International Business Management 6 (4): 408-416, 2012
ISSN: 1993-5250

A Bound Testing Analysis of Budget Deficits and Current Account Balance in Nigeria (1960-2008)

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Abstract: Since, the early days of independence Nigeria's fiscal operation and current account position has been characterised by deficits and imbalances. The twin deficits' hypothesis asserts that an increase in budget deficit will cause similar increase in the current account deficit. However, the findings of many studies are not in line with this assertion. It is even surprising that using the same country data produce different result. This study investigates the relationship between budget deficit and current account balance in Nigeria from 1960-2008. Ordinary least square was first explored to determine the effect of budget deficit on current account balance in Nigeria. Various diagnostic tests preceded cointegration analysis. In order to capture the short-run disequilibrium situation among the variables, namely current account balance, budget balance, investment and private savings, an error correction model was estimated as a follow up to cointegration analysis. Estimation of long-run elasticities was done from the computed autoregressive distributed lag. Thereafter Granger causality test was conducted to determine the causal relationship among the variables. Ordinary least square result show that a unit increases in budget deficit will cause 0.71 unit increase in current account balance. Bound cointegration test established a long run relationship among the variables. Evidence from the error correction model shows that 1% change in budget deficit will cause 0.67% change in current account balance. The empirical findings of this research work indicate that there is a bi-directional relationship between budget deficit and current account balance as revealed by the Granger causality test. The findings support the twin deficits hypothesis. It has also been empirically supported by Ahmadu for Malaysia and Philippines, Evan for Cambodia, Tahir and Mahbiibz for Pakistan.

Key words: Twin deficits, diagnostic test, bound cointegration test, error correction model, granger causality

INTRODUCTION

Background and problem statement: The question of relationship between budget deficits and current account balance started to engage researchers' attention in the 1970s. At that time, budget deficits and current account deficits emerged in many countries. While the principal issues of fiscal deficits are not certainly new, the development of government deficits of the past decades had led to renewed interest. Many analysts suspect that budget deficits and current account deficits are closely and perhaps even causally related. Indeed, national income identities guarantee that budget deficits must create either an excess of private saving over investment or an excess of import over exports. Testing this proposition across countries has yielded different results. It is therefore necessary to examine the relationship between the two variables in Nigeria.

The movement of budget deficit and current account balance in the 1960's show case frequent divergence between the two variables. In the early days of independence, Nigerian government in its fiscal operation recorded to a large extent frequent budget surplus from 1960-1969. In the same vein, the current account balance in this period show more of deficit (CBN, 1965). The first occurrence of twin deficits in Nigeria's fiscal operation and current account balance was in 1970 where budget deficit was 8.6% of GDP and the current account deficit was 0.9% of GDP. Also in 1972 deficit occur in both the country's fiscal operation and current account position. Co-existence of surplus was recorded in the fiscal balance and current account balance in 1973 and 1974 this period mark the time of windfall revenue in the sales of oil in the international market (CBN, 1974).

The period of 1977 and 1978 also show a simultaneous deficits in the country's fiscal operation and current account balance where the budget deficit and current account deficit in this period averaged 5.3 and 2.8% of GDP, respectively. From 1981-1983, the twin deficits reoccurs in Nigeria economy following several government finances that increase its expenditure and also the volatility of oil price in the international market. Several government policy measures in the post-SAP

period also resulted to the occurrence of deficits in the budget and current account balance from 1986-1989. Co-movement of the budget deficits and current account deficits are also visible in the periods of 1992-1994. The years of 1998, 2000 and 2002 were also period of deficits in the country's fiscal operation and current account (A.E.O., 2008) (Fig. 1).

The size of this fiscal and current account imbalances has been a concern to academics, policy makers and investors coupled with the fact that there had been only 15 cases of fiscal surplus and 27 cases of current account surplus in 48 years (1960-2008).

Imbalances in Nigeria's current account position are mostly attributed to fluctuation in oil prices. Frequent current account deficits reflect the expansion in domestic absorption that could not be satisfied by domestic supply. Fiscal deficit according to Olumuyiwa (2001) has been the major causes of various macroeconomic imbalances in Nigeria such as high inflation rate, current account deficits, high indebted economy and slow economic growth. Therefore, government is concern to reduce the size of budget deficit and current account deficit in the country.

Since, the issue of the twin deficits has not left Nigeria out, it becomes imperative to examine the relationship between budget deficits and current account balance in Nigeria. This will enable us to see whether a long run relationship exist between budget deficit and current account balance and also to determine the causal relationship between the two variables.

