

Triple Deficit Hypothesis: A Panel ARDL and DumitrescuHurlin Panel Causality for East African Countries

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Abstract

This paper aimed at examining the relevance of triple deficit hypothesis for East African countries, specifically assessing the dynamics of savings gap (SG), fiscal balance (FB) and current account balance (CAB). Secondary data from the International Monetary Fund (IMF) for the time period 2004 through 2018 were used. The study adopted Panel ARDL model and Dumitrescu-Hurlin panel granger causality analysis that allows capturing of slope heterogeneity among each member. The study findings revealed both fiscal balance and savings-investment gap to have a positive impact on current account balance for East African countries. However, the short run coefficients were not significant at both 5% and 10% levels of significant, implying that fiscal balance and savings-investment gap have no impact on current account balance in the short run, but the study further found evidence that the current account balance is on average -1.2991 in the short run for East African countries. Additionally, based on the current study, Dumitrescu-Hurlingranger causality results gave reasonable grounds to conclude that triple deficit hypothesis in East African countries does not hold.

Keywords: Current account balance; Fiscal balance; Granger Causality; Panel Cointegration; Savings gap; Triple deficit hypothesis;

JEL Classification: C33, E21, E22, E52, E62, F32, H62.

1 Introduction

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The Agenda 2063, “**The Africa we want**” envisages that development in the continent should be people-driven, among others. The agenda 2063 aims at attaining the Pan-African vision, “*An integrated, prosperous and peaceful Africa, driven by its own citizens, representing a dynamic force in the international arena*”. The Agenda 2063 builds on and reflects the 2030 Agenda for Sustainable Development, which, among others, foresees:

“...a world in which every country enjoys sustained, inclusive and sustainable economic growth and decent work for all. One in which democracy, good governance and the rule of law as well as an enabling environment at national and international levels, are essential for sustainable development, including sustained and inclusive economic growth, social development, environmental protection and the eradication of poverty and hunger...”

In essence, the 2063 “African we want” agenda and the 2030 Agenda for Sustainable Development, among others, 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. Economist equally agree that savings-investment balance, fiscal and current account balances are among of the notable indicators that reveals not only the country’s “*economic health*” but also its macroeconomic stability,(Sancar, 2014;Epaphra, 2017). Empirical evidences show that countries with balanced fiscal and current accounts are economically stable as compared to those with imbalances, (Ibid). Borrowing Banday, (2016) words, fiscal and current account deficit countries are referred to be “*economically ill*”.

As highlighted in the preceding paragraph, current account balance, fiscal balance and savings-investment balance are among macroeconomic variables that determine country economic position. Osakwe & Verick, (2007) argues that policymakers should be anxious about rising current account, budget and saving imbalances. Among others, the literature points out reasons behind including increased likelihood of a currency crisis and accumulation of external debt which results into increased future taxes, thus deteriorating investment and worsening of employment.

Economics literature documents that the relationship between current account balance and fiscal (budget) balance has its origin in early 1980s following Budget Deficits (BD) and deterioration of Current Account Balances (CAB) in the United States of America, (Çoban & Balıkçioğlu, 2016). Şen & Kaya, (2018) also confirm that in 1980s, fiscal deficit in the United States was at its peak which in turn resulted into increasing current account deficits. Equally, evidence from the International Monetary Fund show that current account deficits in the world is gaining momentum. As depicted in Figure 1, a significant number of countries located in northern and southern America experience current account deficit, a problem being more critical in United States. The figure reports that most Asian countries have balanced current accounts. Arguing on the same, Park & Shin, (2009), revealed in their study that Asian countries moved from current account deficit to surplus region because the region transformed into net exporter than importer, some maintained savings while in others, investments fell to a reasonable degrees. On the other hand, the figure show that African countries are also suffering from current account deficits. With the exception of Libya, Nigeria, Botswana, South Sudan and Congo Republic, the rest of the countries have deficit current accounts amounting from 0 to 50 (USD, billions).

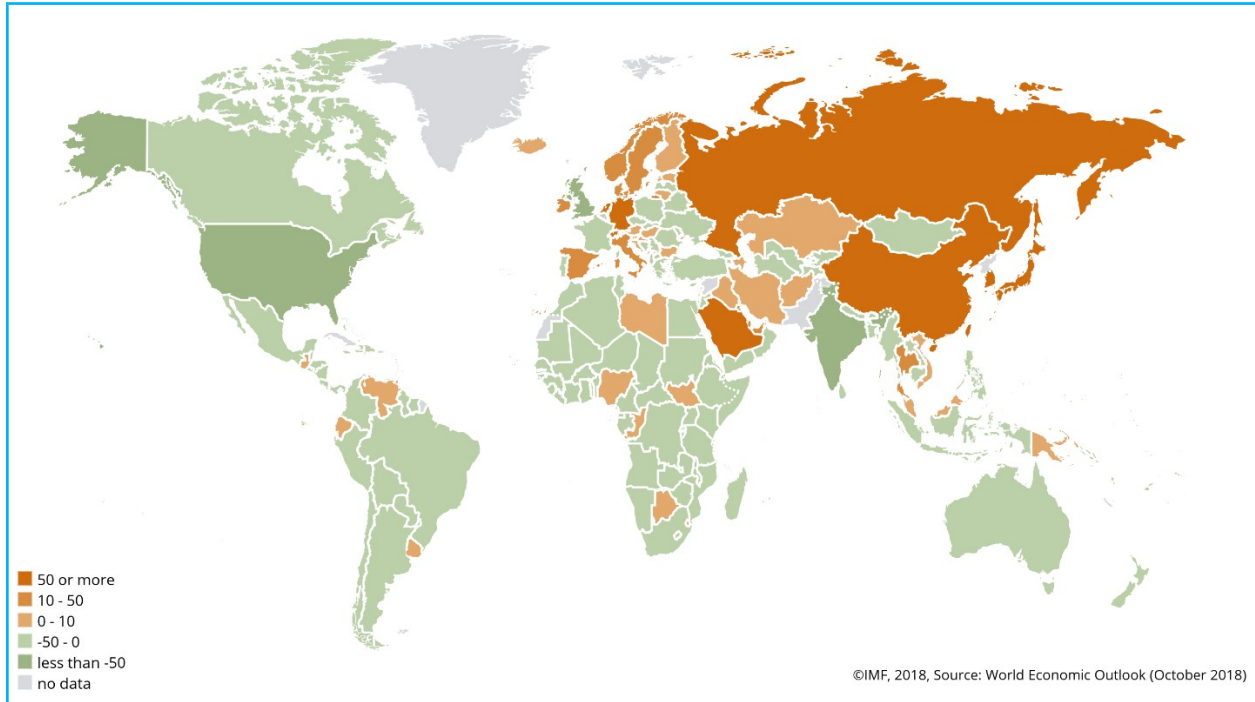


Figure 1: Distribution of Global Current Account Balances (Billion, USD)

