G. (2016). The twin deficits hypothesis: Evidence from Ghana. *International Journal of Business and Economic Sciences Applied Research*, 9(3), 55-62.
- [67]. Şen, H., & Kaya, A. (2016). Are the twin or triple deficits hypotheses applicable to post-communist countries?
- [68]. Şen, A., Şentürk, M., Sancar, C., & Akbaş, Y. E. (2014). Empirical findings on triplet deficits hypothesis: The case of Turkey. *Journal of Economic Cooperation and Development*, 35(1), 81-102.
- [69]. Shastri, S., Giri, A. K., & Mohapatra, G. (2017). Assessing the triple deficit hypothesis for major South Asian countries: A Panel Data Analysis. *International Journal of Economics and Financial Issues*, 7(4).
- [70]. Suresh, K. G., & Tiwari, A. K. (2014). A structural VAR (SVAR) analysis of fiscal shocks on current accounts in India. *Macroeconomics and Finance in Emerging Market Economies*, 7(1), 140-153.
- [71]. Swamy, P. A. (1970). Efficient inference in a random coefficient regression model. *Econometrica: Journal of the Econometric Society*, 311-323.
- [72]. Tang, T. C. (2014). Fiscal deficit, trade deficit, and financial account deficit: Triple deficits hypothesis with the US experience.
- [73]. Thirlwall, A. P. (2013). *Economic growth in an open developing economy: the role of structure and demand*: Edward Elgar Publishing.
- [74]. Vamvoukas, G. A. (1999). The twin deficits phenomenon: evidence from Greece. *Applied Economics*, 31(9), 1093-1100.
- [75]. Volcker, P. A. (1984). The Federal Reserve position on restructuring of financial regulation responsibilities. *Fed. Res. Bull.*, 70, 547.
- [76]. Walker, Christopher. (2002). Ricardian equivalence and fiscal policy effectiveness in Japan. *Asian Economic Journal*, 16(3), 285-302.
- [77]. Westerlund, J., & Edgerton, D. L. (2007). A panel bootstrap cointegration test. *Economics letters*, 97(3), 185-190.

- [78]. World Bank, T. (2018). World Bank open data. World Bank Web site (INTERNET).
 [79]. Yi, C.-D. (2003). An empirical analysis of Ricardian equivalence on real exchange rate and current account: Korea. International Economic Journal, 17(4), 61-83.

9. Appendix

Appendix 1. Macroeconomic imbalances (resource gaps) and economic performance in SSA, 1980-2018