It was discovered that earlier studies on the related issues focuses on the United States and Asian countries. The study by Egwaikhide (1997) look at the effect of budget deficits on current account balance for 20 years that is 1973-1993. It becomes necessary to extend the time frame and use a more robust and recent econometric technique in analyzing the relationship between budget deficit and current account balance in Nigeria. This study covers a time frame from 1960-2008. First, the choice of the period is to capture the different policy regimes implemented by the Federal Government. Second, the long period is to allow for a better degree of freedom.

Literature review: The literature on the connection between budget deficit and current account balance

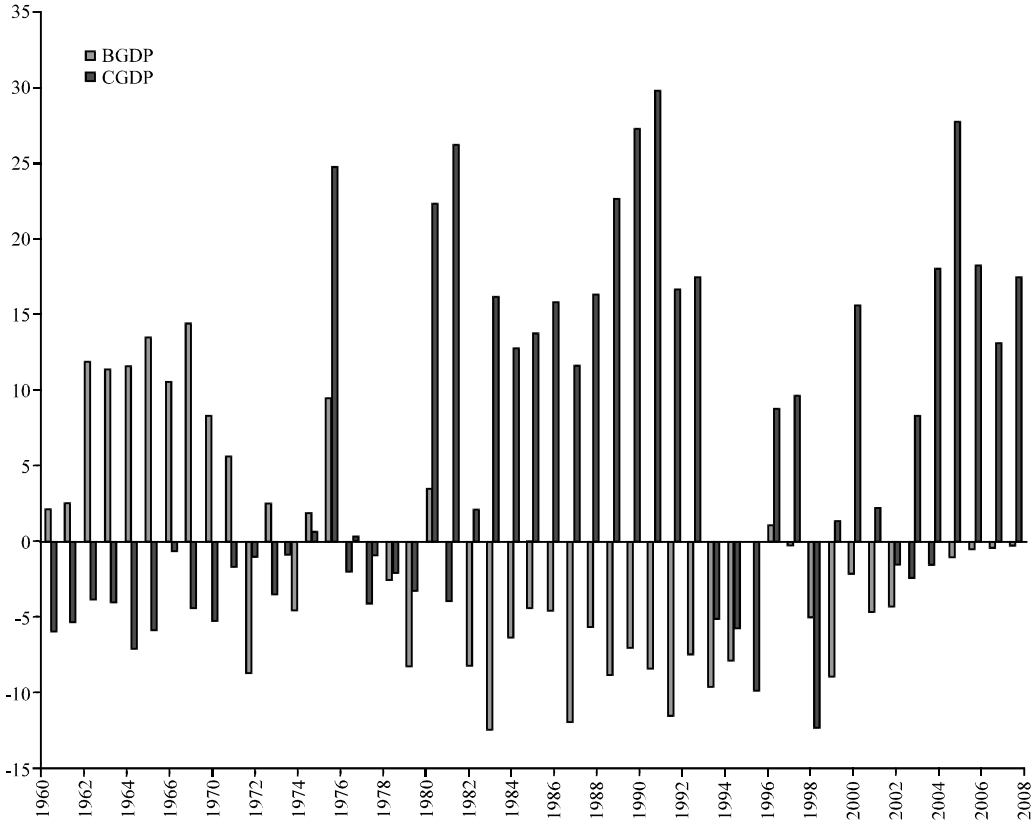

Fig. 1: Trend analysis of budget deficits and current account balance; budget deficit ratio of GDP and current account balance ratio of GDP

seems to concentrate on the open economy model that relates national output with aggregate demand and external sector. Flemming (1962) and Mundell (1963) independently extend the open-economy Keynesian model. The model demonstrates that an increase in budget deficit would induce upward pressure on interest rates, causing capital inflows and exchange rate to appreciate. The appreciated exchange rate would make export less attractive and increase the attractiveness of imports, subsequently worsening the current account under a flexible exchange rate regime. Under a fixed exchange rate regime, the budget deficit stimulus would generate higher real income or prices and this would worsen the current account balance. In other words, running a budget deficit ultimately will widen the current account deficit under both flexible and fixed exchange rate regime, although the transmission mechanisms may differs.

Buchanan (1976) rediscovered the Ricardo proposition known as the Ricardian Equivalence hypothesis. According to this view, an inter-temporal shift between taxes and budget deficits does not matter for the real interest rate, the quantity of investment or the current account balance. In other words, the absence of any link between the two deficits would be in accordance with Ricardian equivalence hypothesis.