Source: Adopted from International Financial Statistics (As of March 20, 2019)

Aloryito, Senadza, & Nketiah-amponsah, (2016) and Obinyeluaku, (2013) report that despite recording reasonable figures for economic growth and inflation rates, most countries in sub-Saharan Africa have been experiencing fiscal and current account imbalances, and the gap being mostly associated with fiscal instability. Arguing on the same, Moussa, (2016) alludes that dependency on international trade is gaining momentum in African countries. Significant dependence on international trade has resulted into growing of trade and current account deficits in most countries. Increased current account deficits result into increased public debts, consequently making a continent vulnerable to financial crisis and worsening of the economy. Then again, literatures show that countries that spend more than what they collect are vulnerable to fall into fiscal deficit. A fiscal deficit country saves less, and this compels the country to close the deficit gap, among others, by borrowing. This may on the other hand lower economic growth rate, deteriorate level of investment (Crowding out private investment), push up interest and exchange rates and result into price instability (Solomon & Wet, 2004; Kalim & Hassan, 2013; John, 2015). As a result of fiscal imbalances, appreciation of exchange rates makes importation of goods cheaper and export more expensive, consequently, deteriorating current account balances, (Epaphra, 2017).

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).Triple deficit, therefore, provides better understanding of the relationship existing between savings balance, budget balance and trade balance, (Çoban & Balikçioğlu, 2016). We refer savings-investment balance and budget balance to form country’s internal equilibrium whereas current account balance which is subject to international trade forms external equilibrium. Thus, triple deficit hypothesis tries to ascertain the existence of equilibrium among the two categories.

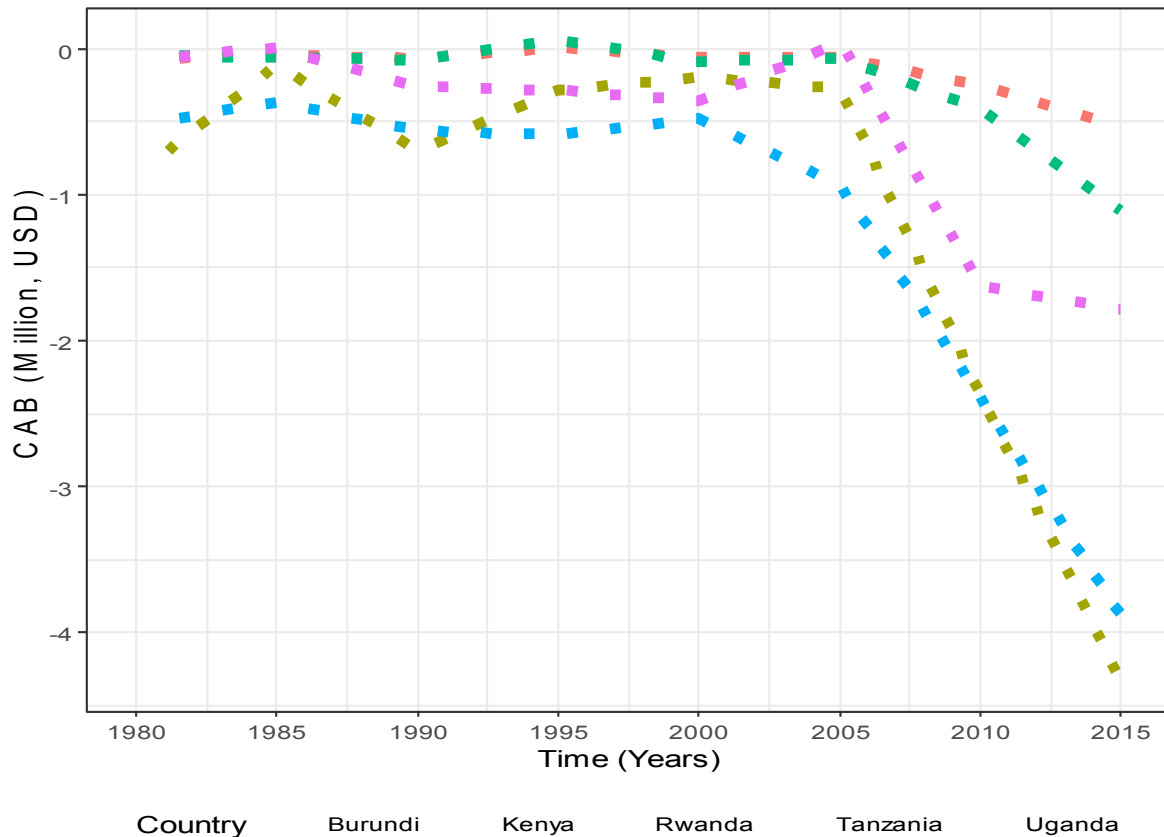


Figure 2: Current Accounts balances for East African Countries (In Million, USD)

Source: Author’s construction: World Bank Development Indicators Database, 2019.

As evidenced in Figure 2, dynamics of the savings gap, fiscal and current account balances in East African countries dates back to periods prior to independence. East African countries have had current account imbalances over the years. The problem seems to be more critical in Tanzania and Kenya, each country recorded a deficit of over USD –04.0 billion in 2015 where as Uganda had USD –01.7 billion, around USD –1.0 for Rwanda and less than USD –00.5 billion in Burundi. On the other hand, Figure 3 reports the fiscal balances for some selected East African countries over the years 1990 to 2015. As shown (Figure 3), with the exception of Rwanda and Burundi which recorded a slightly positive fiscal balance, countries have been registering deficits in fiscal balances. It is evidenced that the problem has been rampant in the United Republic of Tanzania and in Uganda.

