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Twin Deficit Hypothesis and Economic Growth in Nigeria

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Abstract: As economic turmoil extends across countries, discussions on fiscal policy have taken center stage. In particular, mounting fiscal and external deficits in many economies have revived interest in the Twin Deficit Hypothesis. This timely study empirically examines this hypothesis and economic growth in Nigeria from 1986-2022 using Toda-Yamamoto and ARDL models. Analysis uncovered a two-way relationship between budget shortfalls and trade gaps, backing the hypothesis. Short-term, inflated public borrowing and outlays hamper output, while improved external accounts and interest rates boost activity. However, currency depreciation slows near-term growth. Long-term, sustained budget and current account weaknesses, and higher borrowing costs drag on national output. But a weaker currency lifts competitiveness and long-run growth. To enable short and long-term expansion, findings underscored the criticality of fiscal prudence and constructive external positions.

Keywords: Twin Deficit Hypothesis, Fiscal Deficit, Current Account Deficit, Economic Growth.

1.0 INTRODUCTION

Macroeconomic stability remains an ongoing challenge for policymakers in Nigeria as the economy grapples with the simultaneous occurrence of adverse fiscal and external positions. As emphasized by Okafor et al. (2022), managing internal and external deficits is an integral priority for sub-Saharan African countries like Nigeria seeking to foster sustainable growth trajectories. However, despite repeated policy efforts at structural adjustment spanning debt relief programs in the 1980s and 1990s to public financial reforms under the 2017 Economic Recovery and Growth Plan, the country continues to exhibit remarkably high budget shortfalls and rising debt burdens concurrent with troubled current account balances (Efuntade, 2020).

Data from the Central Bank of Nigeria (CBN, 2021) reveals the severity of persistent twin deficits facing the economy. From 2015 to 2020, the federal deficit escalated substantially from ₦1,557.8 billion to ₦7,118.7 billion. Over the same period, external debt service payments quadrupled from ₦1,060.38 billion to ₦4,221.65 billion even as the current account deficit hovered around $15 billion. Consequently, GDP growth remained muted, fluctuating between 2.79% in 2015 and -1.92% in 2020. As Ayinde et al. (2021) caution, the unabated accumulation of public debt contributes to worsening current account deficits over time. Ultimately, this self-reinforcing cycle of high internal and external imbalances prompts macroeconomic crisis.

Therefore, investigating the validity of the twin deficit hypothesis (TDH) in Nigeria emerges as an urgent research priority. The TDH postulates that budget deficits lead to trade deficits, implying fiscal conditions directly impact the external position (Bilman&Karaoglan, 2020). Intuitively, rising fiscal deficits may boost imports and reduce export competitiveness, consequently worsening the trade balance. However, past empirical examinations of the TDH in Nigeria remain inconclusive. While studies like Okafor et al. (2022) and Ayinde et al. (2021) affirm the existence of twin deficits, Abu and Gamal (2019) found no relationship. Given the mixed evidence, this study sets out to formally test the presence of the TDH and quantify the extent of impacts on economic growth in Nigeria over the long-run.

As achieving fiscal consolidation and stability is tied closely to the economy's growth prospects, understanding deficit-growth linkages can guide strategic policy reforms. Building on past literature, the current study adopts recent data and robust econometric frameworks to produce updated, actionable insights for policymakers. This is important because demonstrating whether Nigeria exhibits the twin deficits phenomenon and tracing the ramifications on output is integral. Consequently, the study is guided by these research objectives- i) examines the causal relationship between fiscal deficit and the current account in Nigeria, ii) determines the impact of fiscal deficit on economic growth in Nigeria, and lastly, iii) ascertains the impact of the current account deficit on economic growth in Nigeria.

2.0 LITERATURE REVIEW

2.1 Conceptual Literature

2.1.1 Twin Deficit Hypothesis

The twin deficit hypothesis proposes that there is a causal link between a country's budget deficit and its current account deficit (Miller &Russek, 1989). Essentially, it suggests that rising fiscal deficits lead to increasing external imbalances. Bilman and Karaoglan (2020) define the twin deficit hypothesis as the notion that fiscal deficits trigger higher interest rates which attract capital inflows from abroad that then fund larger trade deficits.

2.1.2 Fiscal Deficit

The fiscal deficit occurs when a government's expenditures exceed its revenues in a given budget cycle (Hayes, 2020). Business Standards (2022a) notes that the fiscal deficit is measured as total spending minus total receipts, excluding debt. An expansive fiscal deficit points to excessive borrowing to finance government spending.

2.1.3 Current Account Deficit

The current account deficit results when the value of imports of goods and services exceeds the value of exports for a country (Banton, 2022). It signals that a country is spending more than it produces domestically. Persistent, large-scale current account deficits imply reliance on external financing and may heighten vulnerability to crisis (Amadeo, 2021).

2.1.4 Economic Growth

Following Business Standard (2022b), economic growth refers to the annual change in a nation’s total output and income arising from all domestic and overseas economic activity by its citizens. It captures the overall rise in production across sectors on a net basis after adjusting for inflationary impacts.

2.2 THEORETICAL LITERATURE

2.2.1 Mundell-Fleming Model

The theoretical foundation linking fiscal deficits with the trade balance and economic growth is underpinned by the seminal Mundell-Fleming model formulated by Fleming (1962) and Mundell (1963). The model analyzes the interaction between budget deficits and current account balances assuming perfectly mobile international capital flows. It postulates that fiscal expansion and higher domestic interest rates attract foreign capital inflows which leads to currency appreciation and cheaper imports, consequently worsening the trade balance (Olga, 2000).

