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Triplet Deficits Hypothesis: Empirical Evidence from Tanzania

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Abstract

This study tests a triplet deficit hypothesis in Tanzania, which examine how the three variables move together namely: budget account (BA), current account deficit (CAD) and financial account (FA). This study used deductive approach. The current investigation employed secondary data extracted from Bank of Tanzania (BoT) for the period of 48 years (1976-2024). In data analysis, first both Augmented Dickey Fuller test and Phillip Perron test used in test of unit roots. Also, Autoregressive Distributed Lag (ARDL) applied to determine the long-run relationship while Granger causality employed to determine direction of causality. Result show that, variables of financial account, current and budget deficits are correlated in the long run. Finding of ECM model estimation indicates presence of the short run relationship between FA, CAD and BD. For long-run only current account deficits and budget account deficit are co-integrated. Granger causality test reveals the causality runs from the FA to the CAD and FA deficits, thus, we conclude that the triple deficits hypothesis holds in Tanzania. Conclusively, ARDL technique confirmed long-run association among the triple deficits. Granger support the twin deficits hypothesis running from budget deficit to current account deficit, also BD does not granger cause FA. Since evidence supports the presence of the triple deficit hypothesis, efforts to reduce the budget deficit should be prioritized, as it has long-term implications for the external balances. Fiscal discipline, efficient public expenditure management, and improved revenue mobilization are essential to reduce the pressure on both the current and financial accounts.

Keywords: Budget Account, Current Account Deficit, Financial Account, Triplet Deficit Hypothesis

1. Introduction

The rise of globalization has noteworthy in increased the interconnectedness of countries, contributing to numerous global, continental, and regional trade arrangements intended to encourage economic integration (Umulisa, 2020). Amongst the greatest recent of these is the African Continental Free Trade Area (AfCFTA), which consist of 54 out of 55 African Union (AU) countries. As the major free trade agreement in terms of joining countries meanwhile the establishment of the World Trade Organization, AfCFTA search for to remove tariffs on 90 percent of traded goods, create an incorporated market, and increase economic unity across the continent (Ekobena et al., 2021). Nonetheless, the benefits of trade agreements differ amongst countries, frequently influenced by the specific economic and structural characteristics of the members (Sakyi et al.,

2017; Okafor, et al., 2021; Magoti et al., 2020). Challenges consist of internal trade barriers, fiscal imbalances, and issues associated to savings and investment policies (Akinci & Yilmaz, 2012; Workneh, 2021). When these issues converge establishing as fiscal, current account, and saving-investment deficits, together known as triple deficits they hinder the intended developmental gains of such trade agreements (Shastri et al., 2017; Okafor, et al., 2021; Arif & Maryam, 2024).

Relationship among the current account deficit (CAD) and budget deficit (BD) first developed in the United States during the Reagan administration in 1982. At the time, the U.S. was dealing with high inflation, slow economic growth, increasing public spending, and an underfunded defense sector (Wray, et al., 2024). Şen & Kaya, (2018) similarly approve that, fiscal deficit in the United States of America was at its highest during 1980s which contributed to rise in current account deficits. Similarly, data from the International Monetary Fund showed that global current account deficits are increasing. These economic challenges encouraged investigations into the causal relationships among different fiscal indicators, finally giving rise to the Triple Deficit Hypothesis (TDH) a theory suggesting a positive linkage among the fiscal deficit, current account deficit, and saving-investment gap (Sen et al., 2014; Magoti, Mabula & Sende, 2020). Twin Deficit Hypothesis, a precursor to TDH, highlights the relationship between a nation's fiscal balance and its current account, where fiscal imbalances frequently translate into external imbalances (Miller & Russek, 1989). Events for instance the 2008/09 global financial crisis brought this connection back into focus, as numerous nations challenged decrease revenues and increased public spending, highlighting the limited fiscal space for counter-cyclical measures, particularly in oil-importing countries (OECD, 2011).

The Tanzanian government has been working to achieve a balanced balance of payments and a balanced budget, along with other goals like sustainable economic growth, better living standards, and job creation (Bank of Tanzania, 2024). To support stable internal and external balances, the government adopted various policies such as structural adjustment programs (SAPs), import substitution, reforms in the financial sector, and privatization (Bank of Tanzania, 2024). These policies aimed to boost economic activity, keep inflation low, maintain positive real interest rates, stabilize the exchange rate, and ensure overall price stability to build a prosperous economy. Current account, the fiscal account, and the growing savings-investment gap remain unbalanced in regardless of these efforts (Ruch, 2021). These accounts consistently demonstrate deficiencies, which makes sustainability of the internal and external balance a major concern. Based to the United Nations (2020), instability in these accounts is a problem since it can result in unemployment and an unstable macroeconomic environment, which lower economic growth and increase poverty.