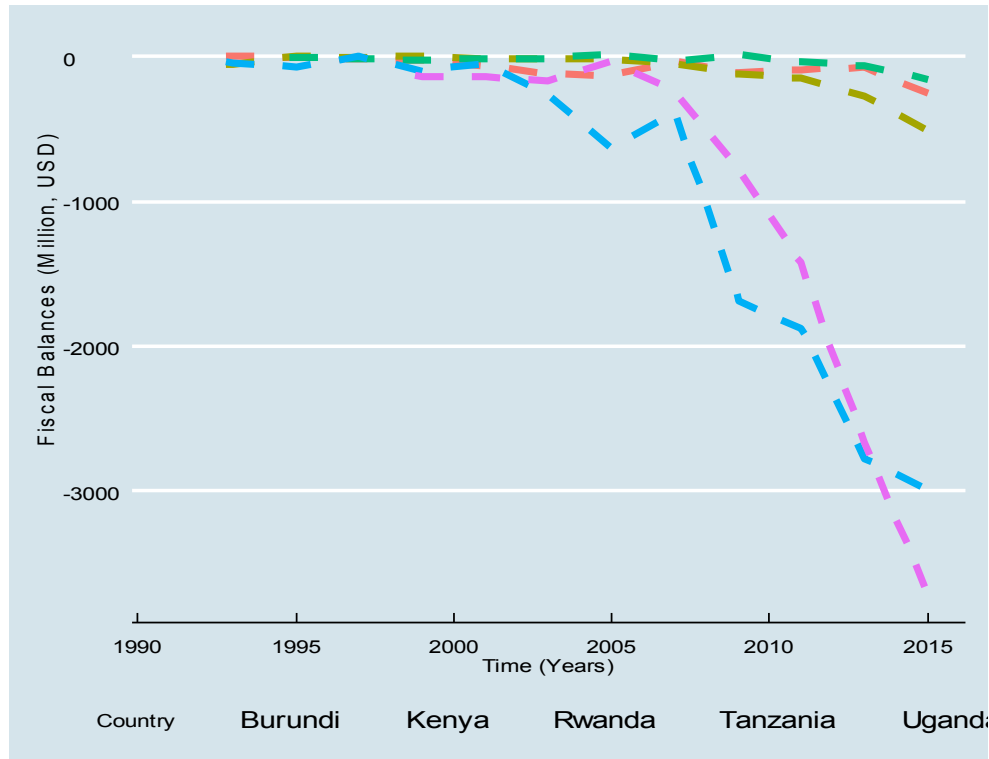


Figure 3: Fiscal Balances for East African Countries (In Million, USD)

Source: Author’s construction: World Bank Development Indicators Database, 2019.

Empirical evidences from Njoroge, Kosimbei, & Korir, (2014); Osoro & Gor, (2014); Mawejje, (2015); Sakyi, Evans, & Opoku, (2016); Bwire *et al.*, (2017); Yeboua, (2017); Epaphra, (2017) and Suphian, (2017) confirm that budget deficit, current account deficit and savings imbalance have been dominant economic problems in East African countries to the extent of retarding economic development in the states. From economics point of view, widening of the savings gap, fiscal deficit and current account imbalances, among others, deteriorate country’s level of investment (since interest rates rise), makes exchange rates to appreciate, consequently, exportation of goods and services becomes expensive and worsens economic performance of a country.

As the countries move on implementing objectives and targets of the East African Community (EAC), a need for assessing economic performances and dynamics of the savings gap, fiscal and current account balances of member countries and EAC community as a whole is imperative, and thus a basis of this paper. Understanding the validity of triple deficit, the causal relationship between savings gap, fiscal and current account balances East African member 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 counties not to get up into unnecessary heavy burdens (debts). In the same vein, Yang, (2011) recommends that relevant and reliable information on savings gap, fiscal and current account balances “contains important information about an economy’s performance, and also provides valuable macroeconomic policy recommendations”.

With regard to this paper, empirical evidence finds both fiscal balance and savings-investment gap having a positive impact on current account balance for East African Countries such that increase in fiscal balance and savings leads to an increase in current account balance in the long run. Thus, if East African countries are in a position of having a self-sufficient budget such that expenditure do not overweight revenues and have surplus in saving-investments, it achieves both internal and external equilibrium, hence economic stability. However, regarding the validity of triple deficit hypothesis, we employ the pairwise Dumitrescu-Hurlin panel causality that considers slope heterogeneity across panel cross-sections tests. The study finds the probability values not statistically significant at 1%, 5% and 10% levels of significance. Therefore, in the current study, based on the data and estimation procedures applied, the test gave reasonable grounds to conclude that triple deficit hypothesis in East African countries does not hold and thus, the view that domestic imbalances (budget and savings-investment deficits) when taken all together (at the same time) do not have causal impact on current account deficit (external imbalance) holds. Thus, to this end, sound policies regarding better investment possibilities, proper resource allocations and trade policies should be continually monitored and reviewed.

The remainder of this study is organized as follows. Section 2 reviews both theoretical and empirical literature on current account balance, savings and fiscal balances. Section 3 dwells on the methodology of the study and estimation procedures, empirical results and the discussion of the findings are presented in section 4. Section 5 presents conclusions, policy implications and recommendations.

2 Literature Review

2.1 Theoretical Literature

Having its roots back 1950s, dependency theorists (Raúl Prebisch and Hans Singer) provide a theoretical framework for global development and development from economic, political and cultural spheres of influence, (Namkoong, 1999; Chase-Dunn, 2015). The theory holds that: -

“No society can be understood in isolation from this order and in fact the condition of underdevelopment is precisely the result of the incorporation of third World economies into the world capitalist system which is dominated by the developed North”, (Randall and Theobald 1998, 120).

The idea behind dependency theory is that economic activities and development plans in developed countries leads to underdevelopment in developing countries. Among others, the grounds behind this argument lies in the export-import cost differentials. Often, developing countries produce raw materials (industrial goods) and exports the materials in developed countries for processing after which the final goods are sold back to developing countries. Owing the fact that exportation of raw materials is cheaper than importation of finished goods, developed countries benefit much from such kind of trading activities. To this end, sustainability of economic and developmental activities in developing countries remain to be governed by developed countries, hence, unhealth economies in developing countries.

Among the traditional economist is Keynes. They consider the two deficits, that is budget deficit and current account deficit as “twin deficit”. In essence, the twin deficit links the relationship between current account and fiscal balances. The hypothesis, as suggested by Keynes, considers

budget deficit and current account deficit to be interrelated, that there exists a unidirectional causal relationship between current account balance and budget balance running from budget deficit to current account deficit, (Forte & Magazzino, 2015). Based on both theoretical and empirical literatures on the same, the discussion on twin deficit hypothesis has however been inconclusive.

