

Original Article

Understanding the Empirical Relationships between Exports Volatility and Dynamics of Current Account Balance in Nigeria

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Abstract - This paper provides empirical evidence that links exports and current account balance in Nigeria between 1981 and 2018. Exports were segmented into oil and non-oil exports and introduced into the model as explanatory variables in addition to the exchange rate. Data on the underlying variables were sourced from the Central Bank of Nigeria Statistical Bulletin and analyzed using Autoregressive Distributed Lag (ARDL) model, descriptive statistics, unit root test, and cointegration tests amongst others. The unit root test results reveal that the variables are mixed integrated. It was also found from the ARDL bounds test that the variables have a long-run relationship. The estimated ARDL model shows that oil exports have a significant positive relationship with a current account balance in both the short-run and long run. On the basis of the findings, this paper concludes that, on balance, oil exports play an important role in boosting the current account balance and providing a platform for achieving a favorable balance of payments position in the long run. Thus, this paper recommends the diversification of the export base to ensure that Nigeria adequately taps into the other productive non-oil sectors of the economy while boosting oil production in order to revamp total exports and boost the current account balance.

Keywords - Current account balance, Oil exports, non-oil export, Exchange rate, ARDL, and Nigeria.

I. INTRODUCTION

One of the ways of mirroring the economic wellbeing of any economy is through the current. Essentially, it reflects the economic and financial relations of a country with the rest of the world which embodies the net balance between the import and export of goods and services. Egilmez&Kumcu (2011) describe the current account as an important component of the balance of payment. Hence, it has a determining role in economic decisions and expectations. From a broad spectrum, the current account comprises balanced trade relations, net cash transfers at a recorded point in time, and net factor income or primary income which is the difference between the receipts on foreign investments and payments made to international investors. Developed countries consistently make efforts to ensure that the

earnings received from exports are greater than the payments made for the importation of goods and services. Put differently, countries strive to attain a favorable balance of trade in order to promote economic stability and improve their creditworthiness.

The global competitiveness of any economy reflects in the current account balance of a nation, whether it be deficit or surplus. For deficits, this implies that the country's payment for goods and services imported is higher than her receipts for export of goods and services; such a country reflects an economy that is a potential net debtor with the rest of the world. It is important to know that natural resource with special attention to oil is exhaustible which raises the need for inter-generational equity considerations. Again, the Dutch disease phenomenon in which an increase in the rate of natural resource production will eventually lead to a real appreciation of the domestic currency which reduces the competitiveness of non-oil exports and increasing imports are believed to adversely impact the current account position and its prospects.

As one of the key oil exporters in Africa, Nigeria has been characterized by a high level of uncertainties in the current account balance due to the fluctuations in the global oil prices and volume of oil production following the pegging of oil supply by the Organization of Petroleum Oil Exporting Countries (OPEC). Some of the factors considered to determinant the current account balance include; oil price (Gruber and Kamin, 2007), trade openness (Hermann and Winkler, 2009), financial intermediation and integration (Aizeman, 2007), fiscal policy, and public saving (Gruber and Kamin, 2007). However, the impact of these factors on current account position varies across various countries and an estimation method is applied. In Nigeria, oil and non-oil exports have emerged as the key determinants of current account balance and their values in the past decade (2009-2018) are summarized in figure 1.



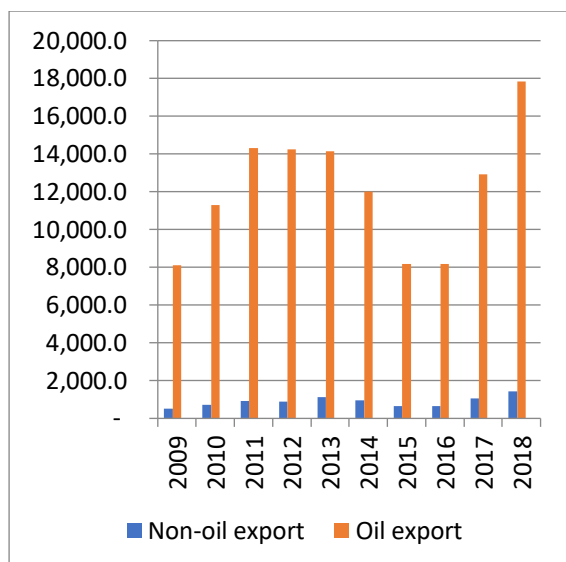


Fig. 1 Nigeria's oil and non-oil exports over the period, 2009-2018.