However, some empirical examinations note reversals in the purported causality - for instance, a financial crisis triggered by substantial trade imbalances can plunge an economy into recession, which then widens budget deficits due to lower tax revenues and the need for countercyclical government expenditure (Amaghionyeodiwe& Akinyemi, 2015). Nonetheless, the Mundell-Fleming model's core theoretical contention that rising fiscal deficits induce downward pressure on the current account balance by expanding absorption and boosting aggregate domestic spending remains a pivotal foundation underlying the twin deficit hypothesis.

2.2.2 Ricardian Equivalence Hypothesis

The Ricardian Equivalence Hypothesis (REH) pioneered by Barro (1976) disputes the existence of any predictable relationship between a country's internal budget balance and its external current account position. As Advocates of REH contend, since forward-looking consumers rationally anticipate future tax obligations to repay debts incurred from sustained budget deficits, such government borrowing does not necessarily alter intertemporal budget constraints for individuals or boost real demand in the economy (Chang & Hsu, 2009). Thus, the REH directly challenges the validity of the twin deficits hypothesis by claiming that, given interest and exchange rates stability, no tangible link exists between fiscal deficits and trade imbalances.

2.2.3 Mainstream Economic Growth Models

Orthodox Keynesian macroeconomic theory advocates utilizing fiscal stimulus through budget deficits as a lever to multiply aggregate demand across supply chains during periods of low business confidence or contractions (Saleh, 2003). This output gain at the national level arises chiefly due to the presence of excess industrial capacity and liquidity constraints that curtail purchasing power for individuals, two key assumptions within the Keynesian framework (Dwivedi, 2010). By contrast, Neoclassical economists argue against discretionary fiscal expenditures, positing that such artificial stimuli primarily serve to distort free market self-regulating mechanisms. Moreover, higher public borrowing risks crowding out private investment spending (Taylor, 2009). Therefore, assessing Nigeria's specific experience by examining the empirical validity of the twin deficit hypothesis and tracing the ramifications of fiscal balances on external accounts and economic growth against the contrasting implications from these mainstream paradigms offers invaluable reference for policymakers.

From these theories, while some disagreements persist across models, established theoretical frameworks largely envisage a substantive role for a country's prevailing fiscal stance and budgetary conditions in decisively determining external positions and prospective macroeconomic outcomes. Accordingly, empirically evaluating both the existence and precise extent of these postulated impacts of budget deficits on the trade balance and growth trends in Nigeria emerges as an urgent multi-dimensional research priority to support the design of appropriate policy interventions.

2.3 THEORETICAL FRAMEWORK

This study on validating the twin deficit hypothesis and quantifying its impacts on economic growth in Nigeria is grounded in the Mundell-Fleming analytical model. The model provides the underlying theoretical basis linking a country's fiscal deficit with its current account balance (Fleming, 1962; Mundell 1963). The framework assumes an open economy with perfect capital mobility internationally. It postulates fiscal expansion through tax cuts or spending hikes raises domestic interest rates relative to global rates, making the economy more attractive for foreign financial capital inflows (Ball & Mankiw, 1995). Consequently, exchange rate appreciation occurs due to increased demand for local currency. This leads to reduced export competitiveness and increased imports expenditure due to higher purchasing power. The resulting deterioration of the trade account signifies the twin deficit hypothesis - an increasing budget deficit directly causes the current account deficit to widen (Miller &Russek, 1989).

Therefore, the Mundell-Fleming constructs the theoretical platform connecting rising fiscal deficits with higher external imbalances. It outlines twin deficits arising from appreciation of the local currency triggered by capital account flows responding to interest rate differentials linked to internal budget expansion. Accordingly, this mechanism serves as the framework adopted in this study, directing the empirical analysis to test for causation between budget and trade deficits and quantify the subsequent impacts on national output in Nigeria.

2.4 EMPIRICAL LITERATURE AND GAPS

Empirical Evidence on the Twin Deficit Hypothesis

Okafor et al. (2022) delved into the examination of current account, fiscal account, and financial account deficits within Sub-Saharan African (SSA) nations. Their exploration focused on discerning the correlation between these deficits and their implications for the African Continental Free Trade Area (AfCFTA). Employing panel data analysis techniques, specifically the Pooled Mean Group-Autoregressive Distributed Lag (PMG-ARDL) specifications, the study assessed the Twin Deficit Hypothesis (TDH) in the region. Variables such as current account balance, budget balance, savings gap, inflation rate, exchange rate, and interest rate were scrutinized. The findings revealed the existence of the TDH in SSA, demonstrating bidirectional causality between current account balance and budget balance, as well as between savings gap and current account balance. Additionally, unidirectional causality was observed from budget balance to savings gap. The study concluded that the TDH is applicable in SSA. It is important to note, however, that this cross-country analysis has limitations in providing an in-depth understanding of country-specific issues related to the twin deficit.

Similarly, Kiptui (2022) investigated the TDH in Kenya between 1980 and 2017. The validity of the hypothesis was tested using an ARDL model. Given the short time span of the data and the model's suitability for small samples, the ARDL model was used on a dataset of current account balances, budget deficits, real GDP growth rate, interest rate, and exchange rate. Budget deficits have direct positive effects on the current account, according to the findings. Budget deficits have significant indirect effects on the current account. The current account is influenced by budget deficits, interest rates, and the exchange rate. Increased budget deficits raise interest rates and causes the exchange rate to appreciate. The current account suffers as a result of this. As a result, the current account is heavily influenced by the real exchange rate. Budget deficits and the exchange rate, in the long run, dominate in explaining current account movements. The study concludes that Mundell-Fleming model and the twin deficit hypothesis are both supported by the findings.

