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Empirical Test of the Sustainability of Current Account Deficits in Nigeria

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Abstract

This paper examines sustainability of current account deficits in Nigeria, for the period 1980 to 2019. Using the framework of an intertemporal budget constrain, a current account sustainability equation is derived and the conditionality for establishing sustainability is ascertained. The empirical strategy applies the unit root test, the Engle Granger cointegration test and dynamic OLS (DOLS) regression approach for testing the sustainability of the current account. The study finds robust evidence showing stable long run equilibrium relationship between exports and imports. With respect to sustainability the study also shows evidence of weak sustainability especially as reported in the DOLS regression result. On the overall, the evidence from this study does not significantly deviate from extant studies in this strand of the literature.

Keywords: Current Account Sustainability, Unit Root, Cointegration, Dynamic OLS

Introduction

The discussion on the sustainability of a country's current account disequilibrium has continuously gained prominence over the years. The analysis of this subject has focused mainly on the question of at what point can the current account sustainability become of concern. This is an issue of significant importance for policymakers and academic economists alike. Standard textbook analysis indicates that the current account is a mirror image of changes in national net indebtedness.

In the context of developing countries especially those in Africa, maintaining a sustainable current account balance is a tremendous challenge. This is because on the one hand, most of these countries depend largely on imports of various types of consumption goods and raw materials for both the rapidly growing populations and investment sector, while on the other hand their export sector is still uncompetitive in the world markets [1, 2]. Consequently, the growing gap between the rapidly expanding imports and dwindling or sluggishly growing export leads to non-sustainability in current account deficits over time.

Moreover, it can be intuitively inferred that the current account balance is a reflection of either the strength of domestic economies as they measure resource inflows into a country or an accumulation of debts that cannot be serviced in the future [3]. A mixture of external and internal factors such as unsustainable fixed exchange rate regimes, real exchange rate appreciation, and continuous deterioration of terms of trade instigates persistent current account deficits. Hence, the concept of current account sustainability simply represents an analysis of whether a country is capable of fulfilling its long-run intertemporal budget constraint without triggering significant dramatic economic upheavals that can cause painful adjustments in the medium or long term horizon [4].

Interestingly, there exist a divergence of opinion on the implication of large current account deficits among some scholars. For instance, Karunaratne, states that high current account deficits do not pose any significant constrain on the macroeconomic growth trajectory of developing countries and hence should not be a matter for policy concern. The rationale is based on the Australian experience over several years [5]. Roubini also shares a similar line of argument [6]. However, Ozer and Coskun note that large current account deficits represent an indicator of economic fragility [7]. Other researchers, such as, Apergis, Katrakilidis & Tabakis argue that persistent current account deficits can trigger financial crisis, an increase in domestic interest rates, a rapid depreciation of domestic currency and exert excessive burden on a country's future generations through a reduction in living standards [8].

Notwithstanding the preceding argument, there is a consensus in the literature stating that, when a country runs persistent large and growing current account deficit, it would inevitably generate changes in GDP growth and thus, in import spending, causing its present level to be unsustainable. It is further stated that although the present value of trade surplus could be sufficient to repay the country's external debts, theoretically, however, diverting output

from domestic consumption to debt servicing can involve high political risks. Hence, even if a country expects its future expected trade surpluses to finance its present current account deficits, there are still risk involved.

The objective of this paper is to test the sustainability of current account deficits in Nigeria within the context of the bourgeoning debt profile of the country. There has been increasing research on current account, however, less emphasis has been put on testing the sustainability of current account deficits vis-à-vis the increasing debt profile of the country.

Recent studies in this strand of the literature have continuously reported converging result showing that the current account deficit in Nigeria is not sustainable. For instance, Ayadi, Williams, and Hyman reports the existence of a long-run equilibrium between export and imports in Nigeria, but failed to report sustainability in the current account balance for Nigeria [8]. Similarly, Adedeji (2008) also reports unsustainable current account deficits and susceptibility to external crisis necessitated by excessive reliance or misperception of temporary increases in oil prices as permanent ones.

Nigeria, represent an interesting case first because the country has maintained significant and persistent current account disequilibrium for the past decade which has been occasioned by wide fluctuations in its export earnings from crude oil. Though available data shows the country recorded surpluses in its current account for the majority of years in the past decade (WDI, 2018), the increasing debt accumulation could pose significant external and internal balance of payments crises for the country. This had led to concerns about whether or not the current account imbalances observed during the years are sustainable. There are several reasons why policymakers in the country should be concerned about sustainability of the growing current account imbalances in the country.

