

TWIN DEFICIT HYPOTHESIS IN THE PRESENCE OF STRUCTURAL BREAKS IN NIGERIA

Ismaila Akolapo Samotu^{1*} & Monica Adele Orisadare²

¹Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria.

²Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria

*Corresponding author's email: ismailkolapo@yahoo.com

Abstract

Empirical studies on twin deficit debate have focused on how current account imbalances are related to budget imbalance without considering underlying structural forces associated with domestic economy. The main objective of this paper is to examine the effect of structural break on the validity of twin deficit hypothesis in Nigeria and to examine the dynamic interaction among the variables. The study employs the ARDL approach, variance decomposition, VAR-impulse response and Granger causality test to show dynamics between budget deficit and the current account deficit in Nigeria. The empirical results from ARDL indicate that budget deficit exerts a positive effect on the current account deficit both in the long run and short run implying the validity of twin deficit hypothesis in Nigeria. Granger causality test confirms no causality between the twin deficits. The impulse response result also reveals negative effect of shock in fiscal deficit on current account deficit while variance decomposition result shows that current account deficit substantially influences fiscal deficit variance. However, from all the methodologies adopted, structural break does not significantly affect the relationship between the deficits. The policy implication is that persistent increase in budget deficit tends to deteriorate current account balance. Therefore, government of Nigeria should exercise caution in using budget deficit to influence current account deficit even when structural break effect is considered.

Keywords: ARDL, budget deficit, current account deficit, Nigeria, structural break, twin deficit

JEL Classification: E62, H60, H62

Introduction

Understanding the nexus between fiscal and current account deficits is required for proper policy coordination (Ekpeyong & Ogbuagu 2015; Ahmad, Aworinde & Martin 2015). Nigeria experienced an average rising deficit spending and current account deficit majorly between 1970 and 1998. In particular, the country experienced twin deficit in 1970, 1972 between 1981 and 1983, between 1992 and 1994 and 1998 (CBN 2009). In 1970, 1972, 1981, 1982, 1983, 1992, 1993, 1994, 1998, and 2002, budget deficits and current account deficit as percentages of GDP were 8.6 and 0.6; 0.8 and 2.9; 8.2 and 7.7; 12.4 and 9.1; 6.3 and 5.4; 7.4 and 7.1; 15.8 and 2.7; 7.8 and 5.5; 4.9 and 11.8; respectively. Although the persistent rising fiscal deficit continued till 2017, there were still few current account deficits during the period of 1999 and 2017 (CBN, 2009-2017). In 1998 and 2002, Nigeria recorded current account deficit 11.8 and 1.6 as percentage of GDP respectively (CBN, 2009). These trends might suggest the presence of twin deficit hypothesis in the country. Ajayi (2014) asserts that Nigeria uses fiscal deficit to finance the current account which has led to the twin deficit controversy in the empirical literature.

However, there has been an inconclusive result in the extant research work concerning the link connecting fiscal imbalance and current account balance. In Nigeria, some studies such as Iyeli and Ovat (2017); Oloye (2012) establish twin deficit hypothesis, while Osisanwo Tella and Adesoye (2018); Olanipekun (2012) confirm negative link between fiscal and current account shortfalls which implies the establishment of twin

divergent hypothesis in the country. Also, empirical studies about the twin debate has focused on how current account imbalances are related with budget imbalance without considering underlying structural forces or shocks associated with domestic economy which played essential role in explaining the co-movement between the two concepts (Ahmad & Aworinde 2015). These shocks might include sudden change in international oil price, financial distress and bank failure among others while the structural reforms might be in form of the structural adjustment programme, 2004 bank reforms to mention just a few. The reality of economic analysis takes into consideration the effect of these shocks and reforms on the validity of twin deficit hypothesis in the country. This study contributes to the literature by re-examining the twin deficit phenomenon in the light of structural shocks in Nigeria. It also dwells into dynamic relationship between the twin deficits.

This paper is organized into the following five sections: Section 2 dwells on the literature review on the twin deficits hypothesis. In the third section methodology of the paper is discussed. Empirical results are presented in section 4, while, section 5 forms the conclusion of the paper.

Literature Review

Several studies lend support for the twin deficit issue. Vamvakas (1999) and Lau and Tanng (2009) recorded a direct influence of deficit spending on current account deficit. Tang (2015) established that budget deficit inversely caused current account imbalance through its impact on interest rate and real income in the USA. Acarvci and Ozturk (2008) studied the interrelationship in between budget deficit and current account deficit after employing a high frequency data spanning from the first three months of 1987 to the fourth three months of 2005. The empirical analysis from their empirical result confirmed the validity of Keynesian hypothesis implying an existence of twin deficits in Turkey during the study period.