While Keynesian sees increase in fiscal deficit having a positive impact on private consumption, which in turn reduces national savings and widens of current account deficit, Ricardian equivalence hypothesis considers Keynesian argument invalid, that no causal relationship between budget deficit and trade deficit. Ricardian equivalence theory acknowledges the absence of causal relationship between government budget deficits and current account balances, (Forte & Magazzino, 2015). Ricardian points out that regardless of whether government expenditure overweight incomes, the methods of financing the deficit budget (for instance by borrowing) will have no impact on private consumption as the current taxes will be shifted to future period. As a consequence, the current account remain unaffected, since current liabilities (loans) will be offset by future taxes, (Ekrem Akbas & Lebe, 2015; Mabula & Mutasa, 2019).

2.2 Empirical Literature

Akbaş & Lebe, (2016) test the validity of triple deficit hypothesis for G7 countries. The study employed time series data (taken as percent to GDP), sourced from the World Bank and OECD for the period 1994 to 2011 and correctional dependencies for the country forming the panel study the was examined. The study used both Lagrange Multiplier Bootstrap Panel Cointegration Test and Dynamic Seemingly Unrelated Cointegrating Regressions. The study findings gave evidence for existence of bidirectional causal relationship between current account balances, savings gap and budget balances. Additionally, the study confirms that budget balances and saving gap determines current account balances, at 5% level of significance, data gave enough evidence to reject the null hypothesis that “the variables are not cointegrated”. Furthermore, empirical evidence showed that current account deficit increases at the rate of 0.56% for every 1% increase in budget deficit while for each 1% increase in savings reduces the current deficit by 0.03%. These findings therefore gave evidence for the conclusion of validity of triple deficit in G7 countries to be arrived on

Sancar,(2014) presents “Empirical Findings on Triple Deficit Hypothesis: A case of Turkey”. The study uses Vector Autoregressive model to establish the relationship existing between current account, fiscal and servings balance, a framework from which Impulse response function was applied to capture the effect of shocks in error terms. The study then employed Dolado-Lütkepohl Granger Causality to explore existence of the causal relationship among the variables. Study findings revealed a bidirectional granger causality between saving gap and current account deficit, also between saving gap and fiscal deficit. It is also evidenced that current account deficit does not granger cause budget deficit. On the other hand, the VAR output showed that current account and saving deficits have 15% and 8% effect on budget deficit respectively whereas budget deficit causes current deficit by 21% and savings deficit causes current account deficit by 0.1%. Additionally, the study reported the effect of current account and budget deficits on savings gap to be 32% and 50% respectively.

Şen & Kaya, (2018a) studies the validity of triple deficit hypothesis in post-communist countries. the study uses annual data on trade balance, private saving-investment balance and fiscal balance covering time period 1994 to 2015 from the World Bank Development Indicators Database and IMF country's reports. The author employed Granger causality test to solicit the existence of causal relationship among the variables, and they adopted an approach proposed by Konya (2006) that allows capturing of country heterogeneity and correctional dependencies among countries. Study findings showed existence of negative causal relationship between budget deficit and trade deficit for Poland and Romania, while causal relationship between budget deficits and trade deficits for Russia, Ukraine, the Czech Republic or Hungary was not established. Likewise, the findings revealed a positive and significant causal relationship running from trade deficits to budget deficits for Russia, Romania, and Hungary. Overall, neither twin deficit nor triple deficit hypothesis was found valid in the post communists' countries.

Çoban & Balikçioğlu, (2016) uses a dynamic panel model to unfold the divergence of twin or triple deficit for 24 transition economies for the time period 2002 to 2013, all the variables (current account, budget and saving-investment gap) taken as percent to GDP. Among others, their study findings revealed no evidence to justify the relationship between current account and saving deficits. On the other hand, the findings reported an inverse relationship between fiscal balance (budget deficit) and current account balance, the author pointing out that the inverse relationship between the two deficits may be subject to heavy taxes on imports.

Banday, (2016) explores the interrelationship between current account deficit and budget deficit with evidence from Indian economy using time series data for the years 1990 – 2013, other variables being inflation and exchange rates. The study adopts cointegration analysis which, confirms existence of long run relationship among the variables. Additionally, unlike other empirical evidences, a bidirectional granger causality is observed between fiscal deficit and current account deficits. In the same vein, Merza, (2012) examines the twin deficit hypothesis for Kuwait using quarterly data, (1993:4 to 2010:4). The study uses Johansen Cointegration approach to unfold the dependency of current account balance on fiscal balance. The VAR model and granger causality outputs do not confirm the causal relation from fiscal balance to current account balances. It however confirms causality, running from current account to fiscal balance. On the other hand, Ahmed El-Namrouty, (2015) discusses the “Effects of public budget deficit on current account in the Palestinian Territories (1996 - 2012)”. The study findings confirmed the presences of positive relationship between current account and budget deficit. Empirical evidence suggests current account deficit to increase by \$3.08 million for each \$1.0 increase in budget deficit.

Hondroyannis *et al.*, (2010) studies the macroeconomics, financial and structural factors determine current account deficits in Greece using time series data covering the period 1960 to 2007. The study employs cointegration approach, linear and nonlinear models to examine the impact of, among others, fiscal balance, GDP per capita, real interest rate, real exchange rate, trade volume. Among others, the study finding showed that current account deficit narrows as GDP per capita increase and appreciation of exchange rates increases current account and it leads to worsening of international trade, exports in particular and reduces savings. Moreover, the findings show that increase in fiscal deficit widens the current account balance.

Mwangi, (2014) examines the determinants of current account in Kenya. The study employs the Error Correction Model with time series data for the years 1970 to 20110. The findings showed that in the long run, economic growth, fiscal deficit, exchange rate, inflation and trade explain the current account by 16.18%, 14.74%, 17.91 and 15.31% and 13.88% respectively. On the other hand, Osoro & Gor, (2014) studies twin deficit and macroeconomic determinants in Kenya. Their study found Keynesian perspective fitting in Kenya economy with budget deficit granger causing current account deficit. On the other hand, while Epaphra, (2017b) empirical findings failed to reject the twin deficits hypothesis in Tanzania. His study reports evidence for existence of causal relationship between budget deficit and Current account balances, causality running budget deficits to current account deficits.