Adopting the non-linear autoregressive distributed lag (NARDL) model and structural vector autoregressive (SVAR) model, Ayinde et al. (2021) investigated the validity of the TDH in Nigeria from 1981 to 2018, as well as the role of macroeconomic fundamentals in driving this hypothesis. Variables used for the analysis were fiscal deficit, current account deficit, the real exchange rate, the real interest rate, trade openness, and financial openness. The results obtained for the NARDL model support the validation of the TDH for the Nigerian economy, as evidenced by the granger causality test. Because long-run equilibrium exists, it was also determined that the twin deficits were primarily driven by Nigeria's financial and trade openness, as no significant shock effects of the twin deficits could be traced to any of the macroeconomic fundamentals. In conclusion, the study backs up the TDH in Nigeria, and it also shows that trade openness heightened the TDH.

Also, Eze (2020) used annual time series data from 1980 to 2019 to investigate the extent to which changes in budget deficits predict changes in Nigeria's current account balance. The analysis was carried out using the Vector Error Correction (VECM) Model and the Granger causality test. The variables used in the analysis were the current account balance, budget deficits, nominal exchange rate, and export rate. Within the sampled period, the study discovered that changes in budget deficits have a positive and significant long-run impact on Nigeria's current account balance. Second, the results of the systems equation revealed that there was a causal relationship between budget deficits and current account balance during the study period. The Granger causality tests, on the other hand, failed to reveal the causality's direction. The study concludes on the existence of the TDH.

Additionally, Abu and Gamal (2019) investigated the twin deficits hypothesis for Nigeria from 1981 to 2017 using the Autoregressive Distributed Lag (ARDL), Dynamic Ordinary Least Squares (DOLS), and the Toda-Yamamoto (T-Y) estimation techniques. The study used the variables of current account deficit, fiscal deficit, oil price, and interest rate in its analysis. The result of the cointegration test indicates that there is a long-run relationship between budget deficits and current account deficits, along with oil prices and interest rates. The result of the T-Y causality test shows that there is a one-way causality from current account deficits to budget deficits. Increases in budget deficits lead to increases in current account deficits in Nigeria in the short and long run, according to the estimates. In conclusion, the finding supports Keynesian claims about the TDH in Nigeria.

Empirical Evidence on Budget Deficit and Economic Growth

Investigating the effects of deficit financing on economic growth in the Sub-Sahara Africa, Abubakar (2021) employed the fully modified ordinary least squares and panel regression methodologies on a dataset spanning 1986 to 2020. The dependent variable for the study was Real GDP, which represents economic growth, while the explanatory variables were government budget deficit, government domestic debt, government external debt, government external reserves, and broad money supply. The study found that deficit financing is still the best option for achieving the much-desired rapid and sustainable economic growth in Sub-Saharan Africa, as long as the proceeds of the borrowed loans are invested in infrastructural and productive amenities that are likely to produce future streams of income to supplement domestic savings, which are widely believed to be the driving force behind industrialization.The study concludes that deficit financing can still achieve rapid, sustainable economic growth in Sub-Saharan Africa, provided the borrowed funds are invested in infrastructure and productive assets that generate future income streams to supplement domestic savings.

In a country specific study, Efuntade (2020) examined budget deficit and economic growth in Nigeria using annual time series data spanning the period of spanning from 2009 to 2019. The study employed the Error Correction Model (ECM) on an annual time series dataset of GDP, budget deficit, excess public expenditure, public revenue reduction, inflation rate, and unemployment rate. The study's empirical finding revealed that there is a positive significant relationship between budget deficit and economic growth in Nigeria for the period of its analysis. The study concludes that there is a significant positive relationship between budget deficits and economic growth in Nigeria from 2009-2019 based on ECM analysis of time series data.

Similarly, Mavodyo (2020) provided empirical evidence on the budget deficit economic growth nexus and growth-stimulating deficit spending channels in South Africa from 1980 to 2018. Relying on the Dynamic Ordinary Least Squares (DOLS)as estimation technique, the study carried out its analysis using the variables of GDP, budget deficit, gross fixed capital formation as a percentage of GDP, Consumer Price Index. The results of the empirical analysis revealed that if the budget deficit is channeled towards export-oriented industrialization of ores and metals, it promotes and stimulates growth.The study concludes that deficit spending can stimulate economic growth in South Africa from 1980-2018 if channeled towards export-oriented industrialization, based on DOLS analysis.

Also, Adesina and Olatise (2019) investigated the effect of deficit budgeting and financing strategies on economic growth in Nigeria for a period of thirty years, covering 1987-2016. It looked at the trends and effects of deficit budgeting, external financing, and domestic financing of the budget deficit, as well as the impact on Nigeria's economic growth. The study used the ECM as its estimation technique. The study's findings revealed that the effect of deficit budgeting on Nigerian economic growth is positive and significant, whereas external and domestic financing had a significant negative impact on Nigerian economic growth during the study period.The study concludes that deficit budgeting has a significant positive effect on Nigeria's economic growth from 1987-2016, while external and domestic deficit financing strategies have a significant negative impact, based on ECM analysis.