Source: Author's compilation with data from Central Bank of Nigeria Statistical Bulletin.

As reported in figure 1, oil exports have dominated the Nigeria export base which more than doubled non-oil exports in each of the sampled periods. The oil exports increased from ₦8,105.5 billion in 2009 to an all-time high value of ₦17,845.9 billion in 2018. However, non-oil exports rose marginally from ₦500.9 billion to ₦1,434.2 billion. The poor performance of the non-oil exports is an indication that the government's efforts at diversifying the export base are yet to achieve the expected and intended results. In view of the sub-optimal performance of the non-oil sector, the current account balance has varied between negative and positive values, thus causing distortions in the balance of payment positions.

In addition to its implication of current account balance, fluctuation in the exports of oil and non-oil resources has been described as a constraint to the rapid growth of the economy-wide aggregate. For instance, available statistics reveal that in 2014, economic growth declined sharply from 6.3 percent to 2.7 percent in 2015. Similarly, foreign reserves dropped to US\$28.3 billion at the end of 2015 from US\$34.3 billion in 2014 (World Development Indicator, 2016). Following, the increasing interconnectivity of the global economy and cross-border transactions, the current account position has attracted the attention of a myriad of studies that draw support from the theoretical underpinnings of the balance of payments. Thus, this paper deeper insights into the determinants of the current account with particular attention to the export of oil and non-oil resources in Nigeria. The remaining parts of this paper are segmented into the literature review, materials and methods, results and discussion; and conclusion.

II. LITERATURE REVIEW

A. Theoretical Review

a) Elasticity Approach

The elasticity approach emphasizes the role of the exchange rate and trade flows in the current account adjustments (Goldstein and Khan, 1985). It is mainly based on the analysis of price elasticity of demand for imports and that of demand for exports, with respect to changes in the exchange rate. It thus has the benefit of giving straightforward estimates of the price and income elasticities of exports and imports, making it easy to predict the partial-equilibrium impact on the trade deficit of expected changes in the terms of trade and relative income growth. However, the main weakness of this approach is that it is a partial equilibrium-based analysis as it only looks at the traded goods market and ignores the interaction of other various markets in an economy.

b) Absorption Approach

The absorption approach takes cognizance of the fact that the current account balance can be viewed as the difference between income and absorption, or equivalently, the difference between savings and investment. It states that if an economy spends more than it produces (i.e. absorption exceeds income), it must import from other countries for its excess consumption and spending and such economy thus runs a current account deficit. On the other hand, if this economy spends less than it produces (i.e. income exceeds absorption), it runs a current account surplus. This approach provides a more inclusive, and less misleading, framework to analyze and forecast the current account than does the elasticity approach by making it easier to incorporate determinants of financial account transactions into modeling the current account balance.

c) Intertemporal Optimal Approach

More recent theory tends to analyze current account developments on the basis of models of intertemporal maximization, either of the representative agent or of the overlapping-generation variety. The intertemporal approach to current-account analysis extends the absorption approach through its recognition that private saving and investment decisions, and sometimes even government decisions, result from forward-looking calculations based on expectations of future productivity growth, government spending demands, real interest rates, and so on. The intertemporal approach achieves a synthesis of the absorption and elasticity's view.

The quantity-based approach such as the macro-balance approach aims to identify the equilibrium exchange rate that allows for the simultaneous compliance of an external balance and internal equilibrium, estimate of medium-term current

account balances as a function of medium-term characteristics of the economy or fundamentals. One of its main objectives is the estimation of long-term exchange rate level (or time path) consistent with the underlying fundamentals, thus allowing policymakers to recognize short-term misalignments in exchange rates. This underlying current account balance approach may however indicate an undervaluation of a currency, which nevertheless would be justified once the uncertainty over future policy is taken into account. Isard and Faruqee (1998) are some of the examples under this methodology.