In recent years, the issue of triple deficits has re-emerged as a significant topic, drawing increasing interest from scholars and policymakers across both developed and developing nations (Kesgingöz & Ahmed, 2021). The simultaneous occurrence of current account imbalances, budget deficits, and private saving-investment gaps has sparked debate about how effectively internal adjustments specifically fiscal and private savings-investment balances can address external trade imbalances. Similar to twin deficit hypothesis, for triple deficit hypothesis has gained traction globally as researchers explore its relevance and implications in different economic backgrounds.

TDH expands upon the twin deficit theory by incorporating the savings-investment gap, linking three key components: the fiscal balance, the savings-investment balance, and the current account balance. At its core, the hypothesis questions whether domestic imbalances namely fiscal deficits and private saving-investment shortfalls collectively contribute to external imbalances such as trade or current account deficits (Şen & Kaya, 2018). Verifying this relationship, particularly in Sub-Saharan African countries, is crucial for evaluating individual and regional economic performance. Such understanding is also essential for formulating effective policies aimed at promoting macroeconomic stability and preventing countries from falling into excessive debt burdens.

Despite the wide range of studies on the Triple Deficit Hypothesis (TDH) at global and regional levels, there is a clear lack of country-specific research, particularly for Tanzania. Existing studies such as Okafor et al. (2021) and Workneh (2021) analyze Sub-Saharan Africa (SSA) using panel data, which may obscure the unique macroeconomic patterns of individual countries like Tanzania due to variations in economic structures and policy environments. Similarly, while Magoti, Mabula, and Sende (2020) examined East African nations, their findings of insignificant short-run effects suggest possible data limitations or structural differences, yet did not isolate Tanzania's outcomes. The only study focusing directly on Tanzania, by Manamba (2017), explored only twin deficit hypothesis and excluded the savings-investment component, leaving the full scope of TDH unexplored.

Moreover, studies like Arif and Maryam, (2024), which applied advanced econometric techniques to G7 and D8 countries, found no long-run validation of TDH, contrasting with findings from SSA. This inconsistency underscores the need for country-level analysis to better understand the applicability of TDH in diverse economic contexts. In response to these gaps, the current study aims to provide Tanzania-specific empirical evidence using updated time-series data, with the goal of deepening insights into the interrelationships between fiscal balance, current account balance, and the saving-investment gap within Tanzania's macroeconomic environment. The purpose of this study is to provide light on Tanzania's triplet deficit issue. The study specifically aims to find out if current account, fiscal account, and financial account deficits have a connection in the long term. Second, look at how current and budget account deficits are related to one another. The study also looks at the link between deficits in financial accounts and the budget. The final study determines a causal connection between financial account deficits and current deficits.

2. Literature Review

2.1 Theoretical Review

The current investigation is guided by Triple Deficit Hypothesis (TDH), which is primarily explained using national income identity introduced by Mundell during 1960s. TDH proposes that a country can concurrently face three interconnected imbalances: a fiscal deficit, a current account deficit, and a savings-investment gap. These deficits explain that the government's budgetary shortfall, the economy's external trade imbalance, and the domestic saving-investment dynamics are not in equilibrium. In essence, the hypothesis explains how these three deficits are interconnected. Therefore, the national income is used to explain TDH as indicated in equation i:

$Y = C + I + G + (X-M)$ …… (i)

Y represents the national output, which consists of both domestic and external parts. The domestic components consist of consumption (C), investment (I), and government spending (G), while the external part is net exports (X minus M), where X is recognized by exports of goods and services and M for imports. The total of consumption, investment, and government spending is called aggregate domestic expenditure (ADE). Therefore,

$ADE = C + I + G$……(ii)

The following is the result of substituting Equation (ii)'s left side into Equation (i):

$Y = ADE + X-M$ …… (iii)

Reorganising Equation (iii), we obtain at Equation (iv) as follows:

$Y – ADE = X – M$ ……..……(iv)

A negative value appears on the left side of Equation (iv), signifying a domestic deficit in the economy, when aggregate domestic expenditure (ADE) surpasses national output (Y). To maintain equilibrium, this imbalance must be offset by a corresponding negative value on the right-hand side, leading to the emergence of an external deficit. This external imbalance can stem from deficits in either the public or private sector.