In developing countries, bidirectional causality between fiscal imbalance and current account deficit was established in different studies conducted by Darrat (1988), Islam (1998), Pahlavani and Saleh (2009) and Lau and Behrumshah (2006). Bon (2014) employed the panel differenced GMM to study the connection between budget deficit and current balance for ten Asia countries. His study revealed a negative link between the two deficits. Meanwhile, Algieri (2013) resolved that there was an absence of a substantial connection between budget deficit and current account imbalance in Spain, Portugal Ireland and Italy. Ekpeyong and Ogbuagu (2015) investigated the link between budget imbalance and current account deficit in sub-Saharan Africa, making use of panel data spanning from 1970 - 2013. They adopted Generalised Method of Moments (GMM) and their findings confirmed twin deficit hypothesis in the sub Saharan Africa.

In Nigeria, Egwakhide (1997) studied the impact of deficit spending on the current account from 1973 to 1993 applying ordinary least squares method. He discovered presence of a strongly inverse connection of the budget deficit with the current account balance in the country. Oloye (2012) also provided an empirical evidence to establish twin deficit proposition in Nigeria employing time series data between the period 1970 and 2010. The Granger causality test revealed a one-way directional causality from fiscal deficit to current account deficit. Using Engel Granger co-integration, Ajayi (2014) identified that a higher fiscal deficit as one of the determinant factors that improved the balance of payments of the country. Iyeli and Ovat (2017) analyzed budget deficit and current account balance using the methods of co-integration and error-correction device. The study empirically established twin deficits in Nigeria implying a direct bond in between the two deficits in the country. Osisanwo, Tella and Adesoye (2018) in their efforts to investigate the influence of fiscal policy on balance of payment, discovered that fiscal deficit had a positive impact on current account surplus, using the bound testing approach for the period 1981-2015 in Nigeria. In contrary, Olanipekun (2012) discovered that there was a bi-directional connection between budget deficit and current account balance using bound test analysis of budget deficits and current account balance in Nigeria (1960-2008).

Empirical studies that focused on the link that connects budget and current account deficits generally provided inconclusive results. This controversy was not only as a result of the nations considered but also with the several primary structural factors that might result into different connections and the different methodologies that have been applied. It could also be discerned from the empirical reviews that none of the past studies considered the possibility of structural break and the dynamic interactions in their studies of the two relationships.

Data and Methodology

Theoretical framework

The primary objective of this paper is to investigate the effect of structural break on the relationship between current account and fiscal deficits. In line with this, this section presents models for the examination of twin deficit hypothesis in Nigeria using the Keynesian model.

The difference between exports of goods and services and imports of goods and services plus net income from abroad gives the current account balance (CA).

$$CA = X - M + NA \quad (1)$$

Where NA is net factor income from abroad.

In an open economy national saving (S) can be defined as:

$$S = I + CA \quad (2)$$

Saving in equation 2 can be divided into private saving (s_p) and government saving (s_g). Private saving is part of households' income remained after considering taxes and consumption spending and can be expressed as:

$$s_p = Y - T - C \quad (3)$$

Government saving, on the other hand, which represents the excess of tax revenue receipts over expenses on goods and services and transfer payment. This can also be expressed as:

$$s_g = T - G - R \quad (4)$$

Where T is taxes, G is government expenditure and R is transfer payment.

Substitute equations 3 and 4 into equation 2 to give:

$$S = s_p + s_g = Y - T - C + (T - G - R) = I + CA \quad (5)$$

Substituting $s_g = T - G - R$ in equation 3.5, we have:

$$s_p + (T - G - R) = I + CA \quad (6)$$

Making CA subject of formula equation 6 becomes:

$$CA = s_p - I + (T - G - R) \quad (7)$$

Equation 7 reveals that current account balance is dependent on difference between saving and investment and fiscal imbalance which represents the imbalance between government revenue and expenditure on goods and services and transfer payment.

Since $FI = (T - G - R)$ equation 7 then making:

$$CA = s_p - I + FI \quad (8)$$

Empirical model specification

Sakyi and Opoku (2016) argued that since private saving largely depends on disposable income and investment is greatly determined by interest rate, he therefore specified current account as a function of GDP, interest rate and fiscal imbalance.

Following the work of Sakyi and Opoku (2016) we specify current account balance as a function of fiscal imbalance, GDP, and interest rate as follows:

$$CA_t = \gamma_0 + \gamma_1 FI_t + \gamma_2 GDP_t + \gamma_3 int_t + \varepsilon_t \quad (9)$$

The ARDL specification of equation 9 is stated as follows:

$$\Delta CA_t = \gamma_0 + \sum_{i=1}^k \varphi_i \Delta CA_{t-i} + \sum_{i=0}^k \theta_i \Delta FI_t + \sum_{i=0}^k \vartheta_i \Delta GDP_t + \sum_{i=0}^k \pi_i \Delta INT_t + \gamma_1 FI_t + \gamma_2 GDP_t + \gamma_3 int_t + \varepsilon_t \quad (10)$$

When structural break is modeled in equation 10, it becomes

$$\Delta CA_t = \gamma_0 + \sum_{i=1}^k \varphi_i \Delta CA_{t-i} + \sum_{i=0}^k \theta_i \Delta FI_t + \sum_{i=0}^k \vartheta_i \Delta GDP_t + \sum_{i=0}^k \pi_i \Delta INT_t + \gamma_1 FI_t + \gamma_2 GDP_t + \gamma_3 int_t + \alpha_i du_i + \varepsilon_t \quad (11)$$

The structural break is represented in the equation 11 by dummy du while subscript i represents the periods of breaks which was determined by Baiperron test.