3 Data and Methods

3.1 Data

This study uses data on current account balance, fiscal balance and savings gap extracted from the International Monetary Fund (IMF) for Tanzania, Kenya, Uganda, Burundi and Rwanda. We therefore had a balanced panel data for five East African Countries, all data sets are taken as percent of the Gross Domestic Product (GDP) for the time period 2004 through 2018.

3.2 Model Estimation

H. Pesaran, Chudik, Mohaddes, & Raissi, (2015) discusses various models for testing long run relationship in panel data models. Their work compares and acknowledges the relevance of various panel models such Autoregressive Distributed Lag Model (ARDL) and Cross Sectionally Distributed lag (CS-DL) panel models; the Dynamic panel OLS; the Full Modified Dynamic OLS (FM-OLS) and a pooled mean group (PMG) in capturing cross-sectionally dependent errors in heterogenous panels.

In this paper, we adopt a Pooled Mean Group panel ARDL model from the grounds that; it takes care of unobserved cross-sectional factors (H. Pesaran *et al.*, 2015); the model, while confining sameness of long run coefficients, it allows for heterogeneity of short run coefficients across countries and the model is not only appropriate with relatively large sample size but also it gives consistent estimates when the panel data has variables integrated at different levels, preferably variables at I(0) and I(1), (Asghar & Nadeem, 2015; Onuoha, Okonkwo, & Okoro, 2018).

In general, if we let Y_{it} to be the dependent variable of the i^{th} cross-section and X_{it} is a $K \times 1$ vector regressor, we build our panel ARDL model as: -

$$Y_{it} = \sum_{l=1}^{P_Y} \vartheta_{it} Y_{i,t-l} + \sum_{l=1}^{P_X} \theta_{it} X_{i,t-l} + \varphi_{it} \text{ for } i = 1, 2, \dots, N \wedge t = 1, 2, \dots, T \quad (1)$$

Substituting our variables of interest, we have: -

$$CBA_{it} = \sum_{l=1}^{P_{CBA}} \vartheta_{it} CBA_{i,t-l} + \sum_{l=1}^{P_{FB}} \theta_{it} FB_{i,t-l} + \sum_{l=1}^{P_{SG}} \theta_{it} SG_{i,t-l} + \varphi_{it} \quad (2)$$

Such that;

$$\varphi_{it} = \delta_i Q_t + \omega_{it}, \quad (3)$$

Where;

CAB, FB and SG are current account balances fiscal balance and Savings gap respectively.

φ_{it} is serially uncorrelated random error for all i 's, with Q_t representing a vector of unobserved factors, P_y^i and P_x^i are large orders.

3.3 Testing Cross Section Dependence

Given panel data, it is important to ascertain cross-section dependence before running the panel ganger causality and Unit root tests so as to identify the appropriate and relevant tests for the data set at hand, (Akbaş & Lebe, 2016; Onuoha *et al.*, 2018). Cross-Section dependence occurs when residuals in panel cross-sections depends on each other, such that, given a panel linear model:

$$Y_{it} = \theta_i + \delta_i X_{it} + \tau_{i,t} \text{ for } i=1,2,3,\dots,N \wedge t=1,2,3,\dots,T \quad (4)$$

Then,

For cross-section independence: $Cov(\tau_{it}, \tau_{jt}) = 0$; that is $\rho_{it} = \rho_{jt} = 0$ (Null Hypothesis)

For cross-section independence: $Cov(\tau_{it}, \tau_{jt}) \neq 0$; that is $\rho_{it} = \rho_{jt} \neq 0$ (Alternative Hypothesis)

There are different tests of cross-section dependence and Hoyos & Sarafidi, (2006) give detailed discussion of Lagrange Multiplier (LM) proposed by Breusch and Pagan (1980), Pesaran's CD test by Pesaran (2004), Friedman's test of (1937) and Frees' test developed by Free (1995, 2004). In this study, we make use of Lagrange Multiplier (LM) test, which according to Breusch & Pagan, (1980), the test is suitable for large T and small N and rely on the framework of Seemingly Unrelated Regression, (M. H. Pesaran, 2015). Given N number of cross-section for time T and, and borrowing from Hoyos & Sarafidi, (2006), we define pairwise correlation coefficient of residuals as:

$$\hat{\rho}_{ij} = \hat{\rho}_{ji} = \frac{Cov(\tau_{it}, \tau_{jt})}{\sqrt{Var(\tau_{it}) \cdot Var(\tau_{jt})}} = \frac{\sum_{t=1}^T (\hat{\tau}_{it} \hat{\tau}_{jt})}{\sqrt{\sum_{t=1}^T (\hat{\tau}_{it})^2 \cdot \sum_{t=1}^T (\hat{\tau}_{jt})^2}} \quad (5)$$

And the LM test is given by:

$$LM = \sum_{i=1}^{N-1} \sum_{j=1+i}^N \hat{\rho}_{ij}^2 \text{ for } i \neq j \quad (6)$$

3.4 Unit root Tests

There are different unit root tests, among others are Pesaran test proposed by the I am *et*, (2003), Shin W-stat, Levin *et* (2002) herein referred as Levin, Lin & Chu t test for panel data stationarity. Owing the fact that first generation unit root tests (such as IPS and Levin) assumes cross-section independence of residuals (doesn't take into account cross-section dependencies), Pesaran (2005) developed a second-generation cross-section IPS that takes care of cross-section

dependence and its estimation is subject to building a Cross-Section Augmented Dick Fuller regression. In our case, we employ the first generation unit root tests. Bangake & Eggoh, (2012) define the IPS panel unit root equation as:

$$\Delta Y_{i,t} = \vartheta_i + \delta_i Y_{i,t-1} + \sum_{j=1}^p \varphi_{ij} \Delta Y_{i,t-j} + \omega_{i,t} \text{ for } i=1,2,3,\dots, N \wedge t=1,2,3,\dots, T \quad (7)$$

Where; $\Delta Y_{i,t}$ is the variable of interest, ϑ_i is the individual country fixed effects and p is the selected lag length. It should be noted that δ_i is our parameter of interest, therefore, we test the null hypothesis that $\delta_i=0$ against the alternative hypothesis that $\delta_i>0$, the guideline being rejecting the null hypothesis if the computes probability is less than 5% level of significance.