B. Stylized Facts on Current Account in Nigeria

Over time, the current account balance has remained an important indicator of the balance of payment positions as it mirrors the difference between exports and imports of commodities between Nigeria and the rest of the world. The trends of the current account balance between 1981 and 2018 are shown in figure 2.

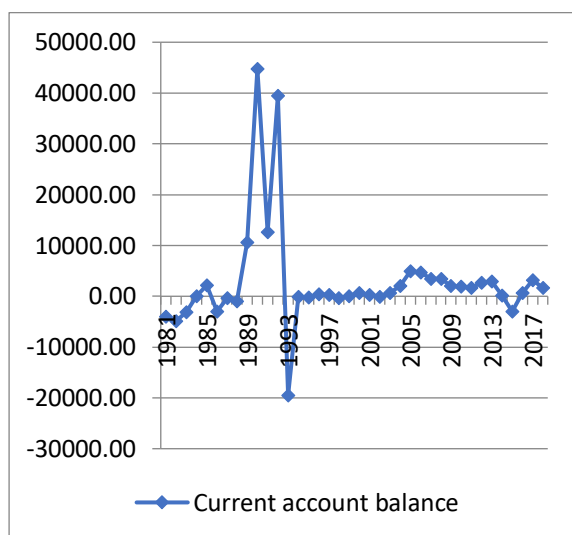


Fig. 2 Current account balance in Nigeria between 1981 and 2018.

Source: Author's compilation with data from Central Bank of Nigeria Statistical Bulletin.

The period of 1981-2018 was characterized by negative and positive current account balances. Figure 2 shows that Nigeria experiences a negative current account balance from 1981 to 1983. The current account balance reached its peak in 1990 and an all-time low-value in 1993. Additionally, the period of 1994-2002 was associated with negative current account balance whereas 2003-2014 periods are associated with the positive current account balance. The deficits in the current account position could be traced to the high dependence of the Nigerian economy on importation and the prevalence of "consumption complex syndrome" amongst households.

C. Empirical Literature

Ogunniyi, Iwebgu, and Adekoya (2018) investigated the impact of the current account balance on economic growth in SANE countries which comprises South Africa, Algeria, Nigeria, and Egypt. ARDL estimation technique was employed to investigate the comparative analysis and fully modified panel OLS (FMOLS) was employed to investigate the overall impact of the current account balance on economic growth. It was discovered from the study that current account balance has a significant negative impact on economic growth for Algeria, Egypt, and Nigeria while it has a significant positive impact on economic growth for South Africa. It was discovered that the structure of an economy with respect to her main source of foreign exchange earnings determines the impact of such activities reflected by her current account balance on the country's economic growth. They recommended that special attention should be paid to the diversification of the export base. This can principally be through technological innovations, agriculture, and so on. Therefore, the mitigation or neutralization of the effect of any shortfall or negative shock in the oil sectors can only be achieved by the implementation of reforms and policies that will reduce dependence on oil and promote dependence on the non-oil sectors.

Gruber and Kamin (2007), using a panel data of 61 countries over the period 1982-2003 and including the standard current account determinants such as per capita income, relative growth rates, fiscal balance, demographic factors, and international trade openness find that the Asian surpluses can be well explained by a model that incorporates, in addition to standard determinants, the impact of financial crises on current accounts. However, their model fails to explain the large U.S. current account deficit even when the model is augmented by measures of institutional quality. Saqib et al (2007) utilized cointegration and error correction techniques in estimating the long and short-run behavioral relationship between Pakistan's current account balance and different economic variables. The empirical results advocate that there exists a significant relationship between the current account balance and the balance of trade, domestic saving, total consumption, and workers' remittances during the period 1972-2005.

Khumalo and Kapingura (2014) developed and estimated the Vector error correction model (VECM) to analyze the impact of capital account liberalization on economic growth in Africa with a focus on South Africa. The estimation of the VECM followed the tests for unit root and cointegration. From the analysis of the relationship existing between capital flows, measured with foreign direct investment (FDI) and portfolio investment (P-I) and economic growth,

the study found that a long-run relationship exists between the variables. In accordance with the findings, the study recommended that for the benefits associated with the capital account to be maximized, proactive efforts should be made by policymakers and other key stakeholders to design and implement sound macroeconomic policies capable of shielding the Nigerian economy from the external shocks and maintain rapid economic growth.