The dynamic analysis of equation 9 is represented in the VAR-model below:

$$\begin{bmatrix} CA_t \\ FI_t \\ GDP_t \\ INT_t \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \\ c_3 \\ c_4 \end{bmatrix} + \begin{bmatrix} \Phi_{11}(L) & \Phi_{12}(L) & \Phi_{13}(L) & \Phi_{14}(L) \\ \Phi_{21}(L) & \Phi_{22}(L) & \Phi_{23}(L) & \Phi_{24}(L) \\ \Phi_{31}(L) & \Phi_{32}(L) & \Phi_{33}(L) & \Phi_{34}(L) \\ \Phi_{41}(L) & \Phi_{42}(L) & \Phi_{43}(L) & \Phi_{44}(L) \end{bmatrix} \begin{bmatrix} CA_t \\ FI_t \\ GDP_t \\ INT_t \end{bmatrix} + \begin{bmatrix} \epsilon_{1t} \\ \epsilon_{2t} \\ \epsilon_{3t} \\ \epsilon_{4t} \end{bmatrix} \quad (12)$$

Where L is the lag operator, CA represents current account deficit expressed as percentages of GDP, FI is budget deficit also expressed as percentages of GDP, GDP is growth rate of GDP per capita and INT is lending rate of interest. Δ is the first difference operator, k is the optimal lag length γ_1 to γ_3 are the coefficients of the explanatory variables in the model. L

Data sources and variables measurement

The study employed quarterly data from the first quarter of 1970 to the fourth quarter of 2017. Fiscal and current account deficits were measured as percentages of gross domestic product, interest rate was as nominal lending rate and gross domestic product was measured as growth rate of GDP. All the data used were sourced from CBN statistical bulletin 2017 edition.

Empirical Result

Performing descriptive statistics before the analysis of time series data is very important in order to identify the properties of the data. Table 1 presents the descriptive statistics of the variables. From the Table 1, the total number of observation is 192 (from the first quarter of 1970 to the fourth quarter of 2017). All the variables are expressed in rates. It can be observed from the Table that the mean (average) and the median of the variables were close. The proximity of the mean and median of the variables implied that the variables

have normal distribution (bell shape). In the same vein, the mean and median of all the variables in the data set fall within the minimum and maximum values. Besides, standard deviation that was used to measure the spread or dispersion of the data showed that current account deficit was the most widely dispersed variable followed by GDP. This implied current account deficit and GDP had been unstable over the study period. On the other hand, skewness was used to measure the asymmetry of the distribution of the series around the mean. If its value was zero, we would have normal distribution. Positive skewness showed that the distribution had a long right tail, while negative skewness indicated that the distribution had left tail. From Table 1, we observed that current account deficit (CI), gross domestic product (GDP) interest rate (INT),) were positively skewed and as such, they had long right tails. This positive skewness implied that their means were greater than medians and their medians greater than their modes. Fiscal deficit (FI) on the other hand was negatively skewed; therefore, it had long left tail. By implication, its mean was less than its median and its median was less than its mode.

In the same vein, kurtosis statistic was used to measure the peak or flatness of the distribution of the series. If the value of kurtosis statistic was above three, the distribution would be peaked or became leptokurtic but if the kurtosis was less than three the distribution would be flat or turned platykurtic. From Table 1, fiscal deficit (FI), current account deficit (CI), gross domestic product (GDP), were peaked or leptokurtic because the values of their kurtosis were greater than three, while that of interest rate (INT) was less than three and as such became platykurtic. The Jarque-Bera statistic was used to test for the normal distribution of the series. It could be used to measure the goodness of fit test of whether sample data have the skewness and kurtosis matching a normal distribution. From Table 1, Jarque-Bera probability revealed that fiscal deficit (FI) and interest rate (INT) were normally distributed while other variables rejected the assumption of normal distribution.

Table 1 Descriptive Statistics

	FI	CI	GDPGR	INT
Mean	-3.77	3.15	1.53	15.13
Median	-2.86	1.48	1.67	16.82
Maximum	9.54	33.20	30.36	29.80
Minimum	-15.75	-11.77	-15.45	6.00
Std. Dev.	4.54	8.74	7.58	6.11
Skewness	-0.12	1.18	1.05	0.07
Kurtosis	3.79	4.83	6.85	2.30
Jarque-Bera	5.44	71.30	153.96	4.12
Probability	0.07	0.00	0.00	0.13
Sum	-723.17	605.27	293.95	2904.02
Sum Sq. Dev.	3935.57	14587.90	10978.82	7119.84
Observations	192	192	192	192

Where FI is the fiscal deficit expressed as percentage of GDP, CI is the current account deficit expressed as a percentage of GDP, GDP is the GDP per capita growth rate, INT is the interest rate.

Source: Author's Computation, 2020.

Table 2 presents correlation matrix of the variables used to ensure that the variables do not suffer from the multicollinearity problem. The correlation matrix indicates moderate correlation among the variables since the correlation coefficients are less than 0.5.