3.5 Granger Causality Test

Konya (2006) and Dumitrescu-Hurlin (2012) proposes different methods for testing granger causality in panel data. The former proposal takes into account cross-section dependencies while the later does not but considers slope heterogeneity across panel cross-sections. In our case, we had balanced and cross-section independent panel, to allow cross-section slope heterogeneity, we therefore employed the test suggested by Dumitrescu-Hurlin (2012) to ascertain the causality between current account balance, fiscal balance and Savings gap as the method is suitable for large T and small N, (Akbas, 2013).

A general approach of Panel granger causality with time T and i cross-section units such that $t = 1, 2, \dots, T$ and $i = 1, 2, 3, \dots, N$, is given by:

$$Y_{it} = \tau + \vartheta_{i,1} Y_{i,t-1} + \vartheta_{i,2} Y_{i,t-2} + \dots + \vartheta_{i,p} Y_{i,t-p} + \theta_{i,1} X_{i,t-1} + \theta_{i,2} X_{i,t-1} + \dots + \theta_{i,p} X_{i,t-p} + \varphi_{i,t} \quad (8)$$

Where $\varphi_{i,t}$ is a normally distributed random error. In our case, integrating our variables under consideration we have the equations:

For Current Account Balance:

$$CAB_{it} = \tau + \vartheta_{i,1} CAB_{i,t-1} + \vartheta_{i,2} CAB_{i,t-2} + \theta_{i,1} FB_{i,t-1} + \theta_{i,2} FB_{i,t-1} + \psi_{i,1} SG_{i,t-1} + \psi_{i,2} SG_{i,t-1} + \zeta \quad (9)$$

For Fiscal Balance:

$$FB_{it} = \tau \theta_{i,1} + FB_{i,1,t-1} + \theta_{i,2} FB_{i,t-1} + \vartheta_{i,1} CAB_{i,t-1} + \vartheta_{i,2} CAB_{i,t-2} + \psi_{i,1} SG_{i,t-1} + \psi_{i,2} SG_{i,t-1} + \zeta \quad (10)$$

For Savings Gap:

$$SG_{it} = \tau + \psi_{i,1} SG_{i,t-1} + \psi_{i,2} SG_{i,t-1} + \vartheta_{i,1} CAB_{i,t-1} + \vartheta_{i,2} CAB_{i,t-2} + \theta_{i,1} FB_{i,t-1} + \theta_{i,2} FB_{i,t-1} + \varphi_{i,t} \quad (11)$$

4 Results and Discussion

4.1 Cross-Section Dependence

Estimation outputs for panel cross-section dependence are tabulated in Table 1. Based on the fact that the number of cross-sections in our panel were less than time series, (large T and small N), the Lagrange Multiplier test Statistic become the most reliable and valid test statistic. As shown, the LM test statistic is 9.90529 with a probability value of 0.4488. At 5% level of significance, we failed to reject the null hypothesis of cross-sectional independence.

Table 1: Residual Cross-Section Dependency Test

Test	Statistic	Df	Prob.
Breusch-Pagan LM	09.90	10	0.4488
Pesaran scaled LM	-00.02		0.9831
Pesaran CD	10.21		0.2269

4.2 Unit root tests

The panel unit root tests are tabulated in Table 2. We test the hypothesis that the variables are not stationary against the alternative hypothesis that the variables are not stationary. Results, as depicted in Table 2 confirm Investment-Savings to be stationary at level, I(0) while Fiscal balance and Current Account balances became stationary after first differencing, I(1).

Table 2: Panel Unit Root Tests

Variable	Method	I(0)		I(1)	
		Test Statistic	Probability	Test Statistic	Probability
Saving Gap	Levin, Lin & Chu t*	-04.19	01.39	-	-
	Im, Pesaran and Shin W-stat	-03.11	0.001	-	-
	ADF-Fisher Chi-Square	28.02	0.002	-	-
	PP-Fisher Chi-Square	22.90	0.011	-	-
Fiscal Balance	Levin, Lin & Chu t*	-01.93	0.027	-02.39	0.0084
	Im, Pesaran and Shin W-stat	-01.13	0.130	-02.55	0.0055
	ADF-Fisher Chi-Square	13.49	0.120	25.16	0.0005
	PP-Fisher Chi-Square	18.67	0.045	56.52	0.0000
Current Account Balance	Levin, Lin & Chu t*	-02.45	0.007	-04.03	0.0000
	Im, Pesaran and Shin W-stat	-01.65	0.049	-02.70	0.0034
	ADF-Fisher Chi-Square	16.81	0.080	24.40	0.0066
	PP-Fisher Chi-Square	17.64	0.061	44.33	0.0000

4.3 Panel ARDL Long Rung Coefficients

Table 3 summarizes results for Panel ARDL Outputs. The study findings shown our variables of interest to be significant at 5% level of significance, hence giving evidence to reject the null hypothesis of all the coefficients to be the same equaling zero. The coefficient of Fiscal Balance was positive (0.9693) implying that in the long run, a unit increase in fiscal balance increases the current account balance by 0.969 units for whereas for each unit increase in savings-investment raises current account balance by 0.4282 units.

Table 3: Panel ARDL Output

Variable	Coefficient	Standard Error	t-statistic	Probability
Fiscal Balance	0.9693	0.1990	4.8700	0.0000
Savings Balance	0.4286	0.0408	10.4987	0.0000

4.4 Panel ARDL Short Run Coefficients

Table 4 report the Panel ARDL output of short run coefficients. The table reports the Cointegrating Equation, which is negative (-0.7163) and significant (Probability = 0.0353). This significant result imply that the variables converges to the long run equilibrium, a speed of convergence being 71.63%. Additionally, all the coefficients of our variables are not statistically significance at all conventional levels, implying that the fiscal balance and savings-investment have no significant impact on current account balance in the short run. On the other hand, we find the coefficient of the intercept negative (-1.2991) and significant (P-value = 0.0462) meaning that, without taking the influence of fiscal balance and saving-investment gap, the current account balances for East African countries in the short run on average amounts to -1.2991.