Yang (2011) examines both the long-run and short-run impacts of the initial stock of net foreign assets, degree of openness to international trade, real exchange rate, and relative income on current account balances for eight selected emerging Asian economies over the period 1980-2009, making use of the cointegrated VAR (Vector Autoregression) methodology. The paper found that current account behaviors in emerging Asian economies are heterogeneous. The results indicate that initial stocks of net foreign assets and trade openness are important in explaining the long-run behaviors of current accounts, but have less important roles in interpreting the short-run variations in current accounts in most of the selected economies. The Real exchange was also found to be less important in explaining current account adjustments, both in the short-run and long run.

Nwani (2005) adopted three econometric approaches focusing on Ordinary Least Squares, cointegration, and error correction model in analyzing the long-run determinants of the balance of payments dynamics in Nigeria for a study period that spans over 22 years (1981-2002). The analysis utilized time series data sourced from documentary sources, especially the Central Bank of Nigeria Statistical Bulletin. It was discovered from the analysis that the balance of payment has a long-run relationship with the underlying explanatory variables. This finding is suggestive that balance of payment fluctuations in Nigeria could be traced to fluctuations in the level of trade openness, external debt burden, exchange rate movement, and instability in the level of domestic prices.

III. MATERIALS AND METHOD

A. Nature and Source of Data

The paper employs data for estimating the impacts of oil and non-oil exports on the current account balance. The data were sourced from the Central Bank of Nigeria Statistical Bulletin (2018) and World Bank over the period 1981-2018.

B. Model Specification

The paper adopts a multivariate model. The model embodies oil and non-oil exports as well as exchange rate as the dependent variables while the current account balance was introduced as the forecast

variable. The formal specification of the model is as follows:

$$CAB = b_0 + b_1NOEX + b_2OEX + b_3RER + U_t \quad (1)$$

Where: CAB = Current Account Balance

RER = Real Exchange rate

NOEX = Non-Oil Export

OEX = Oil Export

Ut = random variable

b₀ = constant parameter

b₁, b₂ & b₃ = estimated parameters of the independent variable.

The specification of the autoregressive distributed lag (ARDL) model is provided as:

$$\Delta CAB_t = c_1 + \sum_{i=1}^q m_1 \Delta CAB_{t-i} + \sum_{i=1}^q m_2 \Delta OEX_{t-i} + \sum_{i=1}^q m_3 \Delta NOEX_{t-i} + \sum_{i=1}^q m_4 RER_{t-i} + n_1 CAB_{t-1} + n_2 OEX_{t-1} + n_3 NOEX_{t-1} + n_4 RER_{t-1} + e_t \quad (2)$$

C₁ = vector of intercepts

m₁ - m₄ = short-run coefficient of the predictor variables

n₁ - n₄ = the long-run multipliers.

e_{1t} = stochastic variable

a) Variable Description

i. Current account (CUA): The current account balance is concerned with the exports of goods, services, transfers, and imports over a particular period. Net factor income is also included in the current balance. It is expected that an increase in commodities exports will reduce output volatility. It is applied in this paper as the dependent variable.

ii. Real (effective) exchange rate (REER): This refers to the value of the domestic currency against the foreign currency in the international market. Thus, an increase in REER is expected to decrease exports and the current account. However, a temporary real appreciation should result in an improvement of the current account according to the consumption smoothing hypothesis.

iii. Non-oil Exports: These include products such as agricultural, manufacturing, industrial products, and services.

iv. Oil Exports: Crudeoil, Petrochemical products and it by products are examples.