In addition, Goitsemodimo et al. (2018) used a panel cointegration approach to examine the political economy of budget deficits in the BRICS countries between 1997 and 2016, determining the long-run relationship between economic growth, budget deficits, inflation, and gross investment. The study's findings revealed a long-run equilibrium relationship between economic growth and the variables studied. Furthermore, for the period under consideration, there is a positive relationship between budget deficit, inflation, and economic growth for the BRICS countries. Finally, the findings support the hypothesis that the budget deficit and economic growth are linked in both directions.The study concludes that there is a long-run equilibrium relationship and positive association between budget deficits, inflation, and economic growth in BRICS countries from 1997-2016, based on panel cointegration analysis.

Empirical Review on Current Account Deficit and Economic Growth

Beirne and Volz (2020) studied the impact of current account imbalances in major surplus (Japan, Germany, and China) and deficit (the US and the UK) countries. Using a structural vector autoregression (SVAR) framework, they found that positive shocks to current account balances in China, Germany, and Japan lead to positive regional and global growth effects, with Japan having notable spillovers to regional growth. The study emphasized that global growth responses are smaller than regional ones, especially with the amplifying effect of global value chains. Growth responses in deficit countries are generally lower. A positive shock to the UK's current account had marginal positive effects on global and regional growth, while a positive shock to the

persistent US current account deficit slightly hampered global growth. Overall, the study concluded that surpluses in China, Germany, and Japan generate significant positive growth spillovers, especially for Japan, while deficits in the US and UK have smaller effects, considering macroeconomic factors and global value chains.

In a similar study, Velmurugan and Jyoti (2020) assessed public debt, current account deficit, and economic growth in India using an annual time series data set spanning the period of 1998 to 2019. The study used the Vector Error Correction Model (VECM) on a dataset of India's GDP, gross external debt, internal debt, and current account deficit. The results show that there is a long-run relationship between the variables, but the study fails to find short-run causality between them. External debt, internal debt, and the current account deficit all have a negative and statistically insignificant relationship with GDP, according to the findings. It was concluded that an increase in public debt and a current account deficit leads to a reduction in GDP growth.The study concludes that public debt and current account deficits have a negative but statistically insignificant relationship with economic growth in India from 1998-2019, based on VECM analysis of time series data that found long-run linkages but no short-run causality between the variables.

Bringing the analysis to Nigeria, Sanni et al. (2019) investigated the connection between Nigeria's current account balance and economic expansion. Using annual data spanning the years 1970 to 2016, Auto Regressive Distributed Lag (ARDL) Bounds testing methodology was used to examine the relationship. The study discovered a long-term relationship between the current account balance, the real gross domestic product (GDP) growth, and the bilateral real exchange rate in Nigeria using the variables of current account balance, real GDP growth, and exchange rate. The study's discovery of a positive correlation between real GDP growth and the current account balance suggests that an increase in real GDP growth would result in a strengthening of the current account balance. However, the study discovered a negative relationship between the real exchange rate and current account balance, showing that a decline in the exchange rate would cause the current account balance to deteriorate.The study concludes that real GDP growth has a positive long-run relationship with Nigeria's current account balance from 1970-2016, while the real exchange rate is negatively related, based on ARDL bounds testing of time series data.

Ozer et al. (2018) used ARDL bounds testing to explore Montenegro's current account deficits and their link to economic growth from Q3 2011 to Q4 2016. Analyzing variables like GDP, inflation rate, government balance/GDP, current account balance/GDP, net FDI/GDP, external debt/GDP, gross reserves/GDP, and credit to the private sector/GDP, the study found long-run relationships in the model. Results indicated a causal connection between current account deficits and growth in both short and long terms. Short-term findings suggested a negative correlation between changes in the GDP ratio, current account deficit, and GDP growth rate. In essence, an increase in the current account deficit to GDP ratio corresponded to a decrease in the GDP growth rate and vice versa. However, the ratio of the current account deficit to GDP had a positive long-term impact on GDP growth. The study concluded that Montenegro's current account deficit had a negative short-run but a positive long-run relationship with economic growth during the specified period.

Lastly, Ogunniyi et al. (2018) examined the economic performance and current account balances of SANE countries- South Africa, Algeria, Nigeria, and Egypt, focusing on the impact of each country's current account balance on economic growth. Employing Fully Modified Panel OLS (FMOLS) and the ARDL estimation technique with variables including real GDP, current account balance, real exchange rate, real interest rate, oil price, trade openness, and financial openness, the study found that while South Africa experiences a significantly positive impact of current account

balance on economic growth, Algeria, Egypt, and Nigeria exhibit a significant negative impact. This suggests that an economy's structure, relative to its primary source of foreign exchange earnings, determines the impact of its current account balance on economic growth. The study concludes that the varying impacts of current account balance on economic growth across SANE countries indicate a significant positive effect in South Africa but a significant negative effect in Algeria, Egypt, and Nigeria. This underscores the influence of an economy's structure on the relationship between current account balance and economic growth.

From the review above, this study provides a fresh perspective on Nigeria, differentiating itself from existing literature in several significant ways. Unlike recent works such as Okafor et al. (2022), Ayinde et al. (2021), Eze (2020), and Abu and Gamal (2019) that exclusively focused on the federal level deficit, this research introduces a comprehensive fiscal deficit measure, encompassing all three tiers of government. This approach takes into account the intricate relationship between the fiscal deficit, current account deficit, and economic growth. Additionally, the study employs the net national product as a more inclusive measure to capture economic growth, a choice particularly valuable as the research considers external balance, ensuring a more holistic understanding of economic growth.