This dynamic is explained by the impression of leakages and injections in an open economy: imports (M), taxes (T), and savings (S) act as leakages that lower the demand for goods made domestically, while exports (X), government spending (G), and investment (I) act as injections that increase that demand (Magoti et al., 2020). Consequently, Equation (v) reflects the total expenditure on goods provided within economy comprising both domestic and export components while Equation (vi) outlines how revenue generated from this supply is utilized.

$AE = C + I + G + X$ …….....(v)

Since, $AE = ADE + X$, and

$Y = C + S + T + M$ …….(vi)

For the economy to be in equilibrium, aggregate expenditure (AE) must equal national output (Y), and leakages (S + T + M) must equal injections (I + G + X). As a result, Equations (v) and (vi) are equivalent in the following way:

$C + S + T + M = C + I + G + X$ ……..(vi)

We can clearly distinguish amongst leakages and injections within economy and how the equivalence of leakages and injections leads to equilibrium by rearranging Equation (vii).

$$S + T + M = I + G + X \quad \text{.....(viii)}$$

Equation (viii) is rearranged to be consistent with Equation (ix) to symbolise the external deficit.

$$(S-I) + (T-G) = (X-M) \quad \text{.....(ix)}$$

Internal and external balances for economy are shown in equation (ix), where the budget balance (T–G) is called BUD, the saving-investment gap (S–I) is called SAG, and the current account balance (X–M), which includes unilateral transfers comprised of imports and exports, is identified as CAB in this study. This formula shows that a budget deficit (BUD), saving-investment deficit (SAG), or both can lead to an external deficit (CAB). In particular, a Twin Deficit happens when a budget deficit is the primary cause of the external deficit. Moreover, the saving-investment gap often arises due to insufficient domestic savings compared to investment needs, a condition frequently aggravated by the presence of a twin deficit, thereby giving rise to a Triple Deficit as supported by Magoti et al., (2020). Likewise, Bayramoğlu and Öztürk (2018) describe the TDH as a "balance of imbalance," meaning it reflects a state in which the two key internal economic balances—fiscal and saving-investment—are both in deficit, and this is counterbalanced by an external deficit, collectively highlighting deeper macroeconomic vulnerabilities.

2.2 Empirical

Arif et al. (2024) examined the triple deficit hypothesis (TDH) amongst Group of Seven and Developing Eight. Finding of mean group (PMG) and mean group (MG) indicated weak evidence supporting either the twin or triple deficit hypotheses in both the short and long term. In contrast, Okafor et al. (2021) studied the TDH in Sub-Saharan Africa (SSA) using panel secondary data and PMG-ARDL techniques. They found support for the TDH in SSA. Similarly, Workneh, (2021) again from SSA tested triple deficit hypothesis. His investigation used secondary data from World bank that cover period from 1980 to 2018 and included total of 35 Sub African countries. The co-integration test results indicated a long-run relationship amongst government budget balance, the current account balance, and the private saving-investment balance. Thus, his study conclude that the triple deficit hypothesis holds true.

Magoti, Mabula and Sende, (2020) from East African Countries (EAC) investigated to examine the relevance of triple deficit hypothesis. Their study used secondary data from IMF for time period of 2004 to 2018. Finding of granger causality established that both fiscal balance and savings investment associated with increase current account balance for EAC. Thus, their study concluded that there is no triple deficit hypothesis in EAC.

Azizullah and Wajid (2017) conducted a triplet deficits hypothesis in Pakistan for the time spanning from 1980 to 2014 and the units of analysis were fiscal deficit, current account equilibrium and capital and financial account equilibrium. Income expenditure approach is developed for co integration and the ARDL bound methodology approach was also applied. The empirical findings revealed that, triple deficit hypothesis for Pakistani data is validated by finding of co-integrated association of current, budget and financial account deficit (Azizullah and Wajid, 2017).

