TERMS OF TRADE INSTABILITY AND BALANCE OF PAYMENTS ADJUSTMENT IN NIGERIA: A SIMULTANEOUS EQUATION MODELLING

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Abstract

This paper employs simultaneous equation modeling to test the hypothesis that impact of terms of trade instability has no significant impact on Nigeria's balance of payments position. Empirical evidence reveals that *BOP* has negative relationship with terms of trade. This implies that for any 1percent instability (shock) in terms of trade, balance of payment will be adversely affected by about 1.8 percent. Hence it becomes pertinent for policy makers to pursue policies that will stabilize terms of trade. The study also invalidates the Marshal-learner condition. Hence, caution should not be thrown to the wind in adopting the policy of deliberately depreciating the naira especially because of the peculiarity of the country's exports and imports. Indeed, evidence thus abound that it is not enough to increase exports rather the export basket should be diversified. The negative association between inflation and *BOP* should be a source of worry to policy makers. It is therefore imperative for economy to address exchange control problems to the effect that the naira does not depreciate beneath a managed floor value.

Key Words: Terms of trade instability, Balance of payments adjustment, Nigeria

Background to the Research Problem

Nigeria's economic stability is very much dependent on developments in the oil sector. The petroleum reserves in Nigeria acts as a major contributor to the country's economy. The United States (US) is the major importer of Nigeria's crude petroleum. Among the various sectors of the economy, the oil sector is holds the larger share in the total GDP in the country. Since oil revenues account for 89% of total exports, the

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economy is extremely vulnerable to oil price shocks. The dependence on oil made Nigeria particularly vulnerable to world price fluctuations. In addition, oil and gas exports make up 95% of Nigeria's total exports. This leaves the economy vulnerable to fluctuations in global energy prices. The lack of economic diversification is thus demonstrated by the fact that oil receipts account for 65% of total budget revenues in 2010 (CBN, 2000). The crux of the foregoing is that the Nigeria's oil sector dictates the country's trade profile. Thus, distortions in the price of oil often culminate into terms of trade shocks. Oil producing countries in sub-Saharan Africa including Nigeria have large terms of trade shocks (Cashin and Pattilo, 2000). Nigeria ranks among the most volatile economies in the world and terms of trade shocks are the major reasons for this unstable nature of the economy (Madavo, Tomlinson, Mills and Addison, 2003). The thrust of the paper therefore is to ascertain the possible effects of terms of trade shocks and Nigeria's balance of payments position. The paper seeks to test the hypothesis that terms of trade instability has no significant impact on Nigeria's balance of payments position. Preceding the introductory section is the review of empirical literature. Section three draws on economic theory to build a theoretic framework and the research model to facilitate the empirical evaluation of the study. Section four analyses the econometric results. Finally, section five concludes the paper.

Trends In The Nigerian Foreign Trade and External Balance

At independence, Nigeria had accumulated a trade deficits resulting from large quantities of machinery and equipment imported. This was transformed into a trade surplus as revenue from crude oil began to grow. Between 1960 and 1970, value of exports grew by 19% and export of crude petroleum guaranteed a favourable trade balance (IMF, 1999). However, trade deficits returned in mid-1970s. Since that time Nigeria's balance of trade has alternated between periods of deficits and surpluses, driven by fluctuations in the global oil market and government expenditure patterns. The dependence on oil has made Nigeria particularly vulnerable to world price fluctuations. Nigeria's overall commodity terms of trade fell substantially from a base of 100 in 1985 to 76.3 percent in 1994 and 54.1percent in 1998 [CBN (2010)]. Between 1986 and 2000, Nigeria's terms of trade has displayed consistent instability, rising as high as 144.8 and 140.3 in 1990 and 1996 respectively, and falling to as low as 54.1 in 1998. More generally, Nigeria's terms of trade has displayed erratic tendencies over the years and hence noticeable instability. The same can be said for her balance of payment balances.