Table 2 Correlation Matrix

	FI	CI	GDPGR	INT
FI	1.00			
CI	0.30	1.00		
GDPGR	0.31	0.40	1.00	
INT	-0.22	0.33	0.06	1.00

Source: Author's Computation, 2020.

It is very important to perform unit root test on our variables before adopting the ARDL estimation approach. We therefore applied augmented Dickey-Fuller (ADF), Philip-Peron (PP) and KPSS tests as presented in Table 3 (with intercept) and Table 4 (With Trend and Intercept) to ascertain the integration order for the appropriateness of the adopted estimation method. Considering the likely effect of structural break is appropriate for this kind of study whose sample size covers political, economic and structural reforms periods. Table 5 presented Zivot and Andrew (ZA) structural break unit root test by focusing on unit root with intercept and unit root with trend. The results of the ZA unit root test with structural for the one with intercept and the one with trend revealed mixed orders of integration and that there were different break points among the variables.

Table 3 Unit Root Test (With Intercept)

Augmented Dickey Fuller (ADF)Test				Philip-Peron (PP) Test			KPSS Test		
Variables	Level	1 st Difference	Status	Level	1 st Difference	Status	Level	1 st Difference	Status
FI	-3.46 (0.003)*	-	I(0)	-3.4646 (0.0029)*	-	I(0)	0.739*	-	I(0)
CI	-2.88 (0.021)**	-	I(0)	-2.8765 (0.018)**	-	I(0)	0.739*	-	I(0)
GDPGR	-2.5752 (0.069)***	-	I(0)	-3.4646 (0.0003)*		I(0)	0.739*	-	I(0)
INT	-2.5750 (0.4507)	-3.4654 (0.000)*	I(1)	-2.5748 (0.2518)	-3.4648 (0.00)*	(1)	0.347*	0.739*	I(1)

Note: * = 1%, ** = 5%, *** = 10% significance level

Source: Author's Computation, 2020.

Table 4 Unit Root Test (With Trend and Intercept)

Augmented Dickey Fuller (ADF)Test				Philip-Peron (PP) Test			KPSS Test		
Variables	Level	1 st Difference	Status	Level	1 st Difference	Status	Level	1 st Difference	Status
FI	-3.434 (0.018)**	-	I(0)	-3.434 (0.017)**	-	I(0)	0.119	0.216*	I(1)
CI	-3.434 (0.052)**	-	I(0)	-3.434 (0.034)**	-	I(0)	0.216*		I(0)
GDPGR	-3.141 (0.151)	-4.009 (0.001)*	I(1)	-4.007 (0.003)*		I(0)	0.216*		I(0)
INT	-3.141 (0.789)	-4.008 (0.000)*	I(1)	-3.141 (0.275)	-4.007 (0.00)*	(1)	0.119	0.216*	I(1)

Note: * = 1%, ** = 5%, *** = 10% significance level

Source: Author's Computation, 2020.

Table 5 Zivot and Andrew (ZA) Unit Root Test with Structural Break

With Intercept				With Trend			Breaks	
Variables	Level	First difference	Status	Level	First difference	Status	Break Dates	
FI	-4.58	-4.58***	I(1)	-4.11***	-	I(0)	2009Q4	1982Q2
CI	-4.58	-5.34*	I(1)	-4.11	-4.80*	I(1)	2005Q3	2004Q2
GDPGR	-4.58	-5.34*	I(1)	-4.11***	-	I(0)	2004Q4	2010Q2
INT	-4.58	-5.34*	I(1)	-4.80*	-	I(0)	1993Q1	1987Q2

Note: * = 1%, ** = 5%, *** = 10% significance level

Source: Author's Computation, 2020.

ZA unit root test is used to determine the order of integration of the series in this study which confirms to the extant literature (Akinlo & Emanuel, 2017; Stephen *et.al*, 2016; Odionye *et.al*, 2019; Jibrilla, 2016). The main basis for using Z-A unit root test is that conventional unit root tests fail to reject the unit root hypothesis for the series that are actually stationary with a structural break (Perron 1989; Perron 1997). The break used in this study follows BaiPerron procedure.

However, the structural breaks of current account deficit adopted in this paper followed Bai and Perron (1998) procedure. The first quarters of 2000 was estimated and used in the ARDL model (equation 11) These break could be associated with huge structural reforms, global oil price fluctuation, external debt crisis, financial distress, global financial crisis, transition to democratic regime, political crisis among others. The breaks (2000) as determined by Bai Perron procedure coincided with major happenings that were capable of triggering breaks in the economy. According to NDIC quarterly report (2004) the country recorded 30 distressed banks before the 25 billion naira banking capitalization policy in 2005.

The ARDL bound test for co-integration result in the Table 6 below reveals the presence of a long run relationship between current account imbalance and fiscal imbalance at when structural break is considered and when it is not since the F-statistic of 4.02 and 3.98 are greater than the upper bound and lower bound at 5 per cent significance level.