Egwaikhide (1997) analyzes the effect of budget deficits on the current account balance in Nigeria using behavioral equations drawing on time-series data covering 1973-1993. A simple estimation method Ordinary Least Squares (OLS) was explored. Policy simulation exercise was considered in this study. Findings suggest that budget adjustment is needed to raise real investment in the economy since it is directly linked to the performance of real income. The result of the simulation experiment stressed that budget deficits occasioned by increased in expenditure precipitated the deterioration of the current account balance. A similar macroeconomic framework was adopted by Tchokote (2005) to examine the effect of budget deficit on current account balance in Cameroon for the period 1965-2000. In the study, two stages least square was used to capture simultaneous equation bias which may arise from ordinary least square method. It was found that concurrent fiscal deficit and negative current account balance have triggered a series of macroeconomic imbalances in Cameroon.

Korsu (2006) investigates the effects of fiscal deficits on external sector performance in Sierra Leone using annual data from 1971-2005. The study utilized three stages least square methodology to estimate simultaneously money supply, price level, real exchange rate and overall balance of payment. Counterfactual policy simulation was later performed but the direction of causality was not explicitly identified in the study. Evidence shows that fiscal restraint improves the external sector of Sierra Leone by reducing money supply and the price level. The result also point to the need for a sustained reduction in the budget deficits of Sierra Leone as this helps in achieving monetary restraint and low price level which has real exchange rate depreciation and improvement in the balance of payment as ultimate external sector benefits.

Ali (2006) explores the inter-linkages between budget deficits and trade deficits in Lebanon by using Granger causality and unrestricted error correction model. Bound test cointegration was adopted to establish the long run relationship between budget and trade deficit. The study employs Jarque-Bera test to check the normality of the error terms. Empirical findings of the study shows that budget deficit and trade deficit have a positive significant relationship in the long run. The direction of causality runs from trade deficit to budget deficit.

Tahir *et al.* (2007) investigate the twin deficits hypothesis in Pakistan using quarterly time-series data for period 1975-2005. Cointegration test and Granger causality test was conducted to determine the long run relationship and the direction of relationship between budget deficit and current account balance. Error correction model was also used to capture the short-run disequilibrium situation among the variables. Cointegration test indicated the existence of long run relationship between the deficits. While Granger causality test shows that bi-directional causality runs between budget deficit and current account balance in Pakistan.

Ratha (2012) examines the relationship between budget deficits and trade deficits in India using monthly data over the period 1998-2009 and bound testing approach to cointegration. The lag structures of the autoregressive distributed lag are selected based on Akaike information criterion, findings support that the Twin Deficits Theory holds for India in the short run.

Various methodologies have been used to analyze the relationship between budget deficits and current account balance. Among the methodology include ordinary least square; two stage least square, vector autoregressive model and vector error correction model. In the analysis, researchers intend to fill the gap in the literature by making use of a robust and recent econometric modeling which include bound cointegration test to determine the long run relationship, error correction model to capture the short run disequilibrium situation among the variables and Granger causality test to establish the direction of relationship between budget deficit and current account balance in Nigeria.

Theoretical framework: The framework of national account defines a clear link between budget deficits and current account. This framework has is foundation in Keynesian theory which has been extended by Mundell (1963) and Flemming (1962). It has also been adopted by Nozar and Loretta (2006) and Tahir *et al.* (2007) for analyzing the relationship between budget deficit and current account balances. The theoretical reasoning for connection between budget deficits and current account balance according to Tahir *et al.* (2007) can be traced from the national income identity:

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

Where:

Y = The national income
C = The private consumption expenditure
I = The investment spending
G = The government expenditure
X = Export
M = Import

$$C = f(Y_d) \quad (2)$$

For current account balance:

CA = X-M
CA = Current account
M>X = Current account deficit
G = Government expenditure
T = Government revenue
BD = G-T
If G>T = Budget deficit

The Current Account balance (CA) is defined as payment received from abroad in exchange for current goods and services, minus the analogous payment made to foreigners by the domestic economy. In a simple description, the current account may be equal to net exports. When a country import more than its exports it has current account deficit which is financed by borrowing from abroad. Such borrowing may be done by government or by private sector of the economy. Private firms may borrow by selling equity, land or physical assets. So, a country with current account deficits must be increasing its net foreign debt (or running down its net foreign wealth) by the amount of the deficit. A country with current account deficits is importing present consumption and/or investment (if investment goods are imported) and exporting future consumption and/or investment spending.