Nigeria's balance of payments has shown persistent deficits. For example, between 1986 and 2000, overall balance of payments reflected deficits. The current account balance however showed positive balance within the same period except in 1995 and 1998 when it recorded deficits of N186, 084.6 millions and N331, 435.2 million respectively. As late as 1955, 70% of Nigeria's exports were to Britain and 47% of its imports were from Britain. However, by 1976 Britain's share of Nigerian exports and imports dropped to 38 percent and 32 percent respectively. In the 1970s, Britain was replaced by the United States as Nigeria's leading trading partner. In 1988 the United States was Nigeria's superlative consumer, buying more than 36% of its exports,

largely petroleum products; Britain was Nigeria's leading dealer, selling about 14% of the country's imports. In the 1980s, trade with Eastern Europe and the Soviet Union constituted less than 1% of Nigeria's total. In 1981 to 1985, the country recorded a trade deficit of US$202.9 million. The trade deficits can be attributed to the glut of the international oil market that led to a fall in the country's export value. In 2007, the main items of Nigeria's exports were crude oil (US$ 58.5 billion) and gas (US$5.2 billion), together accounted for around 98% of total exports of Nigeria in 2007. In 2008, the country's current account surplus increased sharply by 118.2% to US$ 2.2 billion compared to US$ 4.8 billion in 2007. Trade with the Economic Community of West Africa (ECOWAS) countries embraced only 3% of total trade. In 1990 Nigeria had associate status with the European Economic Community (EEC). As a result, it had a number of major EEC trading partners, including Germany, France, Italy, Spain and the Netherlands. Nigeria's overall commodity terms of trade declined substantially from a base of 100 in 1980 to 83.8 in 1984, 35.5 in 1986, before rising to 42.6 in 1987 and thereafter falling to 34.6 in 1988 (World Bank, 2000). Meanwhile, export purchasing power declined from a base of 100 in 1980 to 48.3 in 1984, 23.0 in 1986, 23.1 in 1987 and 20.4 in 1988. This indicates about 79.6% decline in the purchasing power of exports in eight years. Between 2008 and 2009 declining exports and increased capital flight weakened the naira against the US dollar.

Literature Review

Meier (1968) writes, "when a country's terms of trade improve, its real income rises faster than output, since the purchasing power of a unit of its export rises." What this means in effect is that a deterioration in the terms of trade resulting from higher import prices or lower export prices can lead to decline in investment, an increase in government indebtedness and wage compression if it is not counter balanced by productivity and export volume growth (UNCTAD, 1990). Mbata (1980) found that current accounts balance, lending rates, exchange control measures and total output had impact on the balance of payments in Nigeria's. Agene (1991) empirically ascertained that the substantial deterioration in the county's balance of payments position is induced by to worsening terms of trade, excessive imports and overvaluation of the naira. Studies by Osuntogun et al, (1993) and Obadan (1994) found negative effects of exchange rate on Nigeria's export performance. According to Bleaney and Greenaway (2002), there is a negative relationship between terms of trade instability and economic performance. Africa countries have the most volatile terms of trade in the world (Madavo, Tomlinson, Mills and Addison, 2003). According to Adamu (2003), real income, inflation rate, money supply, interest rate and current account balance are all key variables in the determination of balance of payments in Ghana. In his empirical study of the long run determinants of balance of payments in Nigeria between 1981 and 2002, Nwani (2004) found that the level of trade openness, external debt burden, exchange rate movement and domestic inflation re significant factors responsible for balance of payment fluctuations in Nigeria.

An empirical research carried out by Addison et al (2003) for the West African monetary zone (WAMZ) revealed that unfavourable term of trade has negative impact

on the balance of payments. They established that Ghana and Nigeria have together experienced relatively high degrees of volatility in both terms of trade and real exchange rate. Accordingly, the authors explained that improvement in terms of trade increases demand for labour in traded goods sector implying an increase in real wages. They posit that the income effect in the case of improved terms of trade results in higher prices of non-tradable generating appreciation of real exchange rate while the substitution effects leads to a decrease in prices of imported goods and service, falling demand for non-tradable and hence depreciation of real exchange rate. However, if the income effect of improved terms of trade is stronger than the substitution effect an appreciation of real exchange rate will occur, otherwise real exchange rate shocks re-enforces real exchange rate shock and this interdependence and interrelationship between these two shocks have dire consequences for both trade balance and the overall balance of payments (,2005). In their empirical study, Ezema and Amakon (2005) found that terms of trade shocks in Nigeria are high and has impacted negatively on macroeconomic performance. Chukwu (2007) observed instability exchange rate as a determinant of trade in Nigeria, having at one time, a positive weight on export trade balance and at other times a negative impact. This suggests an erratic change in its value having a long-run effect on export and economic growth. Ezema (2009) maintained that the dependency on oil exports has the possibility of generating negative terms of trade shocks.