Having established the long-run relationship between fiscal deficit and current account deficit from Table 6 using ARDL bound test to co-integration, we proceeded further to estimate the ARDL model for both situations (when the structural breaks were accounted for and when they were not considered) so as to establish the validity of twin deficit hypothesis or not.

Table 6: Bound Test for Co-integration (Dependent Variable: Current Account Imbalance)

		T-statistic	Value	K
Without Break	Structural	F-statistic	4.028843**	3
With Break	Structural	F-statistic	3.979413**	3
Critical Value Bound				
For both with and without Breaks	Structural	Significance levels	Lower bound	Upper bound
		10%	2.01	3.1
		5%	2.45	3.63
		2.5%	2.87	4.16
		1%	3.42	4.84

Note: * = 1%, ** = 5%, *** = 10% significance level

Source: Author's Computation (2020).

Table 7 and 8 present the ARDL estimates of the relationship between current account deficit and fiscal deficit in order to test for the validity of twin deficit hypothesis in Nigeria when the structural breaks are not considered. From Table 7 and 8, fiscal deficit had positive and significant effect on current account deficit in the short-run and the long-run. Specifically, a unit increase in fiscal imbalance (deficit) led to 0.52 and 0.79 units increase in current account imbalance (deficit) in the short-run and the long-run respectively. This result confirmed the existence of twin deficit hypothesis in Nigeria. The results from this study were consistent with the Keynesian position that there is a strong and direct connection between fiscal deficit and current account imbalance in Nigeria between the period of the first quarter of 1970 and the fourth quarter of 2017. Since Nigeria growth rates have been majorly in positive as a result of fiscal deficit increase as a result of a rise in aggregate demand for imported consumable goods which tends to increase current account deficit confirming twin deficit hypothesis in the country. That is why Nigeria massively devalued and depreciated naira during the SAP period so as to boost the export in order to close the current account

deficit gap. Other studies that found similar result of the positive relationship between fiscal imbalance and current account imbalance in Nigeria include Onafowora and Owoye (2006) and Oloye (2012).

Both economic growth proxy by GDP and interest rate reveals positive and statistically significant impact on the current account imbalance as depicted in Table 7 and 8. An immediate increase in interest rate in the short run (as earlier confirmed) as a result of a rise in fiscal deficit attracted foreign capital which step up current account deficit and thereby confirm twin deficit hypothesis in the country.

The significance of error correction term (ECT) of -0.1468 reaffirms the presence of co-integration in the relationship while its negative sign implies the speed of adjustment (14.68 per cent per quarter) to equilibrium in the long-run after its deviation from the equilibrium in the short-run.

From the Table 9 the ARDL model results on the relationship between fiscal imbalance and current account imbalance when structural breaks are incorporated in the model are presented. The short-run and the long-run coefficients of fiscal deficit are directly and significantly related with current account deficit as we have in the situation when structural breaks are not considered except that of interest rate which is not significant. The only difference is that the speed of adjustment back to equilibrium is higher when the structural breaks are taken into consideration. The coefficient of dummy variable for the structural break is negative but not statistically significant and this indicates that structural break does not significantly affect the relationship between the twin deficits.

From Table 10 diagnostic test results show that the ARDL models are free from serial correlation problem in the residuals. The heteroskedasticity test result indicates that the ARDL models do not have heteroskedasticity problem. Also, the Ramsey RESET test result reveals that the ARDL models are correctly specified. Figure 1(a) and 1(b) which are CUSUM test results confirm to the stability of the specified model.

Table 7: Estimated Short-run and Long-run Coefficients Using ARDL (1, 1, 0, 0)

Dependent Variable: Current Account Imbalance {without structural break}

Short-Run Coefficients

Variable	Coefficient	Std. Error	T-Statistic	Probability
$\Delta(FI)$	0.5215*	0.181219	2.877754	0.0045
$\Delta(GDPGR)$	0.0801***	0.041996	1.906538	0.0581
$\Delta(INT)$	0.0601***	0.032530	1.846596	0.0664
ECT(-1)	-0.1468*	0.053151	-2.762403	0.0063

Note: * = 1%, ** = 5%, *** = 10% significance level

Source: Author's Computation (2020).

Table 8: Long Run Coefficients

Variable	Coefficient	Std. Error	T-Statistic	Probability
FI	0.7915**	0.395633	2.000553	0.0469
GDPGR	0.5453**	0.234882	2.321668	0.0213
INT	0.4091**	0.191359	2.137982	0.0338

Note: * = 1%, ** = 5%, *** = 10% significance level

Source: Author's Computation (2020).

Table 9(a) Estimated Short-run and Long-run Coefficients Using ARDL (1, 1, 0, 0)

Dependent Variable: Current Account Imbalance {with structural break}

Short-Run Coefficients

Variable	Coefficient	Std. Error	T-Statistic	Probability
$\Delta(FI)$	0.5236*	0.181910	2.878371	0.0045
$\Delta(GDPGR)$	0.0804***	0.042380	1.895964	0.0595
$\Delta(INT)$	0.0638	0.045638	1.397433	0.1640
$\Delta(D_CI)$	-0.1279	0.697841	-0.183336	0.8547
ECT(-1)	-0.1448*	0.050202	-2.884479	0.0044

Source: Author's Computation (2020).