First, the current account balance is an indicator of the state of an economy. To the extent that if foreign investors perceive a country's current account imbalances to be unsustainable, they are unlikely to hold assets denominated in that country's currency. Depending on the speed and magnitude of the decline in demand for its foreign assets, this could lead to a current account reversal which has severe implications for the domestic economy. Recent evidence suggests that high current account deficits increase the probability of a currency crisis (Edwards 2002). Second, current account deficits lead to the accumulation of forebt which has to be repaid at some point in the future. If domestic and foreign investors are rational, they will expect an increase in future taxes by the government in order to service and repay the debt. The expected increase in taxes will affect their investment decisions with negative consequences for output and employment in the country.

On the overall this study is motivated by the need to analyze the current account sustainability of the country and to better understand the risk the country may be facing, especially within the present economic context. The paper contributes to the literature by using current data and utilizing several econometric tools of analysis and test for the sustainability. In particular, the study employs the various types of unit root test methods, cointegration test and the Dynamic OLS estimation method to derive conclusive evidence on the nature of the sustainability of current account in Nigeria.

The remainder of the paper is structured as follows: sections two outlines the theoretical framework and empirical methodology while section three presents the empirical results and discussion. Lastly, the concluding remarks are covered in section four.

Theoretical Framework

The basic theoretical framework adopted for testing the sustainability of current account follows that of previous studies. Specifically, Hakkio and Rush and Husted provides a robust theoretical framework that has served as the analytical workhorse for empirical research in this strand of the literature [9, 10].

The theoretical basis of the model is an intertemporal budget constrain model that examines the behavior of the stock of foreign debt to determine where a country's intertemporal constraint is satisfied. The current-period budget constraint at time t is given by;

$$C_t + I_t + G_t + B_t = Y_t + (1 + r_t)B_{t-1} \dots\dots\dots (1)$$

Where the terms in the right hand side: C_t, I_t, G_t and B_t are consumption, investment, government expenditure stock of foreign claims (which can be positive or negative) available to the consumers respectively; while r_t is a one-period interest rate. In an open economy, the following national account identity also holds;

$$Y_t - C_t - I_t - G_t = X_t - M_t = TB_t \dots\dots\dots\dots (2)$$

Where X_t and M_t are the exports and imports, respectively; TB_t is the economy trade balance at time t, representing the net amount of output the economy transfers to foreigners. Therefore;

$$B_t = (1 + r_t)B_{t-1} + (Y_t - C_t - I_t - G_t) \dots\dots\dots (3)$$

$$B_t = (1 + r_t)B_{t-1} + (X_t - M_t) \dots\dots\dots\dots\dots (3a)$$

$$B_t = (1 + r_t)B_{t-1} + (TB_t) \dots\dots\dots\dots\dots\dots (3b)$$

The budget constraint in Equation (1) must be satisfied for all periods. Therefore, it can be iterated forward to form an intertemporal budget constraint which is represented by the following equation;

$$B_t = \sum_{i=1}^{\infty} \mu_i [TB_t] + \lim_{n\to\infty} \mu_n B_{t+n} \dots\dots\dots\dots (4)$$

Where;

$$\mu_i = \prod_{j=1}^{i} (1 + r_{t+j})^{-1}$$

Equation (4) states that the amount borrowed (lent) by a country, in international financial marketplace, is the present value of the future trade surpluses (deficits) conditional on last term of the equation converging to a zero value. However, if the last term is non-zero and B_t is positive, then a "bubble financing" is implied by the external debt position. On the other hand, if B_t is negative, the implication is that welfare level can be improved if a country lends less [10, 11].

Equation 4 implies that conditional on information at time t the current foreign claims can be written in terms of future expected trade balance schemes as;

$$B_t = E_t \sum_{i=1}^{\infty} \mu_i [TB_t] + E_t \lim_{n\to\infty} \mu_n B_{t+n} \dots\dots\dots\dots (5)$$

Where E_t is the mathematical expectation conditional on the information available at time t. For the intertemporal budget constraint to hold, the following transversality condition needs to holds.

Equation 5, is a necessary condition for current account sustainability it states that the current value of the outstanding foreign claims be equal to the expected present value of future trade balance. That is, the intertemporal budget constraint holds at n→∞ such that the present value of expected foreign debt to GDP ratio converges to zero.