Indicator Name	Fiscal Balance		Current account		Private saving-investment balance		Trade balance		GDP growth (annual%)
	% of GDP	Billion US \$	% of GDP	Billion US \$	% of GDP	Billion US \$	% of GDP	Billion US \$	
1980	-2.98	-12.81	-0.23	-0.98	-13.60	-58.51	4.73	1458.76	4.04
1981	-4.23	-17.57	-4.66	-19.38	-15.28	-63.51	-2.06	-665.12	-0.46
1982	-4.89	-19.72	-4.45	-17.97	-13.02	-52.53	-1.90	-618.38	-1.14
1983	-3.62	-14.80	-2.50	-10.23	-11.51	-47.07	0.47	140.62	-2.50
1984	-2.84	-11.16	-1.46	-5.74	-10.82	-42.56	2.40	570.49	2.60
1985	-1.95	-7.43	-0.32	-1.20	-9.79	-37.35	5.08	1096.75	1.76
1986	-2.49	-7.90	-2.11	-6.68	-12.69	-40.21	2.03	501.64	1.61
1987	-4.79	-14.76	-1.26	-3.89	-13.96	-43.01	3.39	913.41	2.73
1988	-4.28	-14.44	-2.54	-8.56	-14.50	-48.87	2.05	588.11	4.49
1989	-3.23	-11.14	-1.81	-6.22	-14.12	-48.64	2.69	810.48	2.53
1990	-2.88	-11.42	-1.24	-4.92	-12.95	-51.33	2.93	1143.02	2.38
1991	-3.72	-15.00	-1.83	-7.37	-12.92	-52.09	2.14	846.93	0.39
1992	-5.22	-21.15	-1.91	-7.73	-12.53	-50.78	1.59	622.10	-0.38
1993	-4.96	-19.30	-1.78	-6.94	-12.60	-49.03	1.77	699.14	-0.90
1994	-4.34	-15.37	-2.03	-7.18	-15.08	-53.44	1.53	586.87	1.21
1995	-3.13	-12.12	-2.91	-11.29	-15.12	-58.64	0.78	368.88	3.37
1996	-2.44	-9.64	-1.45	-5.71	-15.22	-60.02	1.95	1030.03	5.11
1997	-3.04	-12.44	-1.98	-8.11	-15.39	-62.96	1.30	718.93	3.60
1998	-3.39	-13.42	-4.30	-17.02	-16.14	-63.81	-0.37	-206.06	2.37
1999	-3.09	-12.18	-2.78	-10.99	-16.29	-64.28	1.03	411.96	2.16
2000	-0.81	-3.19	0.54	2.13	-19.58	-77.28	4.97	2030.34	3.50
2001	-1.92	-7.32	-1.40	-5.33	-20.13	-76.89	3.27	1287.99	4.26
2002	-2.11	-8.71	-3.10	-12.80	-20.31	-83.86	2.75	1170.78	6.34
2003	-1.70	-8.79	-2.53	-13.07	-20.61	-106.40	2.53	1350.20	4.25
2004	0.30	1.90	0.79	5.07	-21.23	-136.26	3.95	2598.99	6.53
2005	-0.09	-0.72	1.60	12.32	-21.22	-163.34	5.42	4228.37	6.21
2006	3.09	28.03	2.62	23.74	-22.91	-207.94	5.91	5366.93	6.14
2007	0.47	4.98	0.66	6.98	-21.87	-230.56	5.63	5943.95	6.62
2008	-0.23	-2.79	-0.42	-5.01	-22.89	-276.27	6.05	7347.57	5.36
2009	-4.44	-50.54	-2.60	-29.65	-23.15	-263.63	2.32	2685.37	3.04
2010	-2.34	-31.82	-0.84	-11.42	-21.25	-288.79	4.47	6143.14	5.58
2011	-1.55	-24.47	-0.85	-13.40	-20.74	-327.95	5.49	8657.79	4.45
2012	-2.20	-36.18	-2.11	-34.74	-21.69	-357.40	3.03	4965.14	4.04
2013	-3.21	-55.67	-2.61	-45.25	-21.42	-371.75	2.48	4287.88	5.00
2014	-3.34	-60.79	-3.78	-68.77	-22.02	-401.05	0.38	694.96	4.66

The Triple Deficit Hypothesis in Sub-Saharan African Countries (SSA)

2015	-4.09	-67.09	-6.08	-99.85	-22.14	-363.34	-3.46	-5640.54	2.83
2016	-4.38	-66.30	-3.93	-59.44	-21.12	-319.61	-2.31	-3480.77	1.23
2017	-4.60	-73.92	-2.56	-41.12	-20.77	-333.72	-0.10	-165.34	2.53
2018	-3.55	-60.83	-2.70	-46.41	-20.07	-344.32	0.61	1035.72	2.39

Source: Africa Development Bank & World Development Indicator Databases, 2020

Appendix 2. Dynamic Common Correlated Effect Mean Group Model(DCCEMG)