According to the national income identity national savings(s) in an open economy equals:

$$S = Y - C - G + CA \quad (3)$$

Alternatively, the Eq. 3 can be written as:

$$S = I + CA \quad (4)$$

Where Y - C - G = I stand for investment. It is worth to look at national saving more closely. Researchers distinguish national saving between saving decision made by the private sector (S_p) and saving decision made by the government (S_g) mathematically researchers have:

$$S = S_p + S_g \quad (5)$$

S_p is that part of personal disposable income (income after tax) that is saved rather than consumed in general researchers have:

$$S_p = Y_d - C = (Y - T) - C \quad (6)$$

Where:

Y_d = Personal disposable income
T = Tax collected by government. Government saving
(S_g) = Defined as difference between government revenue collected in the form of Taxes (T) and expenditure which is done in form of government purchases (G). Mathematically researchers have:

$$S_g = T - G \quad (7)$$

Now, Eq. 5 in an identity form can be written as:

$$S = S_p + S_g = (Y_d - C) + (T - G) = I + CA \quad (8)$$

In order to analyze the effect of government saving decision in an open economy the above identity can be written as:

$$S_p = I + CA - S_g = I + CA - (T - G) \quad (9)$$

$$S_p - I + (T - G) = CA \quad (10)$$

Or alternatively researchers can have:

$$CA = S_p - I - (G - T) \quad (11)$$

Equation 10 provides a convenient framework to examine the relationship between budget deficits and current account balance. Researchers expect a positive sign for budget balance; a positive sign for private savings and negative sign for investment as shown in Eq. 10, the government deficit measures the extent of government borrowing to finance expenditure. Looking at

the macroeconomics identity (Eq. 10) researchers can see that two extreme cases are possible. If researchers assume that difference between private savings and investment is stable overtime, the fluctuation in the public sector deficit will be fully transmitted to the current account and twin deficits hypothesis will hold.

MATERIALS AND METHODS

Data sources and definitions: This study utilizes secondary data of various organizations and agencies which include Central Bank of Nigeria statistical bulletin, CBN annual report and statement of account, IMF financial statistics and National Bureau of Statistics annual abstract of statistics. Statistics such as budget balance, current account balance and private savings are collected from Central Bank of Nigeria statistical bulletin while that of domestic investment (proxy by gross capital formation) are obtained from IMF international financial statistics. All the variables employ are being expressed in percentage of nominal GDP. This study covers the period between 1960-2008. The variables are current account balance (CGDP), budget balance (BGDP), domestic investment represented by the growth rate of gross capital formation (IGDP) and private savings (PGDP). According to Ahmadu (2004) and Tahir *et al*. (2007), the relationship between budget deficit and current account balance can be specified as:

$$CGDP = f(BGDP, IGDP, PGDP)$$

$$CGDP = \beta_0 + \beta_1 BGDP - \beta_2 IGDP + \beta_3 PGDP + \upsilon_t \quad (12)$$

$$\beta_1, \beta_3 > 0, \beta_2 < 0$$

Where:

CGDP = Current account balance
BGDP = Budget deficit
IGDP = Investment (Proxy by gross capital formation)
PGDP = Private savings

All variables are express as a percentage ratio of nominal GDP.

Unit root test: Researchers begin by determining the stationarity of the variables using two tests of unit roots, namely the Augmented Dickey-Fuller (ADF) and the Phillips-Perron tests. While the Dickey-Fuller class of test assumes that the residual from the auxiliary regression are white noise, Phillip-Perron test does not make any assumption about the residuals (Table 1).

While the Dickey-Fuller class of test assumes that the residual from the auxiliary regression are white noise, Phillip-Perron test does not make any assumption about the residuals. While the ADF procedure is most commonly used test, it nevertheless requires homoskedastic and uncorrelated errors in the underlying structure. The Phillips-Perron non-parametic tests generalize the ADF procedure, allowing for less restrictive assumptions for the time series in question. Researchers make use of the test of unit root in order of guarantee that the inferences regarding the important issue of stationarity are unlikely driven by the choice of testing procedure used.