Theoretical Framework, Model Specification and Estimation

Theoretical Framework

In the analysis of balance of payments, three approaches are identifiable. These include the elasticity approach, absorption approach, and monetary approach. The propelling force of the elasticity approach is the determination of a relative price change through devaluation that could improve a country's trade balance. Accordingly, if the elasticity of demand for imports is sufficiently smaller than negative one in absolute value, the effect of the increase in domestic money expenditure on imports as a result of devaluation, on the balance of trade might not be offset by the by the increase in domestic money revenue from the increase sales of exports, particularly if the elasticity of demand for the export is also small. This is the Marshall-Lerner condition (Marshall, 1923 and Lerner, 1944), which holds that devaluation will improve the trade balance if the sum of export and import elasticities is greater than unity. The absorption approach views that a country with a trade deficit can restore equilibrium to its balance of trade by reducing the level of aggregate demand, that is, an expenditure-reducing policy or by decreasing the level of its income. A reduction is expenditure partly falls on imports, and hence initially reduces the trade deficit. An increase in income through expenditure-switching policy that diverts domestic goods by policies such as devaluation, or taxes, subsidies, or controls on foreign trade also initially reduces trade deficits (Chete, 2001; Appleyard and Field, 1998; Krugman and Obsteld, 1991). According to Johnson (1958), the multiplier effects link the changes in income and expenditure, but as long as the marginal propensity to spend out of income is less than unity, as it is normally assumed, these induced effects do not dominate the effects on the trade balance. The

monetary approach on its part hold that the increase in reserves and hence in money supply is the key determinant of the BOP position.

Simultaneous[2] Equations Model

In this section of the paper, we specify the following system of equations whose solution is a particular measurement of the values of all variables that simultaneously satisfies all of the equations.

$$Y\Gamma = XB + U \quad \textbf{(3.1)}$$

Equation (3.1) is the structural equation in simultaneous modeling. In this equation, $Y = [y_1\ y_2\ \dots\ y_m]'$ is the $(T\times n)$ matrix of dependent variables. Each of the matrices Y_{t-i} is in effect an m_i-columned sub-matrix of Y. The $(n\times n)$ matrix Γ describes the relation between the endogenous variables. The matrix X is of dimension $(T\times k)$ and contains all exogenous variables in the model but without repetitions, that is, matrix X is of full rank. Accordingly, each X_i is a k_i-columned sub-matrix of X. Matrix B has is of dimension $(k\times n)$ and each of its columns consists of the components of the vectors β_i and zeros, depending on which of the explanatory variables in X were included or excluded from X_i. Also, $U = [u_1\ u_2\ \dots\ u_m]'$ is a $(T\times n)$ matrix of the stochastic disturbances (error terms). When we post multiply the structural equation by Γ^{-1}, the system[2] can be specified as the reduced equation:

$$Y = XB\Gamma^{-1} + U\Gamma^{-1} = X\Pi + V \quad \textbf{(3.2)}$$

For empirical assessment, Y is a vector of endogenous variables namely, terms of trade instability, (TNT) and balance of payments adjustment (BOP), X is a vector of one-year lag of terms of trade instability (TNT_{t-1}), inflation rate (INF), broad money supply (MSS), trade openness (TPN), foreign direct investment (FVN), debt stock (DBT), Naira-US$ exchange rate $(EXRT)$ and one-year lag of balance of payments (BOP_{t-1}).