That is last term in the right hand side of equation 5 becomes zero as n→∞. It states that the present discounted value of the expected foreign debt should tend to zero as time tends to infinity.

$$E_t \lim_{n\to\infty} \mu_n B_{t+n} = 0 \dots\dots\dots\dots\dots\dots\dots (6)$$

Equation 6 above can be used to articulate two particular cases in the intertemporal budget analysis. First in the case where $E_t \lim_{n\to\infty} \mu_n$

B_{t+n} <0, the expected discounted future primary surpluses will exceed the present value of foreign debt; thus implying that the economy is accumulating trade surplus. On the contrary if $E_t \lim_{n\to\infty} \mu_n B_{t+n}$

<0 the present value of foreign debt will exceed the expected trade surpluses and the economy continues to borrow and accumulate debt to meet its interest obligation on past debt incurred.

When the above condition is satisfied, then we have the intertemporal budget constraint. Thus the intertemporal solvency constrains or transversality condition can be expressed as;

$$B_t = E_t \sum_{i=1}^{\infty} \mu_i [TB_t] \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (7)$$

Equation (7) states that the present value of the economy's expected transfers to foreigners must equal the value of the economy's initial debt to them. In other words, the country's initial foreign obligations should be paid through surpluses from the trade balance. If this condition fails to hold, this implies that the economy is continually borrowing to meet its interest payments on its foreign debt rather than transferring real resources to its creditors.

By implication, equation (7) implies that the transversality condition ensures the non-explosiveness of foreign debt and when No Ponzi Game condition is fulfilled. That is the present value of all future balances of foreign obligation must be zero. It follows that the current debt is offset by the sum of current and expected future discount surpluses and the budget constrain holds in present value terms as expressed in equation 7.

An Econometric Model for Testing Current Account Sustainability

The preceding conditions derived for current account sustainability can be subjected to empirical verification using time series data of the included variables in the model and different techniques as in previous studies. Following Djeutem and Nguikem and Ayadi et al. a testable equation can be derived by replacing B_t by CA_t in equation (3), thus yielding;

$$B_t = (1 + r_t)B_{t-1} + (TB_t) = CA_t \dots\dots\dots\dots\dots (8)$$

$$CA_t = (1 + r_t)B_{t-1} + (X_t - M_t) \dots\dots\dots\dots\dots\dots (9)$$

$$CA_t = E_t \sum_{i=1}^{\infty} \mu_i [X_t - M_t] + E_t \lim_{n\to\infty} \mu_n B_{t+n} \dots\dots (10)$$

Following Hakkio and Rush (1991) we assume that the interest rate is stationary [12]. If the exports and the imports are integrated of order 1, that is are I(1), then the trade balance is stationary and so is the first term of the right hand side of Equation (10). In this case, a sufficient condition for the current account deficit to be stationary is that the second term of the right hand side of equation (10) vanishes, that is, the condition of Equation (3) is satisfied. Equation (10) can therefore be written in the following reduced form regression model.

Assuming existence of intertemporal budget balance condition and taking into consideration the fact that the limiting value of the second term in the RHS of the equation 10 converges to zero as n→∞, then equation 10 can be written as;

$$CA_t = E_t \sum_{i=1}^{\infty} \mu_i [X_t - M_t] \dots\dots\dots\dots\dots\dots\dots (11)$$

The above expression in equation 11 forms the basis for the empirical test for current account sustainability. Equation 11 fundamentally implies that the sum of the present value of discounted current account surplus or deficit will be equal to the amount needed to just repay the short fall from external balance. Thus when this condition is attained, then it can be said that current expected path of current account is sustainable.

$$X_t^* = \beta_0 + \beta_1 M_t + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots (12)$$

Where X^* represents total exports plus interest payments abroad and ε_t is an error term. Under the null hypothesis that the economy satisfies the intertemporal budget constraint, the model must satisfy two conditions: β_1 =1 and ε_t stationary. In other words, we need to test for the former and the later will be true if X_t^* and M_t are cointegrated given that they are both $I(1)$ in the first place (see Hakkio and Rush, 1991). If X_t^* and Mt are not cointegrated, the intertemporal budget constraint cannot hold and the current account deficit is not sustainable. If there is cointegration but β_1<1, the economy is said to be "weakly" sustainable as the transversality condition may still not hold.