Table 1: Augmented dickey-fuller and phillip-perrons test

	Level		First difference	
Variables	ADF	Phillip-Perron	ADF	Phillip-perron
CGDP	-3.494726**	-3.484762**	-8.276384***	-18.20521***
BGDP	-2722203	-2.533494	-9.661929***	-11.94584***
IGDP	-3.287038**	-3.287028**	-9.049925***	-10.74971***
PGDP	-2.083481	-2.088300	-6.811468***	-6.811468***

Researchers's computation, critical values are 1, 5 and 10% levels of significance respectively. The null hypothesis of ADF and Phillip-Perron's test for presence of unit root. ***, **, *indicate significance at 1, 5 and 10%, respectively

Autoregressive distributed lag (Bound testing approach): The use of bound testing approach is based on two rationales. First, Pesaran *et al*. (2001) and Narayan (2005) advocate that the bound test allows a mixture of I (1) and I (0) variables as regressors that is the order of integration of relevant variables may not necessarily be the same Johansen cointegration test assume that variables under study have the same order of integration. Therefore, the auto regressive distributed lag technique has the advantage of not requiring a precise identification of the order of the underlying data. Second, this technique is appropriate for small or finite sample size (Pesaran *et al*., 2001). Therefore, one need to consider bound cointegration test that will incorporate variables that are stationary both in their level form and first difference. Bound testing approach enables a mixture of I (0) and I (1) variable in the cointegation space. The model for estimation under this approach can be specified as:

$$\Delta Yt = \beta_0 + \beta_1 Y_{t-1} + \beta_2 B_{t-1} + \beta_3 I_{t-1} + \beta_4 P_{t-1} + \sum_{i=1}^{p} \beta_5 \Delta Yt\text{-}i + \sum_{i=0}^{q} \beta_6 \Delta B_{t-i} + \sum_{i=0}^{r} \beta_7 \Delta I_{t-i} + \sum_{i=0}^{r} \beta_8 \Delta P_{t-i} + ut \quad (13)$$

The structural lag of the model is determined by using minimum Akaike's Information Criteria (AIC). From the unrestricted error correction model, the long run elasticities are the coefficient of one lagged explanatory variable (multiplied by a negative sign) divided by the coefficient of the one lagged dependent variable (Bardsen, 1989). For example in Eq. 14, the long run

elasticities of budget deficit and investment are (β_2/β_1) and (β_3/β_1), respectively. The short run effects are captured by the error correction model.

After regression of Eq. 13, the Wald test will be calculated to discern the long run relationship between the concerned variables. The Wald test can be conducted by imposing restriction on the estimated long run coefficient of all the variables under study. The null and alternative hypothesis are as:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ (no long-run relationship)
H_1: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$ (a long-run relationship exist)

The computed wald statistics will be compared with the critical values tabulated (unrestricted intercept and no trend) of Pesaran *et al.* (2001). According to these researchers, the lower bound critical values assumed that the explanatory variables are integrated of order zero or I (0) while the upper bound critical value assumed that are integrated of order one or I (1). Therefore if computed F-statistic is smaller than the lower bound, the null hypothesis is not rejected and we conclude that there is no long run relationship between current account balance and its determinants. Conversely if the computed F-statistic is greater than the upper bound value then current account balance and its determinant share a long run level relationship. On the other hand if the computed F-statistics falls between the lower and upper bound value then the result are inconclusive.

Error correction model: The Error Correction Mechanism (ECM) was first used by Hendry *et al.* (1984) and later by Engle and Granger (1987). If the time series are I (1) then one could run regression in their first differences. However by taking first differences, researchers have lost long run relationship that is stored in the data. This implies that one needs to use variables in levels as well. The advantage of Error Correction Mincorporates variables both in their levels and first differences. By doing this, ECM captured the short-run disequilibrium situation among variables. An ECM formulation which describes the relationship between Y_t and X_t can be presented as:

$$\Delta Y_t = \omega_1 + \omega_2 \Delta X_t - \rho \upsilon_{it-1} + \upsilon_{it} \quad (14)$$

In this model, ω_2 is the impact multiplier (the short run effect) that measures the immediate impact that a change in X_t will have on a change in Y_t on the other hand, ρfeedback effect or the adjustment effect that shows how much of the disequilibrium is being corrected that is the extent to which any disequilibrium in the previous period affect any adjustment in the Y_t period.

Granger causality test: Time series that are not stationary may have a linear combination that is stationary, if the variables are determined to be stationary; researchers apply the standard Granger causality test developed by Engle and Granger (1987). Granger causality test determine the direction of influence between the series. The model is specified as:

$$Y_t = a_0 + \Sigma a_{1i} Y_{t-i} + \Sigma a_{2i} X_{t-i} + \Sigma_{1t} \quad (15)$$

The reverse causality is tested by estimating the following equation:

$$X_t = b_0 + \Sigma b_{1i} X_{t-i} + \Sigma b_{2i} Y_{t-i} + \Sigma_{2t} \quad (16)$$

Where:
Σ_{1t} and Σ_{2t} = White noise error term
Y_t = The budget deficit
X_t = Represent current account balance

The hypothesis is:

H_0: di = ……dk = 0
H_1: di ≠ ……dk ≠ 0

For instance in order to be a unidirectional causality from budget deficit to current account deficit, the estimated coefficient on lagged Y_t in Eq. 15 should be statistically different from zero as a group and the set of estimated coefficients on lagged X_t in Eq. 16 should not be statistically different from zero and vice versa. Feedback effect or bilateral relationship/causality is suggested when a_2 in Eq. 15 and b_2 in Eq. 6 are statistically different from zero and independence when both sets of coefficient are not statistically different from zero in both regression.