C. Method of Data Analysis

The paper used ARDL estimation method to capture both the long run and short run regression estimates. In the ARDL approach, the variables can have different lag length criteria but other methods do not allow for such. There are two steps to be followed using the ARDL approach. The first one is to examine if there is a long-run relationship among the selected variables and this is done by using the technique recommended by Peseranand Shin (1999). The second stage involves the estimation of long-run and short-run relationships between the dependent variable and the explanatory variable(s). This paper also applies the augmented Dickey-Fuller (ADF) test proposed by Dickey & Fuller (1981). The ADF test makes a significant improvement to the Dickey & Fuller (1979) stationarity test as it addresses the problem autoregressive process and applies the same procedure as the Dickey-Fuller test. The general specification of the ADF model in a drift and deterministic trend is of the form.

$$\Delta Y_t = \alpha_0 + \alpha_{1t} + \sum_{i=1}^K \beta_i \Delta Y_{t-i} + u_t \tag{3}$$

Where Y_t = underlying economic time series under investigation, Y_{t-1} = one-period lag of the underlying economy under investigation, β_i = regression estimate, α_0 = drift or constant term α_{1t} = deterministic or linear trend, K = maximum lag length, u_t = stochastic term, which is serially uncorrelated with zero mean and constant variance. Additionally, the bounds test approach to cointegration proposed by Pesaran & Shin (1999) is applied in this paper for testing for evidence of long-run relationships amongst the underlying variables. Essentially, it is considered appropriate for handling times series data with fractional or mixed order of integration.

IV. RESULTS AND DISCUSSION

A. Descriptive Statistics

In order to gain more insights into the properties of variables, descriptive statistics were conducted. The results are summarized in Table 1:

Table 1. Descriptive Statistics of variables

	CAB	SEX	NOEX	RER
Mean	2848	4546.	273.6105	88.5325
	.411	476		0
Median	696.	1467.	28.60000	97.0200
	2300	800		0
Maximu	4473	1784	1434.200	306.425
m	1.20	5.90		0
Minimu	-	7.200	0.200000	0.62000
m	1948	000		0
	8.70			
Std. Dev.	1051	5427.	408.2666	87.1070
	4.93	847		8
Observat	38	38	38	38
ions				

Source: Author's computation with data from Central Bank of Nigeria Statistical Bulletin.

The summary statistics of the variables provided in table 1 show the averages and medians, along with maximum and minimum values recorded for the period. The descriptive statistics revealed that the average values of the exchange rate, non-oil export, and oil export are 88.532, 273.61, and 4546.411. The result further revealed that the current account balance averaged 2848.411 during the study period. It was also observed from the standard deviations for each of the variables that the observations for current account balance and exchange rate converged around their respective mean values while that of oil and non-oil exports deviated from their corresponding mean values.

B. Unit Root Test

The unit root test was conducted with the application of the ADF method. The results are shown in Table 2.

Table. 2 ADF unit root test results

Variables	ADF	Critical Values	Order of Integration
CAB	-3.728835	-3.548490	I(0)
NOEX	-4.065787	-3.544284	I(1)
OEX	-4.098450	-3.544284	I(1)
RER	-4.540646	-3.540328	I(1)

Source: Author's computation with data from Central Bank of Nigeria Statistical Bulletin.

The unit root test results in table 2 were conducted at a 5 percent significance level. It was found that only the current account balance is stationary at levels. This necessitates the rejection of the null hypothesis of a unit root. Other variables in the model were transformed via differencing and they were found to be stationary after first differencing. Based on the outcome of the unit root test results, the current account balance is integrated of order zero I(0) while all the regressors are integrated of order one. It, therefore, follows from the results that the variables are mixed integrated.

C. ARDL Cointegration Bound Test

Following the mixed integration in the series, the ARDL bounds test for cointegration was applied at 5 percent significance levels. The results are summarized in Table 3.

Table 3:ARDL Bound Test Result

Variables	F-stat	Critical Values (5%)		Outcome
CAB		I0	I1	Long-run
NOEX	6.283072	3.23	4.35	cointegration
OEX RER				

The bounds test cointegration was estimated to examine the existence of cointegration among the variables in the model. From the result, it was found that there is a long-run relationship among the

variable. This is because the computed F-statistic (6.283) is greater than the upper bound critical value (4.35) at a 5 percent level of significance. On the basis of this finding, the variables can move together in the long run and as such can be modeled in the dynamic process using ARDL.