Table 9(b) Long-Run Coefficients

Variable	Coefficient	Std. Error	T-Statistic	Probability
FI	0.8323***	0.466397	1.784574	0.0760
GDPGR	0.5549**	0.237104	2.340254	0.0203
INT	0.4404	0.289730	1.520104	0.1302
D_CI	-0.8835	4.772245	-0.185138	0.8533

Note: * = 1%, ** = 5%, *** = 10% significance level, D_CI represents dummy variable for the structural break in the current account imbalance.

Source: Author's Computation (2020).

Table 10: Diagnostic Test for Twin Deficit Hypothesis Current Account Imbalance)

	Without structural breaks	With structural breaks
Breusch-Godfrey Serial correlation Test	0.602420 (0.5486)	0.572494 (0.5651)
Heteroskedasticity Test	1.082433 (0.3716)	1.436791 (0.2027)
Ramsey Reset	2.797400 (0.0636)	2.767154 (0.0655)

Figures in () are P-value

Source: Author's Computation, 2020

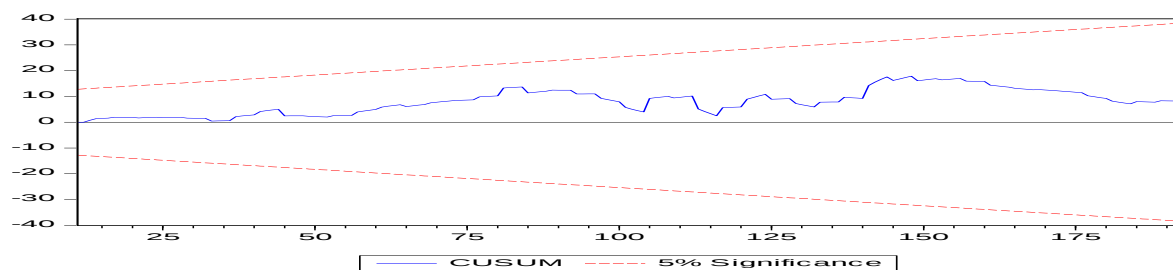


Figure 1 (a): Stability Test for ARDL model (without structural break)

Source: Author's Computation (2020).

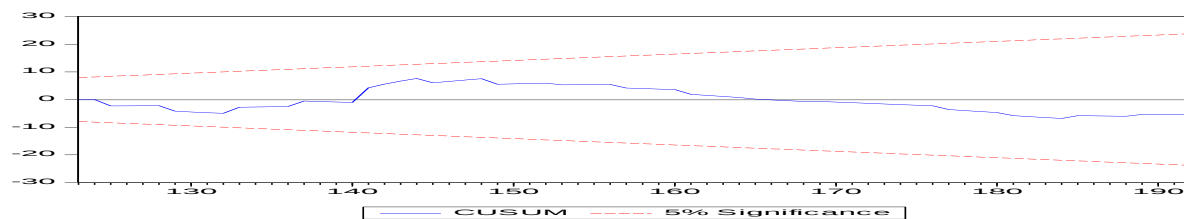


Figure 1 (b): Stability Test for ARDL model (with structural break)

Source: Author's Computation (2020).

Dynamic relationship between the Twin deficits

In order to examine the dynamic relationship between fiscal and current account deficits, VAR impulse response, variance decomposition and granger causality were employed when structural break were considered and not.

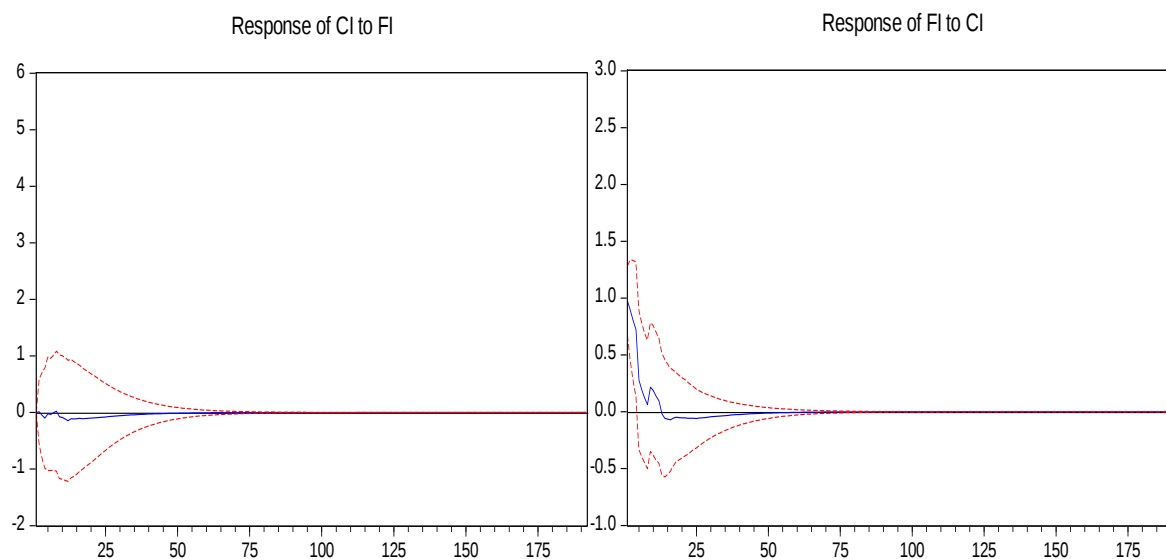


Figure 2(a): Var-Impulse Response Graphs without structural break

Source: Author's Computation (2020).