Estimation

[2] In mathematics, simultaneous equations are a set of equations containing multiple variables. This set is often referred to as a system of equations. [2]The model assumptions are as follows. Firstly, the rank of the matrix X of exogenous regressors must be equal to k, both in finite samples and in the limit as $T \to \infty$. This means that in the limit the expression $\frac{1}{T}X'X$ should converge to a non-degenerate $(k\times k)$ matrix. Matrix Γ is assumed to be non-degenerate. Secondly, error terms are assumed to be serially independent and identically distributed. That is, if the t^{th} row of matrix U is denoted by $u_{(t)}$, then the sequence of vectors $u_{(t)}$ should be iid, with zero mean and some covariance matrix Σ, which is unknown. In particular, this implies that $E[U] = 0$, and $E[U'U] = T\Sigma$. Lastly, the identification conditions requires that the number of unknowns in this system of equations should not exceed the number of n equations. More specifically, the *order condition* requires that for each equation $k_i + m_i \le k$, which can be interpreted to mean that as "the number of excluded exogenous variables is greater or equal to the number of included endogenous variables". The *rank condition* of identifiability is that rank $(\Pi) = m_i$, where Π is a $(k - k_i)\times m_i$ matrix which is obtained from Π by crossing out those columns which correspond to the excluded endogenous variables, and those rows which correspond to the included exogenous variables.

The paper utilized the feasible generalized least squares *(FGLS)* estimator in estimating the reduced form simultaneous model. The *FGLS* estimator is a two-step estimator where *OLS* is used in the first step to obtain residuals and an estimator of *Σ*. The second step entails a computation of $\hat{\beta}_{FGLS}$ based on the estimated Σ in the first step. The study tested for the existence or otherwise of unit root and *stationarity* of the variables and also the stability of the estimated coefficients by utilizing the *Dickey Fuller test, Augmented Dickey Fuller test, Phillips Peron test and the CUSUM* statistical methods. Testing for *stationarity* was found desirous in order to avoid spurious[3] regression estimates. The unit root and *stationarity* tests are based on estimating the following equations

$$Y_t = \delta Y_{t-1} + \varepsilon_t,$$
$$\Delta Y_t = (\delta - 1) Y_{t-1} + \varepsilon_t$$
(3.3)

In what follows, we tested the following stated hypothesis using a t-statistic with a scaled shifted χ^2 distribution.

$$H_0 : \alpha = 1, \ \ I(1)$$
$$H_1 : \alpha < 1, \ \ I(0)$$

It is often the scenario that we simulate paths of two random walks without drift with independently generated standard normal white noises, ε_{1t} and ε_{2t}. Thus, we have:

$$Z_{1t} = \delta Z_{1t-1} + \varepsilon_{1t}, \ Z_{2t} = \delta Z_{2t-1} + \varepsilon_{2t}$$
(3.4)

Then we estimated by *OLS,* the following model

$$Y_t = \phi + \beta X_t + \upsilon_t$$
(3.5)

In the population when $\phi = \beta = 0$, since Y_t and X_t are independent, replications with increasing sample sizes show that the DW-statistics are close to 0, coefficient of multiple determination is excessively large and the error term υ_t is *I(1),* non-stationary such that estimates are inconsistent with a divergent t_β-statistic at the rate $\sqrt{T}$. As both Y_t and X_t are independent *I(1),* the relation can be enhanced consistently using first differences to obtained as follows:

[3]The spurious regression problem arises if arbitrarily trending or non-stationary series are regressed on each other. In case of trending, the spuriously found relationship is due to the trend over time that overrides both series rather than to economic reasons. The resultant effect is that *t-statistic and* R^2 are enormously large. In case of *non-stationarity* of *I(1)* type, the series even without drifts tend to show neighborhood trends, which tend to move along for relatively longer periods of time.

$$\Delta Y_t = \phi + \beta \Delta X_t + \upsilon_t \quad \textbf{(3.6)}$$

With difference stationary series, the estimated regression slope coefficient, β has the expected distribution around zero, the t_β-values are *t*-distributed and the error υ_t is white noise. With the presence of autocorrelation, Dickey-Fuller test of equation (3.6) fails. Accordingly, the Augmented Dickey Fuller test based on the following ADF regression equation was estimated to test for unit root in this study.

$$\Delta Y_t = \varphi Y_{t-1} + \sum_{i=1}^{P} \delta_i^* \Delta Y_{t-1} + \upsilon_t \quad \textbf{(3.7)}$$