3.0 METHODOLOGY

3.1 Nature and Sources of Data

The study utilized secondary data, specifically annual time series data covering the period 1986-2021. Fiscal deficit data, which integrates deficits across federal, state, and local levels for a more comprehensive dataset than federal data alone, along with current account deficit, interest rate, and exchange rate data were obtained from the Annual CBN Statistical Bulletin. Additionally, data on Gross National Product was sourced from the World Bank Database.

3.2 Estimation Technique

To fulfill the initial objective of assessing the twin deficit hypothesis in Nigeria, the study employed the Toda-Yamamoto (T-Y) Granger causality method. This approach, developed by Toda and Yamamoto (1995), addresses non-stationarity and lack of co-integration issues. Unlike the Ordinary Granger Causality approach, the T-Y method is suitable for variables with varying levels of integration, minimizing the risk of misidentifying the order of integration. Notably, it enables the estimation of variables in their levels without the necessity of transforming them into a Vector Error Correction Mechanism (VECM).

To address the second and third study objectives, which involve investigating the impact of fiscal deficit and current account deficit on economic growth in Nigeria, respectively, the study utilized the Autoregressive Distributed Lag (ARDL) model. This model, as proposed by Pesaran et al. (2001), facilitates the modeling of the relationship between economic variables in a single-equation time-series setup. Distinguished by its autoregressive nature, the ARDL model incorporates both lagged dependent variables and a distributive lag component in the form of successive lag independent variables. This model offers several advantages over conventional co-integration techniques, including superior performance with small sample sizes, simultaneous testing of short-run and long-run relations, unbiased estimates for the long run, valid t-tests when some regressors are endogenous, and testing variables regardless of whether they are of difference order zero or order one.

The ARDL method encompasses four steps. After conducting a stationarity test, the first step involves checking for co-integration using the bounds testing procedure (Pesaran, 1997; Pesaran et al., 2001). The second step entails estimating the coefficients of the long-run relationships,

determined by an appropriate lag length selected through criteria like Akaike Information Criterion (AIC), Schwarz Information Criterion (SBC), or the log-likelihood ratio test (LR) for the ARDL model. This ensures accurate identification of the model's true dynamics based on the existence of long-run relationships among the variables. The third step involves estimating the short-run dynamic coefficients. The fourth and final stage includes testing the model's stability using CUSUM and CUSUMSQ tests.The ARDL model is written as;

$$Y_t = \alpha_0 + \phi_t Y_{t-1} + \beta_t X_{t-1} + \varepsilon_t \qquad 1$$

where, Y_{t-1} and X_{t-1} are time series variables, ε_t is the vector of the stochastic error term. Generally, the model can also be defined as ARDL (p, q) the p and q are lag of the parameter which forms the Equation (3.2);

$$y_t = \alpha_0 + \sum_{i=0}^{p} \phi_i y_{t-1} + \sum_{j=0}^{q} \beta_j x_{t-1} + \varepsilon_t \qquad 2$$

3.3 Model Specification

The analysis employed two models. To carry out the first objective of the study, this study adopted the work of Eze (2020). Consequently, like Eze (2020), the study's causal variables were limited to the variables of interest which are the current account deficit and the fiscal deficit. As such, the causal model specification for the T-Y procedure are given in Equations [3] and [4];

$$LnCAD_t = \alpha_0 + \sum_{i=1}^{k} \varphi_{1i} LnCAD_{t-1} + \sum_{j=k+1}^{k+d\max} \varphi_{2j} LnCAD_{t-j} + \sum_{i=1}^{k} \lambda_{1i} LnFD_{t-1}$$

$$+ \sum_{j=k+1}^{k+d\max} \lambda_{2j} LnFD_{t-j} + \varepsilon_{1t} \qquad 3$$

$$LnFD_t = \beta_0 + \sum_{i=1}^{k} \phi_{1i} LnFD_{t-1} + \sum_{j=k+1}^{k+d\max} \phi_{2j} LnFD_{t-j} + \sum_{i=1}^{k} \varpi_{1i} LnCAD_{t-1}$$

$$+ \sum_{j=k+1}^{k+d\max} \varpi_{2j} LnCAD_{t-j} + \varepsilon_{1t} \qquad 4$$

where, α_0 and β_0 are the intercepts; φ, λ ϕ and ϖ are the parameters of the model; ε_t represents the residuals of the models; *k* denotes the optimal lag length; *dmax* is the maximum order of integration suspected to occur in the system; *LnCAD* represents the natural log of Nigeria's current account deficit, while *LnFD* stands for the natural log of fiscal deficit.

This study followed the approach of Ayinde et al. (2021) for its second and third objectives. In contrast to Ayinde et al.'s, which included a broader set of variables like trade openness and financial openness, this study focused on a more concise set: current account deficit, fiscal deficit, real exchange rate, and real interest rate. This adaptation aimed to address the second and third objectives more effectively, providing a focused and refined analysis directly related to the twin deficit hypothesis.As such the study models economic growth as a function of current account deficit, fiscal deficit, the real exchange rate, and the real interest rate. The functional and econometric forms of the models are given in Equations[5] and [6] respectively;

$$GNP=f(CAD,FD,EXR,INT) \qquad 5$$

$$GNP_t = \alpha_0 + \alpha_1 CAD_t + \alpha_2 FD_t + \alpha_3 EXR_t + \alpha_4 INT_t + \varepsilon_t \quad 6$$

***Apriori* Expectation:** FD > 0, CAD, EXR, INT < *0.*

where, α_0 is the intercept; $\alpha_1, \alpha_2, \alpha_3$ and α_4 are the coefficients of the variables; ε_t represents the error term, *GNP* represents economic growth, *CAD* stands for the current account deficit, *BD* represents budget deficit, *EXR* is the exchange rate, while *INT* represents interest rate in Nigeria.