Apart from the unit root and cointegration method to testing sus-

tainability discussed above, the Dynamic OLS (DOLS) method has attained some prominence in the strand of the literature. The DOLS estimator technique is asymptotically equivalent to the Johansen's (1988) maximum likelihood estimator and is considered appropriate in both large and small sample.

The DOLS regression equation can be specified by making some amendments to the equation 11, takes the following form:

$$CA_t = \delta + \varphi TB_t + \sum_{I=1}^{r} \gamma_t \Delta TB_t + u_t \qquad (13)$$

Equation 13 above is a standard augmented OLS regression models with addition of a few lead and lag differences of the regressor. By using the DOLS estimation, we can more efficiently estimate the coefficient of the cointegration vector than by simple OLS.

Baharumshah and Lau (2007) have stated that a modification of the conditionality for sustainability be done. They suggest that sustainability be defined by a range of value for φ. Thus they stipulate two scenarios; (i) The current account is sustainable if there is cointegration relationship between X_t and M_t, with $0<\varphi<1$; (ii) $\varphi>1$ is not consistent with a deficit because surpluses are growing at a faster rate than foreign debt including interest payment.

Empirical Results

Data Issues

Data for the study are obtained from various sources including: the world development indicators; for various years, the data covers the period 1980 to 2017. The stationarity test, cointegration as well as other analysis are carried out on the logarithm of the variables discussed in the previous section. Using the logarithm of the variables demeans the data series and wipes off any outlier that may significant lead to spurious analysis.

Unit root test for X_t and M_t

The empirical analysis begins with an evaluation of the time series properties of the variables. This is done with the use of a set of unit root test approaches.

The unit root test is undertaken in order to ascertain whether the difference between non-stationary series becomes stationary when the same variables move together in the long run, even though they may drift apart in the short run. The combination of the three-unit root tests methods gives robust and concrete evidence on the stationarity property of the time series variables used in this study. The unit root tests are carried out within the framework of constant and trend specification.

The result of the unit root test confirms an important condition earlier made in this study: that export and imports are I(1) variables. In all three unit root test approaches export X_t and import M_t are non-stationary at their levels and thus the null hypothesis cannot be rejected; however they become stationary when they variables are first differenced. That is the variable become integrated of order one I(1) on their first difference.

Table 1: Unit Root Test Result

	ADF TEST		PP TEST		DF-GLS TEST		
	LEVEL	IST DIFF	LEVEL	IST DIFF	LEVEL	IST DIFF	DECISION
Export	-2.4549	-8.1010*	-3.2263	-9.1772*	-2.5505	-5.3155*	I(1)
	(0.1345)	(0.0000)	(0.0950)	(0.0000)			
Import	-2.8816	-6.2371*	-3.0679	-6.5692*	-2.3135	-5.3181*	I(1)
	(0.1797)	(0.0000)	(0.1287)	(0.0000)			
Current Account	-3.1085	-5.8793*	-3.2467	-12.0435*	-2.8996	-4.7457*	I(1)
	(0.1193)	(0.0001)	(0.0913)	(0.0000)			

Note: * represents statistical significance at 1% level. Critical value for DF-GLS is -3.7700

Test for Sustainability Using Engel-Granger Cointegration Analysis

Since export and import have been determined to be stationary at first difference, a long-run equilibrium relationship between them implies that their stochastic trends are linked. This means that the two variables cannot move independently of each other [13]. To test whether or not the series, X_t and M_t are co-integrated, equation 12 is estimated by ordinary least square.

$$X_t = \delta + \varphi M_t + u_t, \qquad (12)$$

thereafter the estimated residuals u^_t from the regression of equation (12) are extracted and then the unit root test is applied to this residual. The null hypothesis of the Engel-Granger cointegration test is that u^_t is I(0) against the alternative hypothesis that it is I(1). The only conditionality for the application of the test is that both series (X_t and M_t) must have identical stationary levels. The application of the unit root test on the residual obtained from the estimation of equation 12 helps to show if the stochastic errors in the estimation of equation 12 converges back to an equilibrium value over a long-run horizon. Thus, the divergence between export and imports is not explosive over the long run horizon. .