RESULTS AND DISCUSSION

Unit root test results: Empirical findings of Ordinary least square result Table 2 shows that all the variables follow apriori expectation signs. Budget Deficit (BGDP) is significant at 5%, investment (IGDP) is significant at 10% and only private saving (PGDP) is not significant in the model. The result obtained suggest that a unit increase in budget deficit will cause 0.71 unit increase in current account deficit, a unit increase in investment will decrease current account balance by 0.58 unit and a unit increase in private savings will increase current account balance by 0.0006 unit. Coefficient of determination (R^2) suggests that budget deficit, investment and private savings account for 43% variation in current account balance in Nigeria.

Table 2: Ordinary least square regression result

Variables	Coefficient	SE	t-statistic
C	17.7500	9.27	1.8600
BGDP	0.7100	0.30	2.4000
IGDP	-0.5810	0.32	-1.8400
PGDP	0.0006	0.62	0.0009

$R^2 = 0.43$, Adjusted $R^2 = 0.38$, F. statistics = 8.23, DW = 2.20

Table 3: Estimated Autoregressive Distributed Lag (ARDL) Model of Eq. 14 dependent variable: Δ(CDGP)

Variables	Coefficient	SE	t-statistics	Prob.
C	-10.408490	6.195435	-1-680026	0.1033
CGDP(-1)	-0.731402	0.188999	-3.869877	0.0005***
BGDP(-1)	0.081103	0.329160	0.246395	0.8071
IGDP(-1)	0.111389	0.259905	0.428575	0.6713
PGDP(-1)	1.510710	0.582204	2.594812	0.0145**
Δ(CGDP(-1))	0.193011	0.170773	1.130218	0.2673
Δ(CGDP(-3))	0.150265	0.151708	0.990490	0.3299
Δ(BGDP)	0.687334	0.326547	2.104852	0.0438**
Δ(BGDP(-3))	0.475496	0.277839	1.711411	0.0973*
Δ(IGDP)	-0.625699	0.337267	-1.855207	0.0734*
Δ(IGDP(-3))	0.345159	0.330160	1.045428	0.3042
Δ(IGDP(-2))	0.628483	0.339406	1.851711	0.0739*
Δ(PGDP)	0.912059	0.635613	1.434929	0.1617
Δ(PGDP(-1))	-1.468443	0.698625	-2.101903	0.0441**
Δ(PGDP(-2))	-1.761885	0.737169	-2.390070	0.0233**

R-squared: 0.593185, Adjusted R-squared: 0.403338, Akaike info criterion: 7.394212; Scwartz criterion: 7.996433; F-statistics: 3.21541; Durbin Waston: 1.773909; *, **, ***indicates 10, 5 and 1% significance level, respectively. Serial correlation LM test: 0.286760(0.780029) Jacquebera: 0.496855(0.780029)

Table 4: Bound cointegration test analysis based on Eq. 14

Critical value (%)	Lower bound value	Upper bound value
1	3.74	5.06
5	2.86	4.01
10	2.45	3.52

Computed Wald statistics (F-statistics) is 4.450290 (significant at 5%). Crititical values are cited from Pesaran *et al.* (2001), Table CI (III) unrestricted intercept and no trend

The estimation of Eq. 13 using autoregressive distributed lag is shown in Table 3. The parsimonious model was derived by using the minimum level of Akaike information criterion for ARDL. Using Hendry's general to specific method, the goodness of fit of the specification that is R-square and adjusted R-square are 0.59 and 0.40, respectively.

The robustness of the model has been confirmed by several diagnostic test such as Breusch Godfrey serial correlation LM test (serial correlation test is used to test whether the explanatory variables are correlated with the error term) and Jarque-Bera (Jarque-Bera test is used to check the hypothesis that a given sample is normally distributed) test to check the normality of the model (Table 4).

The result of bound testing approach to cointegration established the existence of long run relationship among the variables namely current account balance, budget deficit, investment and private saving. This is significant at 5%.