However, if the linear combination of two I (1) processes X_t and Y_t is stationary, that is, υ_t is stationary (Engle and Granger, 1987), then X_t and Y_t are co-integrated. When we estimate this model with least squares, the *OLS* estimator of β is not only consistent, but tremendously consistent. It converges with the rate *T*, instead of $\sqrt{T}$. Given a set of *I(1)* variables $Z_{1t}, Z_{2t}, Z_{3t}, ..., Z_{Kt}$. If there exists a linear combination consisting of all variables with a vector β so that:

$$\beta_1 Z_{1t} + \beta_2 Z_{2t} + \beta_3 Z_{3t} + ... + \beta_K Z_{Kt} = \beta' Z_t ... \quad \textbf{(3.8)}$$

is trend-stationary $\forall \beta_J \neq 0,\ J = 1,2,3,...,K$, then the explanatory variables, Z's are co-integrated of order CI(1,1) such that $\beta' Z_t$ is a trend stationary variable. Given that $\beta' Z_t$ is trend-stationary[4], then also $C(\beta' Z_t)$ with $c \neq 0$. Moreover, any linear combination of co-integrated variables is stationary. There is therefore no interpretation of endogenous or exogenous VAR specifications; hence, the specification of the simultaneous relationship. The paper further tested for Granger causality and it was performed by estimating equations of the following form:

$$\Delta(TNS)_t = \varphi + \sum_{i=1}^{P} \delta_i \Delta(TNS)_{t-i} + \sum_{j=1}^{P} \alpha_j \Delta(BOP)_{t-j} + \varepsilon_t \quad \textbf{(3.9)}$$

$$\Delta(BOP)_t = \phi + \sum_{i=1}^{h} \pi_i \Delta(BOP)_{t-i} + \sum_{j=1}^{h} \partial_j \Delta(TNS)_{t-j} + \mu_t \quad \textbf{(3.10)}$$

Where ε_t, μ_t are white noise disturbances, $q, p, g, and\ h$ are the number of lags necessary to induce white noise in the residuals. Based on the estimated *OLS*

[4]Trend-stationarity means that after subtracting a deterministic trend the process is stationary, I(0). [2]Granger (1969) proposed a time-series data based approach in order to determine causality. In the Granger-sense, variable X is said to Granger cause variable Y if the past values of X can predict current values of Y.

coefficients for the equations (3.9) and (3.10) two prominent different hypotheses about the relationship between *TOT* and *BOP* can be formulated and these include, unidirectional Granger-causality from *TNS* instability to *BOP* position where only *TTN* increases the prediction of the *BOP* position but not vice versa and bidirectional, that is, the feedback causality between *TTN* and *BOP* where *TNS* instability increases the prediction of *BOP* adjustment and vice versa. The data used in this study are secondary and annual. They are obtained mainly from the *World Fact Book* and the statistical bulletins of *Central Bank of Nigeria, various years*. The empirical analysis covers the period from 1973 through to 2011, both years inclusive.

Empirical Results

The unit root test and the co-integration test results are as presented in appendix **A** and **B** respectively. The unit tests results as indicated in Table **A** show the order if integration of the variables. As it were, none of the series could ascertain stationary at level. All the variables namely, Nigeria's balance of payments, terms of trade instability, Naira-US$ exchange rate, openness, real gross domestic product, inflation rates and money supply are stationary in first difference since the *ADF* test statistic of each exceeds the 95 percent critical value in absolute term. The determination of the order of integration of each series is vital for co-integration and indeed, for error correction specification. This is because in the short-run dynamic specification, the order of integration is utilized. Having ascertained the stationarity and co-integration of the variables in the study, we proceeded to estimating an error correction version of the reduced-form simultaneous equation. Evident in Table **B** are the co-integration test results. The test was carries out on the residuals generated on the basis of the ordinary least squares [OLS] estimated results. This is Engle-Granger (1987) procedure. As shown in the table, the *ADF* and the *Phillips-Peron* test statistics in absolute values exceed the 95 percent critical values of the *ADF and PP.* This indeed indicates that the residuals are stationary. In essence therefore, the results established a co-integrating relationship between balance of payments and terms of trade, balance, inflation, exchange rates, external debt stock and real output growth in Nigeria. Intuitively, the null hypothesis of co-integration absence is rejected in favour of the alternative.