Manamba (2017) conducted a study on the twin deficits hypothesis in Tanzania, utilizing secondary data spanning from 1966 to 2015. The research focused on key variables including the budget balance, current account balance, household disposable income, domestic investment, and exchange rates. Using co-integration analysis, an Error Correction Model (ECM), and the Granger causality test, the findings revealed that budget deficits, current account deficits, real GDP, real exchange rate, and interest rates were co-integrated demonstrating a stable long-term relationship among these macroeconomic variables. The investigation provided strong evidence of a linkage between fiscal and current account balances. Furthermore, the influence of fiscal deficits on the current account deficit supported the Keynesian perspective in the context of Tanzania. Additionally, the Granger causality test indicated a one-way causal relationship from the budget balance to the current account balance.

Despite numerous previous studies conducted emphasis on the Triple Deficit Hypothesis (TDH) across global and regional backgrounds, a noteworthy gap exists in country-specific examinations, predominantly for Tanzania. Previous studies for instance Okafor et al. (2021) and Workneh (2021) focused broadly on Sub-Saharan Africa using panel data across multiple nations, which might disguise country-specific dynamics due to heterogeneity in economic structures and policy frameworks. Their results, though supportive of TDH, do not separate Tanzania's unique macroeconomic behaviour under TDH.

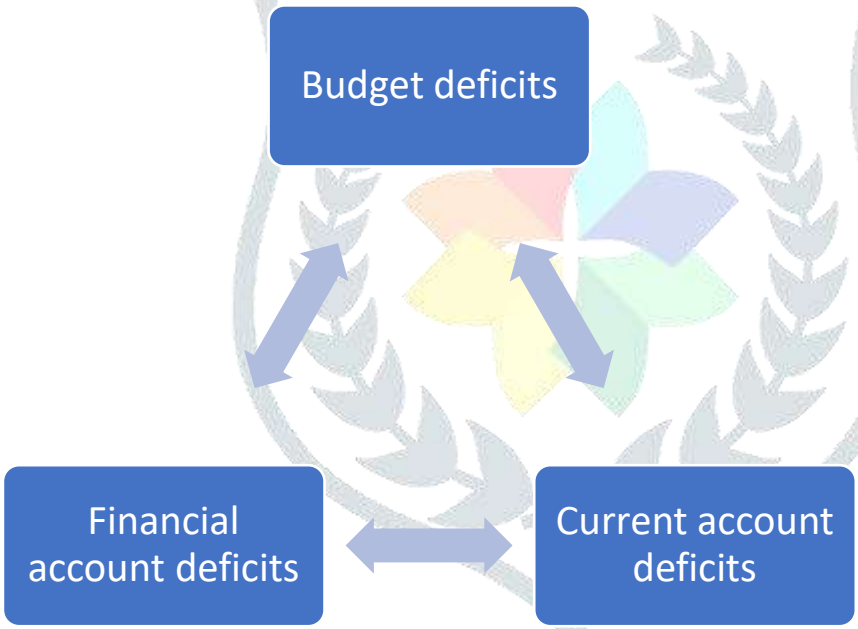
Also, while Magoti, Mabula, and Sende (2020) investigated the East African countries, their results showed insignificant short-run effects, signify either structural differences or data limitations in regional analysis. Yet again, Tanzania-specific results were not separated. The only Tanzania-focused study, Manamba (2017), tested the twin deficit hypothesis and not the full triple deficit framework, leaving the saving-investment gap examined. Thus, study of TDH in Tanzania using updated data and expanded variables remains unexamined. Also, Arif, Maryam, and Arif (2024), though offering advanced econometric methods (PMG and MG estimators) on G7 and D8 countries, conclude no long-run validation of TDH, distinct results from SSA studies. This divergence highlights the importance of Tanzania background, further justifying a focused Tanzanian study. Given these gaps, the current study Tanzania-specific empirical evidence on TDH using Tanzania time-series secondary data,

2.3 Conceptual Framework

The theoretical foundation of the Triple Deficit Hypothesis (TDH) originates from the national income identity, highlighting the interconnection amongst the savings gap, budget deficit, and current account deficit. The hypothesis is rooted in Keynesian economic thought, where the coexistence of budget and current account deficits contributed to disequilibrium in the financial account, forming the "triple deficit." Traditional economic models, including those related to loanable funds and capital flows, specify that the influence of fiscal balances on the financial account is ambiguous. A fiscal deficit, seen as negative savings, can raise domestic interest rates, attracting foreign capital and improving the financial account. However, an alternative pathway exists through the exchange rate mechanism, where a twin deficit can lead to a real exchange rate appreciation, making domestic assets more expensive and worsening the financial account.