3.4 Pre-Estimation Tests

Before estimating the models, the dataset is subjected to preliminary diagnostics- descriptive statistics, unit root tests, and optimal lag selection. The descriptive statistics summarize the distributional features of the data including spreads, skewness, kurtosis, and normality to check variability and dispersion (Greene, 2012). Unit root tests via Augmented Dickey Fuller (ADF) and Phillips Perron (PP) examinations assess stationarity of the time series variables at levels and first differences, which informs the appropriate specification (Dickey & Fuller 1979; Phillips &Perron 1988). Lastly, the optimal lag length for the Toda Yamamoto procedure relies on sequential LR and other information criterion assessments for model selection (Toda & Yamamoto 1995).

3.5 Post-Estimation Tests

After fitting the models, the residuals undergo diagnostic checks to verify model adequacy and the reliability of conclusions. For the Toda Yamamoto estimations, the VAR residual serial correlation LM test examines autocorrelation while the inverse roots AR polynomial assesses coefficient stability. For the ARDL framework, the Breusch Godfrey LM test evaluates residual autocorrelation and the CUSUM & CUSUMSQ plots determine structural stability (Brown et al., 1975). Rejecting the null hypotheses across these tests would necessitate requisite remedial measures. Overall, ensuring the models satisfy requisite statistical assumptions is vital for policy insights.

4.0 RESULTS AND DISCUSSION OF FINDINGS

4.1 Descriptive Statistics

Table 1: Descriptive Statistics Result

	GNP	FD	CAD	INT	EXR
Mean	4.888678	-1513.448	941033.2	23.96486	131.1854
Maximum	14.28384	38.71550	4810028.	36.09000	425.9792
Minimum	0.078427	-10469.25	-3033485.	12.00000	1.754523
Skewness	0.867557	-2.072339	0.654889	0.165574	0.910852
Kurtosis	2.914200	6.397720	3.672060	3.012185	3.034101
Jarque-Bera	4.652720	44.28107	3.341071	0.169287	5.117979
Probability	0.097651	0.000000	0.188146	0.918840	0.077383
Observations	37	37	37	37	37

Source: Author's computation using E-views.

The descriptive statistics reveal considerable variance and non-normal distributions in the data. All variables show large gaps between minimums and maximums relative to the means, indicating substantial spread. Skewness measures suggest asymmetry, with positive skewness for GNP and EXR, high negative skewness for FD, and near symmetry for others. Kurtosis points to leptokurtic distributions with fat tails for all variables. Jarque-Bera statistics reject normality for FD but results are ambiguous for other variables. With 37 observations per variable, the data provides an

adequate sample size. Key insights include high variability, asymmetry, heavy tails, and non-normal distributions - providing context for further analysis.

4.2 Unit Root Test

Table 2: ADF & PP Unit Root Test Results

Variable	ADF Stat.	Order of Integration	PP Stat.	Order of Integration
GNP	-4.000880 (-3.540328)	1(0)	-4.871344 (-3.540328)	1(0)
FD	-5.265012 (-3.544284)	1(1)	17.11784 (-3.540328)	1(0)
CAD	-5.833292 (-3.548490)	1(1)	-10.22647 (-3.544284)	1(1)
INT	-4.485122 (-3.540328)	1(0)	-4.130911 (-3.540328)	1(0)
EXR	-6.377976 (-3.544284)	1(1)	-4.478264 (-3.544284)	1(1)

Figures in parenthesis represents the critical values at the 5% level

Source: Author's computation using E-views.

The ADF and PP unit root tests results show fiscal deficit, current account deficit, and exchange rate achieve stationarity at first differences while GDP and interest rates are stationary at levels. This mix of I(0) and I(1) variables suits applying ARDL bounds testing which accommodates different integration orders. Overall, the unit root tests fulfill model preconditions.

4.3 Causality Estimation

4.3.1 The Lag Length Selection Test

Table 3: *Optimal Lag Length Result*

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-149.9244	NA	0.006244	9.113203	9.337668	9.189752
1	-27.27558	202.0099*	2.04e-05*	3.369151*	4.715940*	3.828445*
2	-4.021796	31.46100	2.50e-05	3.471870	5.940983	4.313908
3	16.62499	21.86130	4.28e-05	3.727942	7.319378	4.952725

Source:Author's Computation using E-views.

* indicates lag order selected by the criterion

where LR: sequential modified LR test statistic (each test at 5% level), FPE: Final

prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion,

HQ: Hannan-Quinn information criterion

The sequential LR test statistic and information criteria thresholds unanimously opt for 1 lag. This strikes a balance between capturing dynamics without over-parameterization given the annual data.

4.3.2 Toda Yamamoto Result

Table 4: Toda Yamamoto (T-Y) Test Result

Null Hypothesis	Chi-sq	df	Prob.
LNFD does not Granger Cause *LNCAD*	8.362905	2	0.0883
LNCAD does not Granger Cause *LNFD*	6.655381	2	0.0359

Source: Author's Computation using E-views.

The Toda Yamamoto procedure finds bidirectional causality between fiscal and external deficits, supporting the twin deficits hypothesis. The probabilities of 8.8% and 3.6% indicate statistically significant causation at 10% and 5% significance levels respectively.