Table 4: Panel ARDL Short Run Dynamics

Variable	Coefficient	Standard Error	t-statistic	Probability
CointEq01	-0.7163	0.3282	-2.1827	0.0353
D(CBA(-1))	0.09253	0.1741	0.5312	0.5983
D(FB)	-0.2521	0.8569	-0.2942	0.7702
D(FB(-1))	-0.3801	0.4028	-0.9455	0.3503
D(S_I)	0.4518	0.2720	1.6613	0.1049
D(S_I(-1))	0.1205	0.1351	0.8920	0.3780
C	-1.2991	0.6304	-2.0610	0.0462

4.5 Cross-section Short Run Effects

Table 5 reports the short run coefficients for each cross-section. As shown, movement towards the long run equilibrium is observed in Burundi, Rwanda and Tanzania. The findings reveal that, on average, without the influence of fiscal balance and saving-investment balance, the current account balance is -1.0385 for Burundi, 0.0123 for Kenya, -3.0356 for Rwanda, -2.4679 for Tanzania and 0.0341 for Uganda. We also noted that a unit increase in fiscal balance improves the CAB by 2.5278 units in Burundi but on the other hand, reduces the CAB by 2.6140 and

1.3287 units in Rwanda and Tanzania respectively. Also, the table reports that a unit increase in savings gap increases the CAB by 0.5432 units and 0.1444 units in Burundi and Rwanda respectively. Contrary, it reduces the Current account by 0.4395 units in Tanzania.

Table 5: Cross-section Short Run effects

Country	Variable	Coefficient	Standard Error	t-statistic	Probability
Burundi	CointEq01	-0.7598	0.0931	-8.1610	0.0038
	D(FB)	2.5278	0.6446	3.9214	0.0295
	D(S_I)	0.5432	0.0531	10.933	0.0016
	C	-1.0385	1.6256	-0.6388	0.5684
Kenya	CointEq01	0.0101	0.0002	49.5111	0.0000
	D(FB)	0.0580	0.0004	147.856	0.0000
	D(S_I)	1.0137	0.0001	15833.1	0.0000
	C	0.0123	0.0016	7.71111	0.0045
Rwanda	CointEq01	-1.4533	0.0618	-23.527	0.0002
	D(FB)	-2.6140	0.2948	-8.8867	0.0030
	D(S_I)	0.1444	0.0427	2.7401	0.0713
	C	-3.0356	1.0717	-2.8326	0.0660
Tanzania	CointEq01	-1.4240	0.0341	-41.7473	0.0000
	D(FB)	-1.3287	0.0416	-31.8920	0.0001
	D(S_I)	-0.4395	0.0110	-40.0277	0.0000
	C	-2.4679	0.7880	-3.1317	0.0520
Uganda	CointEq01	0.0455	0.0022	20.6652	0.0002
	D(FB)	0.0965	0.0020	49.0207	0.0000
	D(S_I)	0.9597	0.0013	740.916	0.0000
	C	0.0341	0.0031	10.9014	0.0017

4.6 Granger Causality

Table 6 Reports output for the Dumitrescu-Hurlin panel causality test. As shown, at both 5% and 10% levels of significance, the probability values are too large to justify the presence causal relationship between current account balance, fiscal balance and savings gap. This gives evidence that, the current study finds triple deficit hypothesis is not valid in East African countries.

Table 6: Pairwise Dumitrescu-Hurlin Panel Causality Tests

Null hypothesis	W-Stat	Zbar-Stat	Prob
FB does not homogeneously cause CAB	2.90409	0.14077	0.8881
CAB does not homogeneously cause FB	3.64005	0.57714	0.5638
S_I does not homogeneously cause CAB	3.69514	0.60981	0.5420
CAB does not homogeneously cause S_I	2.82163	0.09188	0.9268
S_I does not homogeneously cause FB	5.06387	1.42137	0.1552
FB does not homogeneously cause S_I	2.15569	-0.30297	0.7619

5 Conclusions and Policy Recommendations

This paper aimed at examining the relevance of triple deficit hypothesis for East African countries, specifically assessing the dynamics of savings-Investment gap (SG), fiscal balance (FB) and current account balance (CAB) using secondary data for the years 2004 to 2018. In determining the effect SG and FB on CAB, we employed panel ARDL and we find both fiscal balance and savings gap having a positive impact on current account balance for East African countries in the long run, such that increase in fiscal balance and savings leads to an increase in current account balance in the long run. On the other hand, the study findings show a fairly strong speed of convergence towards the long run equilibrium. Else, the short run coefficients were not significant at all conventional levels (1%, 5% and 10%), implying that fiscal balance and savings gap have no impact on current account balance in the short run. Additionally, the findings further reveal that with no influence of other variables (fiscal balance and savings), the current account balance in East African countries in the short run is on average -1.2991.

However, regarding the validity of triple deficit hypothesis, the study finds the probability values not significant at 1%, 5% and 10% levels of significance. Accordingly, based on the data and estimation procedures employed, the current study concludes that triple deficit hypothesis in East African countries does not hold. Therefore, we find evidence in favor of Ricardian equivalency theory as discussed by Ekrem Akbas & Lebe, (2015) and Mabula & Mutasa, (2019).

Thus, this study recommends that appropriate and sound policies regarding better investment possibilities, proper resource allocations and trade policies that promotes amidst, exportation of goods and international trade in order to bring positive impacts on current account balance in both short run and long run. Then again, more emphasis should be geared towards increasing the proportion of annual budget for national investment especially in development project so as to bring balance among public investment, private investment and saving gap.

6 REFERENCES

- Ahmed El-Namrouty, K. (2015). The Effects of Budget Deficit on Current Account: Case Study (Palestinian Territories 1996 – 2012). *International Journal of Economics, Finance and Management Sciences*, 3(1), 57.
- Akbas, Y. E. (2013). Testing for Causality between the Foreign Direct Investment , Current Account Deficit , GDP and Total Credit: Evidence from G7. *PANOECONOMICUS*, 6(May), 791–812.
- Akbaş, Y. E., & Lebe, F. (2016). Current Account Deficit, Budget Deficit and Savings Gap : Is the Twin or Triple Deficit hypothesis Valid in G7 Countries ? *Plague Economic Papers*, 25(03), 271–286.
- Aloryito, G. K., Senadza, B., & Nketiah-amponsah, E. (2016). Testing the Twin Deficits Hypothesis : Effect of Fiscal Balance on Current Account Balance — A Panel Analysis of Sub-Saharan Africa, (August), 945–954.