Also, the study argues that under the TDH framework, exchange rate policies might exert greater influence than interest rate policies. The hypothesis posits a directional causal association from budget balance to current account balance and subsequently to the financial account balance (FA), or directly from BB to FA. Evidence supporting this framework is often established using asymmetric causality tests, which assess whether bidirectional relationships exist amongst budget deficits and current account deficits, and between current account deficits and savings gaps. The confirmation of such relationships recommends the presence of a triple deficit in an economy, as supported by numerous studies including those by Mehrara and Zamanzadeh (2012), Sen and Kaya (2016).

Figure 2.2: Conceptual Framework



Hypotheses of the study

The following are null hypothesis based on conceptual framework in figure 1.

$H_0 =$ Current account deficits does not granger cause budget deficits

$H_0 =$ Current account deficitsdoes not granger cause financial account deficits

$H_0 =$ Budget deficits does not granger cause current account deficits

$H_0 =$ Budget deficits does not granger cause financial account deficits

$H_0 =$ Financial account deficits does not granger cause current account deficits

$H_0 =$ Financial account deficits does not granger cause budget deficits

3. Methodology

This study used deductive which begin with testing theory, development of hypothesis and generally emphasize on causality based on the quantitative research. The study employed a statistical research design since the nature (time series variables) data influence the choice of research designs as argued by Cox, and Reid, (2000). Statistical study design includes testing the hypothesis so that appropriate data that can be analysed by statistical methods expose the valid results and make clear conclusions based on the objective. The current

investigation employed secondary data extracted from Bank of Tanzania (BoT). Thus, the study analyzed the data spanning for the period of 48 years (1976-2024).

In measurement of variables, current account deficits, budget deficits and capital/financial account are measured in million Tanzania shillings but latterly were scaled into percentage of nominal GDP to overcome a significant variation of data. The variables are scaled as the percentage of nominal GDP because in most developing economies like Tanzania there are more repeatedly subject to unfavourable terms of trade shocks (Mwamkonko, 2022). Similar previous empirical studies that employed the same variables as this study on the Triple Deficit Hypothesis include Tang (2014), who analyzed the U.S. economy from 1968 to 2009 using fiscal deficits (general government saving), current account deficits (CA), and capital and financial account deficits (including changes in reserves, FA). Likewise, Ali and Kakar (2017) applied the same set of variables—fiscal deficit, current account deficit, and capital and financial account deficit—to test the existence of triple deficits in Pakistan using data from 1980 to 2014.

Table 1: Measurement of variables

Variable	Definition	Source
CAD	Current account deficits scales as a percent of GDP	Bank of Tanzania [BOT, (2024)]
BD	Fiscal/Budget account deficits scaled as a percent of GDP	BOT, (2024)
FA	Net capital and financial account deficit scaled as a percentage of GDP	WDI website: World Development Indicator (WDI),
GDP	Natural logarithm of nominal GDP	BOT, (2024)
ER	Natural logarithm of exchange rates	BOT, (2024)

3.1 Data Analysis Methods

Before examining the relationship amongst financial account, budget account and current account deficit, first study estimate the finding of the stationarity of the series. In current study both ADF and PP was used to test for unit root. This test is noteworthy since numerous economic operations is subjected to variations for instance government policy, money crisis and political instabilities (Dickey and Fuller, 1981).

3.1.1 Autoregressive Distributed Lag (ARDL) Bound Testing Approach

Finding of ADF test confirmed, inform us about the order of integration of the given series. For which suggested the appropriate models to be used in the course of testing the applicability of Triplet deficits hypothesis. ARDL test as established by Pesaran et al. (2001) is suitable in examining the existence of co integration linkage or cointegration and has more advantages compared to other co integration tests. Firstly, Autoregressive Distributed Lag methodology performed by variables with dissimilar order of co integration

(Pesaran & Pesaran, 1999). Secondly, the ARDL methodology is appropriate for small sample sizes, as recommended by Pesaran et al., (2001). One of the main advantages of the ARDL approach is that it offers unbiased and consistent long-run estimates even in small samples, unlike other cointegration techniques (e.g., Johansen), which require larger datasets for reliable results.

Third, the ARDL model efficiently to estimates short-run and long-run relations. Fourth, when a unique long-run relationship exists, the ARDL method clearly distinguishes between dependent and independent variables, assuming a single reduced-form equation linking them (Pesaran & Shin, 1999; Pesaran et al., 2001). Fifth, the issue of endogeneity is minimal, as each variable is modeled independently, reducing the likelihood of residual correlation. Lastly, the ARDL approach can identify cointegrating vectors even when multiple such vectors are present (Pesaran et al., 2001). Therefore, this study finds ARDL suitable, as the data meet the required condition of mixed order integration (see Table 4.1), allow to estimate short and long run effects.