4.3.3 Causality Post Estimation Tests

4.3.3.1 Serial Correlation Test

Table 5: VAR Residual Serial Correlation LM Test Result

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	Df	Prob.	Rao F-stat	Df	Prob.
1	1.668391	4	0.7965	0.415789	(4, 54.0)	0.7965

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	Df	Prob.	Rao F-stat	Df	Prob.
1	1.668391	4	0.7965	0.415789	(4, 54.0)	0.7965

Source: Author's Computation using E-views.

4.3.3.2 Stability Test

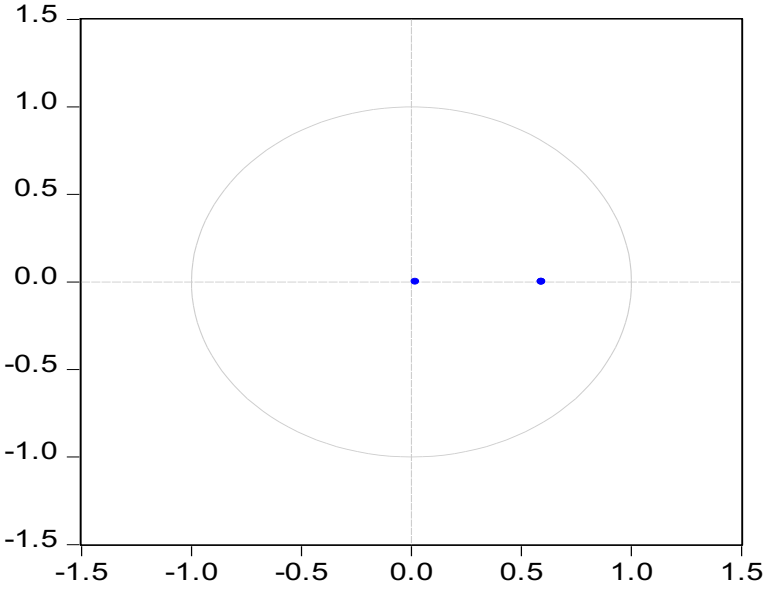

Figure 1: AR Stability Plot

The VAR Residual Serial Correlation LM test produces a probability value of 79.6%, failing to reject the null hypothesis of no serial correlation in the residuals. Similarly, the AR roots stability test on Figure 1 shows all inverted polynomials lying inside the unit circle, satisfying stability. Thus, both checks affirm model adequacy.

4.6 ARDL Estimation

4.6.1 ARDL Bounds Test

Table 6: ARDL Bound Test Result

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.194860	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Source: Author's Computation using E-views.

The computed F-statistic of 6.19 exceeds the 1%, 5% and 10% upper bound critical values, decisively confirming cointegration. This points to a stable long-run relationship between the variables.

4.6.2 ARDL Short-Run Estimation

Table 7: Short-Run Coefficient Estimates

Dependent Variable: D(LNGNP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFD)	-2.754796	1.278900	-2.154036	0.0523
D(LNFD(-1))	-3.923499	1.205238	-3.255374	0.0069
D(LNCAD)	-0.189143	0.111832	-1.691311	0.1166
D(LNCAD(-1))	0.626584	0.136486	4.590831	0.0006
D(LNINT)	2.380731	0.936914	2.541035	0.0259
D(LNINT(-1))	5.812624	1.269677	4.578033	0.0006
D(LNINT(-2))	3.167541	1.242418	2.549497	0.0255
D(LNINT(-3))	2.581780	0.873822	2.954585	0.0120
D(LNEXR)	-0.112879	0.429050	-0.263090	0.7969
D(LNEXR(-1))	-1.094619	0.607182	-1.802785	0.0966
D(LNEXR(-2))	-1.608149	0.548306	-2.932939	0.0125
D(LNEXR(-3))	-0.688952	0.415514	-1.658071	0.1232
CointEq(-1)*	-1.403002	0.193345	-7.256467	0.0000
R-squared	0.890037			
Adjusted R-squared	0.793012			

Source:Author's Computation using E-views.

The short-run estimates show the variables' economic impacts. The fiscal deficit (LNFD) coefficients of -2.75 and -3.92 indicate it negatively and significantly affects growth, suggesting fiscal discipline drives short-run growth. The current account balance (LNCAD) showed an immediate inverse effect of -0.19 on growth but a positive lag 1 effect of 0.63, signaling favorable balances temporarily stimulate growth. The interest rate (LNINT) coefficients ranged 2.38-5.81 across lags, positively impacting growth and implying higher rates promote short-term growth. The exchange rate (LNEXR) coefficients spanned -0.11 to -1.61, inversely relating to growth and indicating potential hindrance from devaluation before full realization. The -1.40 (140%) adjustment rate confirms short-run dynamics precedence. An 89% R-squared signals the independent variables strongly explain short-run growth. This study's short-run analysis spotlights

fiscal and external responsibility, coupled with higher interest rates and exchange rate stability, as short-run growth catalysts preceding complete manifestation.

4.6.3 ARDL Long-Run Estimation

Table 8: ARDL Long-run Coefficient Estimates
Dependent Variable: D(LNGNP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	31.58067	10.64007	2.968090	0.0117
LNFD	-1.701525	0.560302	-3.036801	0.0103
LNCAD	-0.582065	0.316058	-1.841642	0.0904
LNINT	-4.672464	2.227115	-2.097989	0.0578
LNEXR	1.356974	0.415442	3.266335	0.0067

Source:Author's Computation using E-views.