D. Model Estimation

In order to capture the long and short-run dynamic relationships between the forecast and exogenous variables following the evidence of mixed integration in the series, the ARDL is applied. The results showed in tables.

Table 4: ARDL long and short-run coefficients

Dependent Variable: CAB				
Short-run coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CAB(-1))	0.900768	0.389243	2.314155	0.0334
D(CAB(-2))	1.530456	0.365577	4.186412	0.0006
D(OEX)	2.535538	1.189789	2.123546	0.0418
D(NOEX)	16.064709	14.680279	1.094305	0.2891
D(RER)	294.470274	148.224335	1.986653	0.0633
D(RER(-1))	-306.042988	165.891623	-1.844837	0.0826
CointEq(-1)	-1.948927	0.446241	-4.367431	0.0004
Long run coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
OEX	0.279872	0.124569	2.247930	0.0221
NOEX	8.242848	7.225008	1.140877	0.2697
RER	-56.19258	32.109709	-1.750018	0.0981
C	7158.170	1523.4135	4.698770	0.0002

Source: Author's computation with data from Central Bank of Nigeria Statistical Bulletin.

The short-run results reveal that the lagged values of the current account balance have a significant positive relationship with its current value. This implies that the performance of the current account balance in the previous period can be relied upon in predicting its value in the current period. Oil export was found to exert a significant positive impact on the current account balance in both the short and long run. This is indicative that Nigeria has leveraged oil exports in boosting her balance of payments position. In a like manner, non-oil export has an insignificant

positive relationship with the current account balance. The non-significant coefficients of non-oil exports suggest that it has not been optimized to foster rapid and sustained growth of the current account balance. On the contrary, the real effective exchange rate is negatively linked to the current account balance. This finding aligns with the theoretical a priori expectation that an increase in exchange undermines the competitiveness of the domestic economy and as such negative impacts on the current account position due to a decrease in exports. The error correction coefficient (-1.9489) has the associated negative sign and fulfills the statistical critical at a 5 percent level of significance. It, therefore, follows that short-run deviations are reconciled instantaneously to achieve a long-run equilibrium position.

a) Post estimation test

The post estimation tests focused mainly on the residual diagnostics tests such as serial correction and heteroscedasticity tests. The results are summarized in Table 5.

Table 5. Post-estimation test results

Test Type	Prob.	F-stat.
Breusch-Godfrey Serial Correlation LM Test	0.416	3.10969
RAMSEY Reset	0.731	9.5448

Source: Author's computation from parsimonious ECM

The diagnostic tests results reported in table 5 showed that the model does not have a serial correlation problem and it is also free of heteroscedasticity at a 5 percent level of significance. This is evidence from the probability values of the chi-square statistic which exceed 0.05. as they reveal a probability value greater than 0.05. The outcome of these residual diagnostics tests authenticates the reliability of the model for long-term predictions and macroeconomic policy prescriptions.

V. CONCLUDING REMARKS

The study analyzed the empirical relationship between exports and current account balance in Nigeria using the econometrics technique of the ARDL model to estimate the short-run and long-run dynamic coefficients of the exogenous variables. The findings reveal that oil export is positively linked to the current account balance. This could be attributed to the dominance of oil exports in the Nigerian export base. Although non-oil export is associated with positive coefficients in the short-run and long-run, its impacts are statistically insignificant. This is suggestive that Nigeria has not adequately tapped into non-oil exports as much of the emphasis has been on oil exports as major export earnings. This

goes to say that the country's major export is in oil. It was revealed that an increase in the exchange rate will lead to deficits in the country's current account balance. This is because of the negative impact of the exchange rate on the current account balance. On the basis of the findings, this paper concludes that, on balance, oil exports play an important role in boosting the current account balance and providing a platform for achieving the favorable balance of payments position in the long run. Another conclusion drawn from the findings is that the diversification of the export base is yet to achieve the intended and expected results as non-oil exports do not significantly impact the current account balance. Thus, this paper recommends the diversification of the export base to ensure that Nigeria adequately taps into the other productive non-oil sectors of the economy while boosting oil production in order to revamp total exports and boost the current account balance.

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