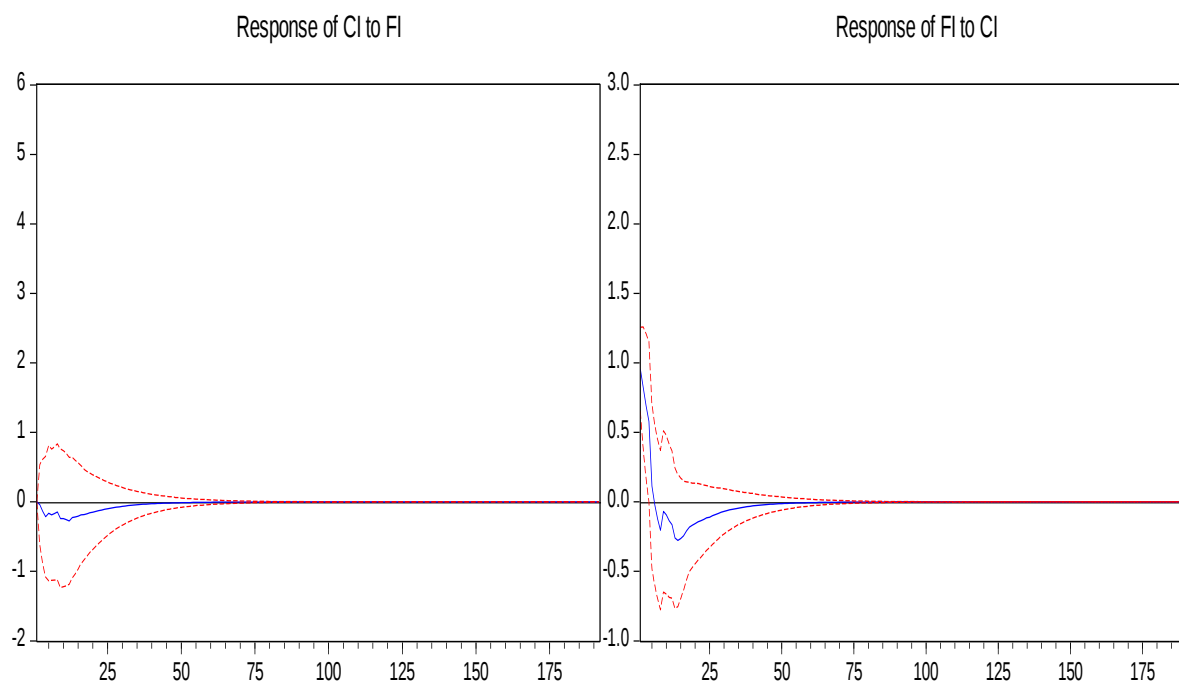


Figure 2(b): Var-Impulse Response Graphs with structural break

Source: Author's Computation (2020).

The Figure 2(a) and 2(b) present VAR impulse response of current account deficit and fiscal deficit with and without structural break. From Figure 2(a) the response of current account deficit to fiscal deficit shock was negative till 32nd quarter when it finally died out. On the other hand, the response of fiscal deficit to a

shock in current account deficit was initially positive until the 15th quarter when it became negative before the 50th quarter. Figure 2(b) showed the VAR-impulse response current account deficit and fiscal deficit when the structural break was considered and the result looked like that of figure 2(a). This implies that structural break's effect on the dynamic relationship between the deficit was insignificant.

Table 11(a): Variance Decomposition of Current Account Deficits (A) and Budget Deficit (B) without structural break

(A)					
Period	S.E.	CI	FI	GDPGR	D(INT)
1	3.909278	100.0000	0.000000	0.000000	0.000000
4	7.031745	98.51653	0.024598	1.376479	0.082395
6	8.116039	93.55197	0.020773	5.285563	1.141689
8	8.815478	89.54467	0.018349	8.713189	1.723796
10	9.033151	87.87626	0.033719	10.39033	1.699693

(B)					
Period	S.E.	CI	FI	GDPGR	D(INT)
1	2.184409	20.03805	79.96195	0.000000	0.000000
4	3.952329	18.71124	80.99280	0.160142	0.135821
6	4.154792	17.59513	81.42553	0.176182	0.803156
8	4.265516	16.79818	81.74610	0.365477	1.090243
10	4.398025	16.22418	81.78863	0.932704	1.054479

Source: Author's Computation, 2020

Table 11(b): Variance Decomposition of Current Account Deficits (A) and Budget Deficit (B) with structural break