The presence of a long-run connexion amongst variables in the ARDL model is tested using the F-statistic (Wald test). If the F-statistic exceeds the upper bound critical value, the null hypothesis of no long-run relationship is rejected, indicating cointegration. If it falls below the lower bound, the null cannot be rejected. However, if the F-statistic lies between bounds, the result is insignificant (Pesaran, 1999; Pesaran et al., 2001). Considering these testing procedures, the mixed order of integration among the variables (budget deficit, current account, and financial account), and the suitability of ARDL for small sample sizes, this study applies the ARDL approach to study the triple deficit hypothesis in Tanzania.

F-statistic (Wald test) is used to determine whether there is a long-run connection among the variables. A substantial long-term relationship is shown if the calculated F-statistic is larger than critical value. The ARDL approach is seen to be relevant for this study because of its benefits, which include its flexibility in handling variables with varying orders of integration, capacity to estimate both short- and long-run dynamics, and suitability for small sample numbers. More specifically, the ARDL model has been applied to test TDH in Tanzania since the variables used to measure the budget deficit, current account, and finance account show mixed integration orders. Equation x; represents the ARDL (p,q1,q2,......qk) model specification.

$$\Phi(L,P) = \sum_{i=1}^{k} \beta_i (L, q_i) x_{it} + \delta w_t + u_t \quad \text{(x)}$$

F-test compares the alternative of H_1:δ_1≠0,δ_2≠0,δ_3≠0 against the null of no co integration defined by H_0:δ_1=δ_2=δ_3=0 from equation (x) ADL. Whether the variables are I(0) or I(1), the F-statistic's asymptotic distribution is non-standard. Two groups of suitable critical values were tabulated by Pesaran et al. (2001). In one set, all variables are assumed to be I(1), whereas in another, all variables are assumed to be I(0). This results in a band that includes all conceivable variable classifications into I(0), I(1), and even slightly integrated. The null hypothesis is rejected if the calculated F-statistic is larger than critical value, demonstrating the presence of cointegration. The F-statistic indicates no cointegration if it is less than or below the crucial value.

3.1.2 Granger Causality test

Granger causality Wald test, when used alongside cointegration tests which helps determine the direction of causality amongst variables and identify which variable serves as a predictor for another. In a VAR framework, each variable is clarified by its own past values. If past values of variable X help predict variable Y, then X is said to Granger-cause Y, indicating uni-directional causality. In some cases, both variables may Granger-cause each other, suggesting bi-directional causality.

The specification for Granger-causality for three variables is indicated in equation (xi) to (xiii) is as follows:

$$BD_t = \propto + \sum_{j=1}^{l} \beta_t CAD_{t-1} + \sum_{j=1}^{l} \gamma_j BD_{t-1} + \sum_{j=1}^{l} \delta_j FA_{t-1} + \mu_{1t} \text{..........................(xi)}$$

$$CAD_t = \theta + \sum_{j=1}^{l} \sigma_j BD_{t-1} + \sum_{j=1}^{l} \lambda_j CAD_{t-1} + \sum_{j=1}^{l} \varphi_j FA_{t-1} + \mu_{2t} \text{.......................(xii)}$$

$$FA_t = \psi + \sum_{j=1}^{l} \rho_t CAD_{t-1} + \sum_{j=1}^{l} \Phi_j BD_{t-1} + \sum_{j=1}^{l} \eta_j FA_{t-1} + \mu_{3t} \text{......................(xiii)}$$

Where: BD stands for fiscal balance obtained from national account base; CAD stands for current account deficit on national account base; FA stands for net financial account; *l* stands for the length of lag term and "*t* "stands for time period (yearly).

4. Findings

4.1 Diagnostic Test

This section present findings. Before presenting the main findings, study first present diagnostic test for example unit root test and Optimal lag length selection. Finding of ADF and PP test indicated in Table 2 which show that for ADF and PP test shows comparable conclusion. Current account deficit and budget account deficit variables were found non-stationary at level either with constant trend, while financial account variable was stationary at level with constant and trend. However, those variables after performing the first difference they become stationary. However, after convert variables into first difference they become stationary at a 1 percent level of significant indicated by critical level. This allows us to conclude that our results are reliable because the variables are stationary, meaning there is no risk of getting misleading (spurious) regression results in the next steps of our analysis.