Table 2: Engle-Granger Cointegration Test

Engle-Granger Cointegration Test			
Dependent Variable: Export	**OLS**	**Unit Root Test on u^_t**	
	1	**2**	
Constant ϕ_0	0.7839**	ADF TEST	-3.9115*
	(0.0028)		(0.0214)
Import	0.8436**	PP TEST	-3.8375*
	(0.0000)		(0.0255)
		DF-GLS	-4.0139
		TEST	
R-squared Adj. R-squared	0.6765 0.6675	Decision: $\hat{u}_t$ is stationary at levels	

** and * represents statistical significance at 1% and 5% respectively.

The result of the Engel-Granger test is reported in table 2 below. Columns 1 and 2 in the table respectively report the OLS regression of equation 12 and the unit root test on the estimated residuals $\hat{u}_t$. As can be seen from the table the estimated residuals from the estimation of equation (12) is stationary at levels (i.e. $\hat{u}_t$ is I(0)), hence, it can be concluded that the two variables are cointegrated.

The Test for Fiscal Sustainability Using Dols

Having robustly established the result of the unit root and the Engel and Granger cointegration test, the long run equilibrium relationship can be estimated using Dynamic OLS model. Using the DOLS regression approach, equation (13) which is duplicated below for ease of reference can be estimated without structural breaks.

$$CA_t = \delta + \varphi TB_t + \sum_{I=1}^{r} \gamma_t \Delta TB_t + u_t \qquad (13)$$

The key coefficient in equation (11) is φ which measures the response of the current account balance to the external balance. As discussed in section 2, a value of this coefficient between zero and unity is consistent with a stabilizing or sustainable current account response to rising external balance. On the other hand, a negative or greater than unity coefficient denotes a destabilizing or unsustainable responses. In view of the data frequency a lag and leads order of two was taken using the Akaike information Criteria.

The result of the DOLS is reported alongside the OLS result for comparison. The regression is reported in table 4. The regression is done using linear and quadratic trend specification. The DOLS is used here to estimate the long-run cointegration parameter and to check whether the divergence in external balance significantly affects the current account sustainability.

The result from the DOLS regression confirms the case of current account sustainability and thus lends credence to that obtained earlier in the cointegration test. Based on the estimations, the current account responses to rising external balance levels are entirely captured by simple linear decisions hence the inclusion of the non-linear trend. The estimated result suggests that current account balances in the country do respond in a stabilizing and sustainable manner to increases in external balance. That is current account surpluses tend to increase in response to rising negative external balance

Table 3: Ols and Dols Regression Result

Dependent Variable: Current Account		
	OLS	DOLS
	1	2
Constant ϕ_0	0.0839	1.4994
	(0.9246)	(0.1893)
Trade Balance (TB)	0.3384*	0.4970
	(0.0027)	(0.2697)
Squared Trade Balance (TB^2)	-0.0027	-0.0258
	(0.7993)	(0.1474)
R-squared Adj. R-squared Durbin Watson	0.2516 0.2075 2.0924	0.5622 0.4221

* represents statistical significance at 1% and 5% respectively.

This implies that current account surpluses tend to increase systematically to match rising negative external balances and foreign claims.

The coefficients from the table shows the long run average response of current account balance to current, squared external balance. Although the coefficient in the DOLS estimation are statistically insignificant, these parameter estimates are broadly in line with a number of previous studies.

Concluding Remarks

Current accounts deficits is a regular occurrence among countries especially developing countries. However, persistent and increasingly high levels of current account deficits in developing countries could significantly inhibit the growth trajectories of the country both in the medium term and long term spectrum.

This study provides some empirically illuminations on the sustainability of current account balance in Nigeria for the period 1980 to 2019. Unlike previous studies in this strand of the literature for Nigeria, this study employs the theoretical framework of the intertemporal budget balance analysis and the econometric methods of unit root, cointegration and DOLS. A major improvement of these methods is that it tests for sustainability while also examining the convergence of the variables to their long-run equilibrium path.

Using the Engel-Granger cointegration test, the study is able to determine the stability of the long-run equilibrium relationship between export and import in Nigeria. By employing the DOLS method, the study extracts the long run equilibrium parameters for measuring the response of current account to fluctuations in external balance.

Interestingly the result shows that there is a stable long run relationship between export and import in Nigeria for the period under study. Similarly, in terms of current account sustainability the result also indicates that the current account is on a sustainable path albeit weak and marginal. This result is in line with previous studies such as Ayadi et al (2013) and Olanipekun [14]. However, the marginal sustainability of the current account as reported here may be attributed to vulnerability of the country to external oil prices which is the country's main export commodity. Thus to overcome this the country must build its reserve and consciously expand her export commodity bundle.

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