(A)					
Period	S.E.	CI	FI	GDPGR	D(INT)
1	3.899179	100.0000	0.000000	0.000000	0.000000
4	6.835542	98.58332	0.142292	1.159936	0.114454
6	7.752882	93.73213	0.213097	4.864060	1.190710
8	8.271832	89.56950	0.257721	8.327577	1.845201
10	8.390552	87.86922	0.414349	9.871579	1.844854

(B)					
Period	S.E.	CI	FI	GDPGR	D(INT)
1	2.169891	19.33016	80.66984	0.000000	0.000000
4	3.799021	16.60362	83.14141	0.062276	0.192702
6	3.960626	15.36016	83.53618	0.082722	1.020937
8	4.054144	15.00590	83.46427	0.151297	1.378528
10	4.155432	14.36182	83.80402	0.479034	1.355124

Source: Author's Computation, 2020

Table 11(a & b) depict variance decomposition of current account deficit and fiscal deficit with and without structural break. From Table 11(a) the variance decomposition of (A) which is current account deficit indicates that 100% of variance in current account deficit was accounted by its own variation in the first period. This share fell to 87% in the tenth period while the share of fiscal deficit was less than 1% on average throughout the period. This finding therefore suggests variation in current cannot be traced to fiscal when the structural break is not considered.

From the Table 11(a) the variance decomposition of (B) which is fiscal deficit shows that 80% of variance in fiscal deficit was accounted by its own variation in the first period followed by 20% variation in current account deficit. On average almost 20% variation in fiscal deficit can be accounted by current account deficit. This implies that current account deficit substantially influenced change in fiscal deficit.

Table 11(b) presents variance decomposition of current account deficit and fiscal deficit when structural break is considered. The result did not give a significant difference from that of Table (a) when the structural was not considered.

Table 12(a): VAR-Granger Causality (Block Exogeneity Wald Test) Without Structural Break

	CI	FI	GDP	INT
CI	-	0.07 (0.99)	4.77 (0.44)	12.72** (0.03)
FI	0.33 (0.99)	-	0.75 (0.98)	1.22 (0.94)
GDP	0.46 (0.99)	1.81 (0.87)	-	6.69 (0.25)
INT	41.28*** (0.00)	1.70 (0.89)	0.59 (0.99)	-

Note: * = 1%, ** = 5%, *** = 10% significance level, , Figures in () are P-value

Source: Author's Computation, 2020

Table 12(b): VAR-Granger Causality (Block Exogeneity Wald Test) With Structural Break

	CI	FI	GDP	INT
CI	-	0.25 (0.99)	5.37 (0.37)	12.45** (0.03)
FI	2.58 (0.76)	-	2.06 (0.84)	1.85 (0.87)
GDP	0.66 (0.99)	1.02 (0.96)	-	7.80 (0.17)
INT	46.59** (0.00)	2.73 (0.74)	0.59 (0.99)	-

Note: * = 1%, ** = 5%, *** = 10% significance level, Figures in () are P-value

Source: Author's Computation, 2020

The Granger causality test conducted in Table 12(a) followed Toda-Yamamoto procedure since our stationary test showed different orders of integration $I(0)$ and $I(1)$. The result of the causality indicated neutral causality between the twin deficits. It also revealed bi-directional causality between current account deficit and interest rate. The result was the same when structural break was considered as in Table 12(b).

Conclusion

In order to confirm the existence of twin deficit hypothesis in Nigeria the relationship between current account imbalance and fiscal imbalance were examined. The ARDL result revealed the existence of twin deficit hypothesis in the country. Fiscal imbalance had positive and statistical positive effect on current account imbalance both in the long run and the short-run whether the structural breaks were incorporated in the model or not. The means any improvement in fiscal imbalance will improve current account imbalance. Meanwhile Granger causality confirms no causality between the twin deficits. The impulse response result also reveals negative effect of shock in fiscal deficit on current account deficit while variance decomposition result shows that current account deficit substantially influence fiscal deficit variance.

It was established that any improvement in fiscal imbalance tended to favourably impact on the current account imbalance in Nigeria. Consideration of structural break did not significantly affect our empirical

estimates especially in the link between fiscal and current account imbalance for all the estimation techniques adopted

What is the policy implication of these results? An increase in fiscal deficit leading to an upsurge in public debt could trigger an increase in interest rate with resultant effect on low domestic investment and; eventually results to current account shortfall. However, VAR decomposition result concludes that current account deficit significantly influence fiscal deficit. This can be attributed to the nature the Nigerian economy that is oil import dependent. By implication, to reduce fiscal deficit the government should concentrate on reducing import and raise exports. This could be possible by promoting non-oil export so as to boost the current account balance and reduce its deficit. This will eventually lead to reduction in fiscal deficit. Although the Granger causality result reveals no causality between the twin deficits, yet it shows bi-directional causality between interest rate and current account deficit. This implies that government could influence current account deficit through interest policy manipulation. Since this study discovered insignificant effect of structural break on the validity of twin deficit hypothesis, this implies persistent increase in fiscal deficit may deteriorate current account balance. Nigerian government should therefore exercise caution in using budget deficit to influence current account deficit.

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