Table 2: Unit Root Test

Augmented Dickey Fuller test					**Phillip Perron (PP) test**			
	Level		First Difference Δ		Level		First Difference Δ	
	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend	Constant	Constant & Trend
CAD	-3.284	-3.09	-7.429	-7.358	-3.3319	-3.246	-7.646	-7.554
BD	-2.205	-2.401	-7.371	-7.303	-2.229	-2.504	-7.521	-7.499
FA	-5.331	-5.335	-10.259	-10.118	-5.384	-5.372	-13.027	-12.78
1% critical Level	-3.655	-4.251	-3.662	-4.26	-3.655	-4.251	-3.662	-4.26

Before applying the ADL or ECM models, this study first determined the optimal number of lags, which made it possible to carry out the Johansen test. The test included a linear trend in the data and used one lag for the differenced endogenous variable. Table 3 presents the results, where the Akaike Information Criterion (AIC)

was applied to determine the most suitable lag length by identifying the lowest value. Based on the AIC, along with the Hannan-Quinn Information Criterion (HQIC) and the Schwarz Bayesian Information Criterion (SBIC), the optimal lag length was identified as one. Based on these results, the study confirms that using a maximum lag length of two for each variable is appropriate. According to Lutkepohl (2008), recommended that, Schwarz Bayesian Criterion (SBC) is more powerful compared to others information criteria, we rely on the Schwarz Information Criterion (SBIC) since it is consistent information criterion which applied when using small observation samples whereby after the lags the number of observations reduced to 44. Mainly, considering the observations available for modelling the relationship the maximum number of lag for the variables included in model was selected as two (m=2).

Table 3: Optimal Lag Length Selection-order criteria

Lag	AIC	HQIC	SBIC	*p-value*
0	17.6527	17.6988	17.7847	
1	16.6184*	16.8026*	17.1463*	0.000
2	16.9843	17.3067	17.9080	0.849
3	17.1835	17.6441	18.5031	0.288
4	17.5178	18.1166	19.2333	0.743

4.2 Long Run Co-integration

The model specification from the previous chapter of ARDL model from equation (xi) to (xiii) for testing the triplet deficit hypothesis that presents the association of variables of interest included in current study (i.e. CAD, BD and FA). The existence of long-run co integration connection for the triple deficits variables was examined by calculated F-test statistic. Findings from estimated parameters suggest that there is a long run connection among current account deficit and fiscal account balance which means that current account deficit has a long run association with budget account deficits at 5% significant level (p-value=0.011) and budget account deficit has a long run connection with current account deficits at a significant level of 5% (p-value=0.018) this findings confirm that there exist a twin deficit hypothesis in the long run for the study period in Tanzania.

Table 4: Autoregressive Distributed Lag Estimates

	Variables	**Coefficient**	**Std. Error**	**t**	**p-value**	**R-Squared**
FA	CAD	0.35	0.2414	1.45	0.157	0.0794
	DB	-0.3661	0.6298	-0.58	0.565	
CAD	BD	1.0946	0.4036	2.71	0.011**	0.2609
	FA	0.1782	0.1213	1.47	0.152	
BD	CAD	0.1574	0.0629	2.5	0.018**	0.2083
	FA	-0.0354	0.0492	-0.72	0.477	

*** denotes statistical significance at 5% level*

4.3 ARDL Bounds Testing Approach to Co integration

Table 5 show a long-term relationship exists amongst the current account deficit and budget deficit, supporting the twin deficit theory. By incorporating the financial account (FA), the concept expands to the TDH. The

ARDL model employed to examine this long-run connection by applying the F-statistic, which determines whether the lagged levels of the variables in the error correction model are jointly significant. The null hypothesis (H_0: $\delta_1 = \delta_2 = \delta_3 = 0$) suggests there is no long-term link between BD, CAD, and FA. If the F-statistic exceeds the upper critical bound, the null hypothesis is rejected, indicating the presence of a long-run relationship. Conversely, if it is below the lower bound, the null is not rejected. However, if the F-statistic lies between lower and upper bounds, the outcome is inconclusive, and further unit root tests are required to determine the variables' order of integration.