Table 5: The Estimated Dynamic Short-Run Error Correction Model; Dependent variable: Δ(CGDP)

Variables	Coefficient	SE	t-statistics	Problem
Δ(BGDP)	0.675272	0.267200	2.527202	0.0163**
Δ(IGDP)	-0.814689	0.303201	-2.686961	0.0111***
Δ(PGDP)	0.551149	0.568456	0.969553	0.3391
Δ(CGDP(-1))	0.153806	0.156580	0.982281	0.3329
Δ(CGDP(-3))	0.126683	0.142044	0.891859	0.3787
Δ(BGDP(-3))	0.577217	0.267357	2.158977	0.0380**
Δ(IGDP(-2))	0.596387	0.299992	1.988010	0.0549**
Δ(PGDP(-1))	-0.990390	0.594126	-1.666969	0.1047
Δ(PGDP(-2))	-1.240698	0.651907	-1.903184	0.0655**
Δ(PGDP(-3))	0.998613	0.693928	1.439073	0.1593
ECM(-1)	-0.568404	0.182986	-3.106278	0.0038***

R-squared: 0.571156; Adjusted R-squared: 0.445025; Akaike info criterion: 7.269171; Schwarz criterion: 7.710799; Dutbin-Waston stat.: 1.795712; *, **, ***indicates 10, 5 and 1% significance level, respectively

From the estimation of the coefficient autoregressive distributed lags, the long-run elasticities are the coefficient of the one lagged explanatory variable (multiplied by negative sign) divided by the coefficient of one lagged dependent variable (Bardsen, 1989). The estimated coefficient of the long run relationship between current account balance (CGDP), Budget Deficit (BGDP), Investment (IGDP) and private savings is estimated as:

$$CGDP = -10.408 + 0.1109BGDP + 0.1523IGDP + 2.0655PGDP \quad (17)$$

Equation 17 shows that all the explanatory variables are positively related to current account balance in the long run. About 1% increase in Budget Deficit (BGDP) will lead to 0.11% increase in current account balance (CGDP). A percentage increase in investment (IGDP) increases current account balance (CGDP) by 0.15% in the long run. Also 1% increase in private savings (PGDP) raises current account balance (CGDP) by 2.07% in the long run. Budget deficit and private savings are consistence with the apriori expectation while investment is not in line with the apriori expectation in the long run. This could be related to the fact that investment in the long run will raise the capacity of the country to increase its merchandise export thereby leading to favourable current account balance (Table 5). The result of the short run error correction model shows that investment is significant at 1%. Budget deficit, three period lag budget deficit, two period lag investment and two period lag private savings are significant at 5%.

The coefficient of the variables in the model show that 1% change (increase) in budget deficit (BGDP) will cause 0.68% change (increase) in current account balance (CGDP). A percentage change (increase) in investment (IGDP) will result to 0.81% change (decrease) in current account balance (CGDP). A percentage change (increase) in private saving (PGDP) will lead to 0.55% change (increase) in current account balance. The coefficient of

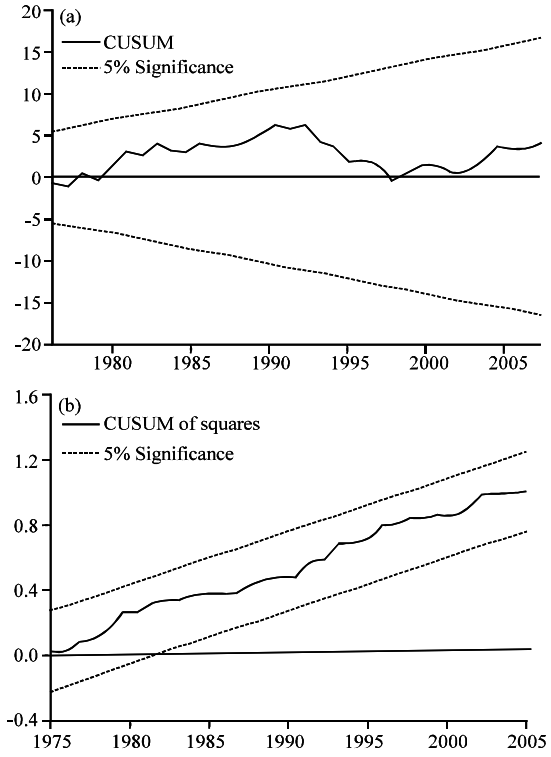

Fig. 2: Plots of CUSUM and CUSUM of squares test

Table 6: Pairwise Granger causality tests Lags: 1

Null hypothesis	Obs	F-statistic	Probability
BGDP does not Granger Cause CGDP	48	4.20575	0.04614
CGDP does not Granger Cause BGDP		9.20312	0.00400

all the explanatory variables namely budget deficit, investment and private savings are in line with the apriori expectation. The error correction term is negative indicating the existence of disequilibrium in the model. Any disequilibrium in the previous requires 0.57% in the current account balance that will be corrected in the current period. Lags are chosen based on Akaike information criterion.