country	short run				ECT		longrun			
	D.BB_GDP		D.SIB_GDP				BB_GDP		SIB_GDP	
	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.	Coef.	Std.Err.
Benin	0.32**	0.62	0.38	0.36	-0.42	0.55	0.61**	1.10	-0.14***	0.91
Botswana	-0.21	0.22	0.01***	0.23	-0.85	0.16	1.05	0.19	0.76	0.13
Burkina Faso	0.40	0.41	0.16	0.22	-0.29	0.22	0.63***	1.74	1.03	1.27
Burundi	0.35	0.27	-0.09	0.15	-0.63	0.22	0.93	0.46	0.65	0.27
Cameroon	0.52	0.47	0.23	0.15	-0.46	0.20	0.18***	0.80	0.14***	0.42
Cape Verde	0.06***	0.43	0.19**	0.43	-0.93	0.45	0.37	0.43	0.30	0.36
Central African Republic	-0.13***	0.50	-0.05***	0.47	-0.93	0.50	0.84	0.60	0.72	0.31
Chad	0.31	0.33	0.38	0.11	-0.76	0.12	0.94	0.44	0.74	0.05
Comoros	0.14***	0.37	0.18	0.20	-0.86	0.29	0.61	0.39	0.21	0.30
Congo, Dem. Rep.	-0.01***	0.34	0.03***	0.18	-0.52	0.38	-0.06***	0.76	0.24	0.23
Congo, Rep.	0.38	0.16	0.54	0.11	-0.54	0.09	0.92	0.11	0.61	0.12
Cote d'Ivoire	0.48	0.58	0.27**	0.55	-0.57	0.37	1.39	0.40	1.38	0.70
Eswatini	0.20	0.29	-0.05***	0.17	-0.62	0.22	0.56	0.57	0.34	0.18
Ethiopia	-0.15***	0.46	-0.05***	0.17	-1.04	0.35	0.30	0.47	0.08**	0.17
Gabon	0.30	0.30	0.18	0.25	-0.69	0.24	1.38	0.25	0.70	0.25
Gambia	-0.21	0.34	0.06***	0.22	-0.88	0.27	0.36	0.49	0.35	0.21
Ghana	0.54	0.37	0.17	0.23	-0.16***	0.60	-0.40***	3.38	0.50***	1.27
Kenya	0.42	0.57	0.55	0.60	-0.19***	0.80	1.13***	3.23	1.44**	3.25
Lesotho	-0.02***	0.18	0.03***	0.14	-0.89	0.17	0.73	0.16	0.67	0.06
Madagascar	-0.01***	0.54	0.23**	0.50	-0.50	0.45	0.96	1.25	0.85	0.45
Malawi	0.32	0.34	0.17	0.15	-0.65	0.22	0.02***	0.62	0.08***	0.24
Mali	0.29	0.32	0.19	0.28	-0.46	0.25	0.42	0.63	0.61	0.50
Mauritius	0.11	0.63	0.46	0.40	-0.16**	0.38	3.12**	6.09	1.78*	2.90
Niger	0.98	0.57	0.14***	0.49	-0.51	0.45	-0.34***	1.37	-0.05***	0.95
Nigeria	0.10***	0.52	0.25	0.27	-0.58	0.39	1.26	1.05	0.47	0.22
Rwanda	0.07***	0.44	0.31	0.33	-0.52	0.51	0.90	0.63	0.54	0.34
Senegal	-0.09***	0.81	0.30	0.37	-0.68	0.52	0.88	1.31	0.12***	0.46
Seychelles	0.61	0.21	0.14	0.10	-0.47	0.18	0.24	0.31	0.55	0.29
Sierra Leone	0.16***	0.41	-0.06***	0.22	-0.94	0.22	0.92	0.29	0.79	0.11
South Africa	-0.05***	0.87	0.11***	0.82	-0.50	0.63	0.54**	1.24	0.53**	1.15
Sudan	-0.03***	0.33	0.07	0.05	-0.69	0.24	0.51	0.44	-0.13	0.11
Tanzania	-0.06***	0.67	0.24	0.14	-0.29	0.35	2.55	3.09	0.01***	0.41
Togo	0.36	0.30	0.34	0.29	-0.61	0.22	-0.08***	0.62	-0.39**	0.87
Uganda	0.31	0.40	0.23	0.25	-0.23**	0.55	-0.93***	3.94	0.72***	1.42

The Triple Deficit Hypothesis in Sub-Saharan African Countries (SSA)

Zambia	0.23	0.37	-0.03	0.20	-0.59	0.21	0.88	0.41	0.90	0.18
--------	------	------	-------	------	-------	------	------	------	------	------

Notes: ***, **, * denote significance at 1%, 5% and 10% respectively

Source: Computations from research data, 2020