Findings from the Table 5 reveals that F(CAD-BD, FA)= 22.965 which is much higher that the upper critical value bound of the 1% significance level, critical value bound 7.438, conclusively we reject the null of no long run connexion amongst fiscal account deficit, financial account deficits and current account deficits. Second relationship F(BD-CAD, FA) provides the confirmation in existence of the long run relationship of the triplet deficits variables as indicated by the F-statistic value of 23.489 which surpass the upper bound of 7.438 at 1% level of significant. The last presentation of F(FA-CAD, BD) were significant at 1% level by the F-statistics value which surpass the upper critical bound of 7.438.

Finding is consistent with Ali and Kakar (2017) whom in their findings suggested that their overall F-statistic in three relationships, for budget account, financial account and current account variables were exceeding the critical values significantly and hence suggest that all the three series (BB, FA, CA) are co integrated in long run and confirm the presence of TDH in Pakistan. The outcomes align with those of Okafor et al. (2021) in the Sub-Saharan African (SSA) context, where the Pooled Mean Group-Autoregressive Distributed Lag (PMG-ARDL) approach confirmed the presence of the TDH. Their findings indicated a bidirectional causal connection amongst current account balance and the budget balance, as well as between the saving gap and the current account balance, along with a one-way causality flowing from the budget balance to the saving gap.

Workneh (2021), using data from Sub-Saharan Africa (SSA), found that current account deficits are mainly influenced by the gap between private savings and investment, as well as by government budget deficits. Moreover, co-integration test exposed a long-term positive relationship among the government budget balance, current account balance, and the private saving-investment balance. In addition Tang (2014) who reported the existence of triplet deficit hypothesis in US, he found that ARDL model rejected the null hypothesis for no long-run co integration relationship for FA, CA and BB for one relationship only and other two relationships F(BB|CA, FA), and F(CA|BB, FA), triplet deficits phenomena were confirmed by the error correction term approach with the decision rule proposed by Oskooee and Brooks (1999). Conclusively, these statistically significant findings provide the proof for the existence of long-run connexion of triple deficits variable and consistently with previous empirical of triple deficits hypothesis for the case of Tanzania in the long-run association.

Table 5: ARDL Bounds Testing Approach to Co integration

Variables	F- Statistic	Critical values bound		Sig level
		I(0)	I(1)	
F(CAD-BD, FA)	22.965*	6.001	7.438	1%
F(BD-CAD, FA)	23.489*	6.001	7.438	1%
F(FA-CAD, BD)	9.403*	6.001	7.438	1%

** denotes statistical significance at 1% level*

5. Conclusion

The ARDL approach provides strong statistical indication of a long-term relationship amongst the triple deficit variables, supporting the presence of TDH in Tanzania. This is shown by the significant long-run associations among the variables. The findings align with previous studies by Ali and Kakar (2017), Okafor et al. (2021), and Workneh (2021), who also confirmed the TDH in Sub-Saharan Africa and Pakistan. Moreover, the estimated long-run coefficients reveal a two-way relationship amongst the current account deficit and the budget deficit, confirming the presence of the twin deficit hypothesis in Tanzania during the study period.

6. Recommendations

Based on the ARDL approach, which confirms a statistically significant long-run connection amongst budget deficit, current account deficit, and financial account deficit, it is recommended that policymakers in Tanzania adopt a coordinated fiscal and external sector policy framework. Since the empirical evidence supports the presence of the TDH in the long run, efforts to reduce the budget deficit should be prioritized, as it has long-term implications for the external balances. Fiscal discipline, efficient public expenditure management, and improved revenue mobilization are essential to reduce the pressure on both the current and financial accounts. Moreover, strategies aimed at enhancing export performance and attracting stable long-term capital inflows will help improve external balances and mitigate the adverse effects of persistent fiscal imbalances.

7. Limitations and Avenue for Future Research

This study associated with numerous limitations that influenced the depth and scope of its findings. Firstly, the analysis was constrained to a 48-year period (1976–2024) using five variables: budget account balance, current account balance. Had data been available from the country's independence in 1961, the results may have provided a more comprehensive considerate of the triple deficit hypothesis. Moreover, shorter time series limit the reliability of statistical inferences compared to longer datasets. Moreover, further studies could also extend the model by including additional macroeconomic variables such as public debt, inflation, and interest rates to assess their influence on the triple deficits. Lastly, while this study offers valuable empirical evidence, it lacks in-depth conceptual exploration of the underlying mechanisms of the triple deficit phenomenon, suggesting the need for more theory-driven investigations.

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