Testing for structural break in the model (stability test): Figure 2 shows that both the CUSUM and CUSUM of square plots are within the 5% critical bound, thus providing evidence that all the parameter of the model do not suffer from structural instability over the period under study. In other words, all the coefficient of the error correction model is stable.

Granger causality test: The possibility of causal relationship between budget deficit (BGDP) and current account balance (CGDP) are examined in this study using the pair wise Granger causality test developed by Engle and Granger (1987). As shown in the Table 6 and as indicated by the p-value of the pairwise Granger causality test, budget deficit does Granger causes current account balance at 5% level of significance and current account balance Granger causes budget deficit at 1% significance level. This results show that there is a bi-directional relationship between budget deficit and current account balance in Nigeria.

CONCLUSION

Nigeria constitutes a valuable case study for investigating the dynamics of persistently high rates of budget deficits and current account imbalances. The aim of this research is to examine empirically the conventionally argument that budget deficit and current account balance have a stable relationship in developing countries. The stationarity properties of the variables were first tested. Ordinary least square was estimated to determine the effect of budget deficit on current account balance. Johansen cointegration test and bound cointegration technique were conducted on the variables in order to compare results. Bound cointegration test enable the combination of both I (0) and I (1) variables in a cointegration space. It also allows the estimation of long run elasticities of the variables under study. Error correction model was employed in this study to capture short run disequilibrium situation of the variables. Granger causality test was also used to determine the causal relationship among the variables.

Trend analysis shows that budget deficit and current account balance in Nigeria has experience consistent variation and imbalances since independence. Evidence from ordinary least square regression indicates that budget deficit is significant in the model, a unit increase in budget deficit result to 0.71 increases in current account deficit. Both Johansen and bound cointegration test indicates a long run relationship between budget deficit and current account balance in Nigeria. All the variables were cointegrated at 5% significance level. This result implies that investment and private savings are important in the model. Since there is cointegration among all the variables in the model, it becomes necessary to construct an error correction model to cater for the short run dynamics among the cointegrating variables (Engle and Granger 1987). Information provided from the error correction model indicates that a large number of error correction coefficients are significant. The error correction model estimate show that a percentage change (increase) in budget deficit will lead to 0.68% change (increase) in current account balance in the short-run. It is important to note that the entire coefficient in the error correction model is of the appropriate signs and satisfactory. The long run elasticities show that 1% increase in budget deficit will cause 0.11% increase in current account balance in the long run. Conducting a Granger causality test on the two variables shows a bi-directional causal relationship. This findings support

the twin deficits hypothesis. The finding here is in line with the one obtained by Ahmadu (2004) for Malaysia and Philippines, Evan and Tuck (2009) for Tahir *et al.* (2007) for Pakistan.

RECOMMENDATIONS

Several policy lessons can be drawn from the findings of this study. Fundamentally, there is need for policy intervention in terms of Nigerian government fiscal operation and external sector performance. Historical data on these variables reflects frequent deficits in the budget and current account balance in Nigeria.

The empirical findings of this study suggest that budget deficit affect current account balance in Nigeria, therefore fiscal discipline is necessary to bring Nigerian ever growing budget deficits to a minimal level. Keynesian proposition support the consistence financing of government of various countries to stimulate economic growth and advancement. But, most of the finances in developing countries that result to deficits in the fiscal balance are caused by mismanagement of public funds due to corruption. Also, it is important to note that surplus seen in the current account balance of the balance of payment is mostly contributed by oil export considering the size of oil in Nigeria merchandise export. It becomes necessary for the government to consider diversifying the economy reliance on oil export since any shock in the price of crude oil will transmit to country's fiscal position.

Existence of a stable long run relationship between budget deficit and current account balance in Nigeria presupposes that development of a strong financial sector to finance the fiscal deficits and diversification of export product are essential for this country's development and may serve to reduce the rising budget deficits and current account deficits in Nigeria.

The result of Granger causality analysis supported the existence of bi-directional causality between budget deficits and current account deficits in this country. Therefore, appropriate policy measures to reduce budget deficits could play an important role in reducing the current account deficits and vice-versa.

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