The long-run estimates provide insights into the relationships between the variables and long-term economic growth. The fiscal deficit coefficient of -1.70 indicates it negatively and significantly affects growth in the long run, suggesting fiscal discipline is key for sustained expansion. The current account balance coefficient of -0.58 implies higher deficits associate with diminished growth, signaling potential negative impacts from persistent external imbalances. The interest rate coefficient of -4.67 suggests interest rate increases negatively influence long-run growth, indicating higher rates over time may hinder robust growth. The exchange rate coefficient of 1.36 shows currency appreciation is associated with elevated growth, implying more competitive rates can stimulate enduring economic progress. The study's long-run analysis spotlights fiscal and external accountability, coupled with lower interest rates and competitive exchange rates over time, as fundamental drivers of strong and stable economic growth in the long run.

4.6.4 ARDL Post-Estimation Tests

4.6.4.1 Serial Correlation Test Result

Table 4.9:Breusch-Godfrey Serial Correlation LM Test Result

F-statistic	1.007774	Prob. F(2,10)	0.3993
Obs*R-squared	5.535586	Prob. Chi-Square(2)	0.1628

Source: Author's computation using E-views.

The Breusch-Godfrey LM test assessed serial correlation. With F-statistic and Chi-Square probabilities above the 5% significance level, there is insufficient evidence to reject the null hypothesis of no serial correlation in the ARDL residuals. The test confirms the absence of concerning autocorrelation issues in the model.

4.6.4.2The ARDL Stability Test Result

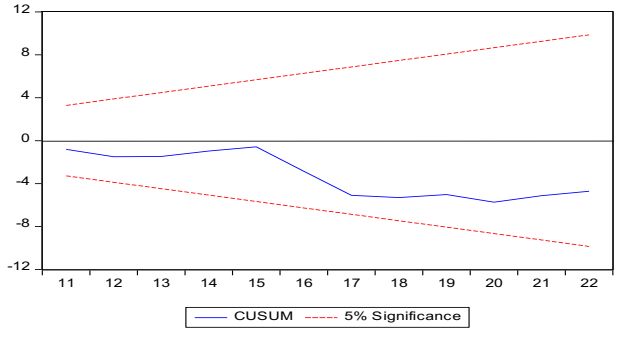

Figure 2: *CUSUM*

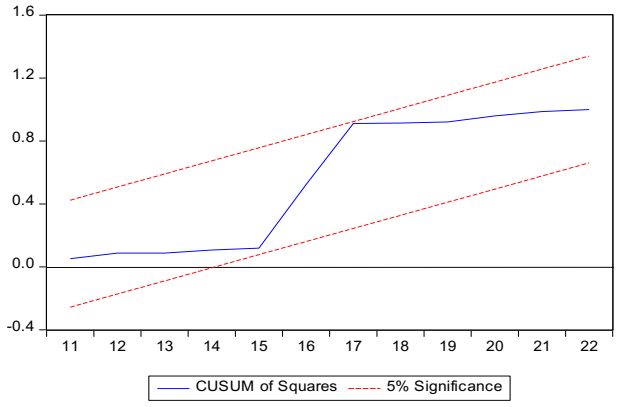

Figure 3: *CUSUMSQ*

The CUSUM and CUSUMSQ plots in Figures 2 and 43 showed the statistics falling within the boundaries of the two straight lines. This signals that the residuals of the estimated ARDL model are stable over time. Since the graphs did not cross the critical limits, it can be inferred the coefficients in the model are constant and the relationships estimated are reliable. The stability tests confirm structurally sound parameter estimates, validating the modelled linkages.

4.7 DISCUSSION OF FINDINGS

The T-Y test evidence for the twin deficit hypothesis aligns with Okafor et al. (2022), Ayinde et al. (2021), Adegboyo et al. (2020), Eze (2020) and Aero and Ogundipe (2018), though contrasts Abu and Gamal (2019)'s unidirectional causality finding. Bidirectional fiscal-current account causality supports the hypothesis that budget deficits worsen trade balances, implying fiscal impacts on external positions and vice versa. This interrelationship highlights policy coordination needs. The ARDL model estimates further elucidate the deficits-growth links. In the short run, fiscal deficits hampering growth matches Okafor et al. (2022), while external balance benefits support standard theory. Interest rate impacts align with monetary transmission channels. However, Aero and Ogundipe (2018) also found short-run exchange rate depreciation slows growth, perhaps due to import costs. Over the long term, Ebi and Ubi (2016) also show persistent budget deficits hampering growth by crowding out investment. Similarly, growing external deficits may impede long-run growth. But exchange rate depreciation having eventual growth benefits contrasts the short-run impact. These varying time horizon effects demonstrate complex twin deficit-growth interplays. Overall, robust evidence affirming the twin deficit hypothesis advances the empirical literature, while expanding knowledge on nuanced relationships over time. Sustainable policy implications derive from these findings.

5.0 CONCLUSION AND RECOMMENDATION

In conclusion, this study confirms the twin deficit hypothesis in Nigeria, highlighting the interrelationship and influence between rising fiscal deficits worsening external positions and vice versa. Short-run analysis shows higher fiscal deficits hamper growth, while favorable external balances, higher interest rates, and exchange rate stability promote economic expansion. Over the long term, persistent budget and trade deficits detrimentally impact growth, but currency depreciation benefits growth via competitiveness.

Key policy recommendations include:

1. Pursuing fiscal discipline by controlling spending and borrowing to curb budget deficits given their negative short and long-term growth impacts.

2. Maintaining favorable external positions through export promotion to support short-term growth.
3. Carefully managing interest rates to balance stimulation against excessive borrowing costs.
4. Sustaining exchange rate stability via interventions when required to encourage investment and competitiveness.

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