- Asghar, N., & Nadeem, M. (2015). Institutional Quality and Economic Growth : Panel ARDL Analysis for Selected Developing Economies of Asia. *A Research Journal of South Asian Studies*, 30(2), 381–403.
- Banday, U. J. (2016). How budget deficit and current account deficit are interrelated in Indian economy. *Theoretical and Applied Economics*, XXIII(1), 237–246.
- Bangake, C., & Eggoh, J. C. (2012). Research in Economics Pooled Mean Group estimation on international capital mobility in African countries. *Research in Economics*, 66(1), 7–17.
- Breusch, T. S., & Pagan, A. R. (1980). Lagrange Multiplier Test and to Model Applications Specification in Econometrics. *Review of Economic Studies*, XLVII(1), 239–253.
- Bwire, T., Lloyd, T., Morrissey, O., Bwire, T., Lloyd, T. I. M., & Morrissey, O. (2017). Fiscal Reforms and the Fiscal Effects of Aid in Uganda Fiscal Reforms and the Fiscal Effects of Aid in Uganda. *The Journal of Development Studies*, 53(7), 1019–1036.
- Chase-Dunn, C. (2015). Dependency Theory. *International Encyclopedia of the Social & Behavioral Sciences: Second Edition*, (October), 196–198.
- Çoban, H., & Balikçioğlu, E. (2016). Triple Deficit or Twin Divergence : A Dynamic Panel Analysis. *The International Journal of Economic and Social Research*, 12(1), 271–280.
- Ekrem Akbas, Y., & Lebe, F. (2015). Current Account Deficit, Budget Deficit and Saving Gap: Is the Twin or Triplet Deficit Hypothesis Valid in G7 Countries? *Prague Economic Papers*, 25(3), 271–286.
- Epaphra, M. (2017a). The Twin Deficits Hypothesis : An Empirical Analysis for Tanzania. *The Romania Economic Journal*, (65), 2–34.
- Epaphra, M. (2017b). The Twin Deficits Hypothesis : An Empirical Analysis for Tanzania The Twin, (November).
- Forte, F., & Magazzino, C. (2015). Ricardian equivalence and twin deficits hypotheses in the euro area. *Journal of Social and Economic Development*, 17(2), 148–166.
- Hondroyannis, G., Papazoglou, C., Tsaveas, N. T., Vasardani, M. A., Brissimis, S. N., Hondroyannis, G., Vasardani, M. A. (2010). *Current Account determinants and External Sustainability in Periods of Structural Change* (September 2010 No. 1243).
- Hoyos, R. E. De, & Sarafidi, V. (2006). Testing for cross-sectional dependence in panel-data models. *The Stata Journal*, 6(4), 482–499.
- John, T. (2015). *The Effect of Budget Deficity on Economic Developement in East African Countries*. University of Nairobi. University of Nairobi.
- Kalim, R., & Hassan, M. S. (2013). What Lies Behind Fiscal Deficit: A Case of Pakistan. In *Second International Conference on Business and Management* (pp. 96–113). lahore - Pakistan: University of Management and Technology.
- Mabula, S., & Mutasa, F. (2019). The Effect of Public Debt on Private Investment in Tanzania. *African Journal of Economic Review*, VII(I), 109–135.

- Mawejje, J. (2015). Macroeconomic Effects of Budget Deficits in Uganda Macroeconomic Effects Of Budget Deficits In Uganda : A VAR-VECM approach, (July).
- Merza, E. (2012). The Relationship between Current Account and Government Budget Balance : The Case of Kuwait, 2(7), 168–177.
- Moussa, N. (2016). Trade and Current Account Balances in Sub-Saharan Africa: Stylized Facts and Implications for Poverty series, (May).
- Mwangi, K. S. (2014). *Determinants of Current Account Balance in Kenya*. Kenyatta University.
- Namkoong, Y. (1999). Dependency Theory: Concepts, Classifications, and Criticisms. *International Area Studies Review*, 2(1), 121–150.
- Njoroge, E. K., Kosimbei, G., & Korir, J. (2014). Testing the twin deficit hypothesis for Kenya 1970-2012, 3(5), 160–169.
- Obinyeluaku, M. (2013). Monitoring Fiscal Sustainability in Africa : Symptoms and Sources, 1–32.
- Onuoha, F. C., Okonkwo, I. C., & Okoro, P. (2018). The Causal Relationship between Foreign Direct Investment (FDI) and the Macro-Economy of Selected West African Countries: Panel ARDL/Granger Causality Analysis. *International Multi-Disciplinary Journal*, 12(49), 2006–2018.
- Osakwe, P., & Verick, S. (2007). Current Account Deficits in Sub-Saharan Africa: Do they Matter? *Proceedings of the African Economic Conference 2007*, 1–21.
- Osoro, O. K., & Gor, O. S. (2014). The Twin Deficit and the Macroeconomic variables in Kenya The Twin Deficit and the Macroeconomic variables in Kenya. *International Journal for Innovation Education and Research*, 2(09), 2–33.
- Park, D., & Shin, K. (2009). ADB Economics Working Paper Series Saving , Investment , and Current Account Surplus in Developing Asia, (158).
- Pesaran, H., Chudik, A., Mohaddes, K., & Raissi, M. (2015). *Long-Run Effects in Large Heterogenous Panel Data Models with Cross-Sectionally Correlated Errors*. Federal Reserve Bank of Dallas.
- Pesaran, M. H. (2015). Testing Weak Cross-Sectional Dependence in Large Panels Testing Weak Cross-Sectional Dependence in Large Panels. *Econometric Reviews*, 34(March), 1089–1117.
- Sancar, C. (2014). Empirical Findings on Triplet Deficits Hypothesis: The Case of Turkey. *Journal of Economic Cooperation and Development*, 1(35), 81–101.
- Şen, H., & Kaya, A. (2018a). Are the twin or triple deficits hypotheses applicable to post-communist countries? *Panoeconomicus*, (00), 28–28.
- Şen, H., & Kaya, A. (2018b). *Are the twin or triple deficits hypotheses applicable to post-communist countries? Bank of Finland, BOFIT*.
- Solomon, M., & Wet, W. A. De. (2004). The Effect of a Budget Deficit on Inflation : The Case

of Tanzania, 7(1), 100–116.

Suphian, R. (2017). Trade Balance Determinants in East African Countries, 2253(May 2016), 78–89.

Yang, L. (2011). Cardiff Business School An Empirical Analysis of Current Account Determinants in Emerging Asian, (March).

Yeboua, K. (2017). Twin Deficits Phenomenon In West African Economic And Monetary Union Countries : Panel Data Analysis Twin Deficits Phenomenon In West African Economic And Monetary Union Countries : Panel Data Analysis, (May 2016).