Using the error correction mechanism, we estimated the short-run adjustment dynamics of the model. The highest lag order utilized in this estimation was one. The best fitting equation was selected using the criteria of maximum R-bar squared. The results are displayed in Table **C** for perusal. As seen in Table **C,** the parsimonious error correction *BOP* results indicate that over 85 percent of the total variation in Nigeria's balance of payments is explained by the error correction term. The coefficients of the error correction term are all negative and statistically significant at the 1 percent level. Thus, it will rightly act to correct any deviations from long-run balance of payments equilibrium. The F-statistic of 34.3 is highly significant, easily passing the significance test even at the 1 percent level. The individual t-test show amongst others, the significance of one-year lag of *TOT i*nstability with a negative coefficient, the significance of the Naira-US$ exchange rate with a negative coefficient and the

significance of foreign debt stock with a positive coefficient. It thus follows that in Nigeria, the balance of payments equilibrium condition is adversely affected by volatility in the Nigerian terms of trade.

Also, the result indicates that exchange rate depreciation goes a long way in determining Nigeria's balance of payments equilibrium. So, the introduction of the devaluation policy as embedded in the structural adjustment programme of 1986 has to some extent helped in maintaining the balance of payments situation even at its unfavorable position so far in Nigeria. Accordingly, for a percent increase in naira depreciation, the balance of payments position is equilibrated up to the tune of 1.6 percent. The external debt burden reported a significant positive coefficient rather than the expected negative sign. This could be pointing to the fact that debts incurred are utilized optimally. This helps to minimize wasteful spending and consequently in prices the balance of payments. The coefficient of broad money supply is marginally significant at the 10 percent level. However, it is correctly signed implying that increases in money supply could aid favorable *BOP* position in Nigeria. The *BOP* effect of inflation is negative but insignificant. In the *TOT* equation, only trade openness and exchange rate variables passed the test of significance. While the coefficient of openness is positive and significant at the 5 percent level, the coefficient of exchange rate is negative and significant at the 1 percent level. The one-year lag of *BOP* fails test of significance in the *TOT* equation. In the overall therefore, the estimated results suggest that balance of payments in Nigeria is highly sensitive to change in *TOT* shocks, exchange rate and the external debt stock.

Conclusion

In the course of this study, Nigeria's balance of payments was examined with particular reference to terms of trade instability in Nigeria. The balance of payments over the period under review revealed persistent deficit position except in few years and the terms of trade also exhibited noticeable fluctuations. Empirical evidence reveals that *BOP* has negative relationship with terms of trade. This implies that for any 1percent instability (shock) in terms of trade, balance of payment will be adversely affected by about 1.8 percent. Hence it becomes pertinent for policy makers to pursue policies that will stabilize terms of trade. It is not enough to increase exports rather the export basket should be diversified to include manufactures since it has been observed that primary products are more susceptible to price fluctuations in the world market because of their inelastic nature. The negative correlation between exchange rate and *BOP* substantiates the argument that exchange rate is capable of inducing significant *BOP* gains in a sub-Saharan African country even though the country's in question has low elasticities of exports and imports. Also, it invalidates the Marshal-learner condition. Hence, caution should not be thrown to the wind in adopting the policy of deliberately depreciating the naira especially because of the peculiarity of the country's exports and imports. The negative association between inflation and *BOP* should be a source of worry to policy makers. Accordingly, inflation rate should be kept within one-digit. Efforts should be intensified to always pursue a surplus current account strong enough to cancel the deficit in the capital account. It is imperative for economy to address

exchange control problems to the effect that the naira does not depreciate beneath a managed floor value. In as much as depreciation in the naira is desirable for an improved balance of payments it should not create lack of incentive to foreign investment. Finally, it is expedient that money supply be created domestically and not via government external borrowings or currency printing. Domestic money creation is self-regulatory and does not necessarily engender indiscriminate consumption patterns. Even though it has been established in this study that terms of trade instability negatively impacts balance of payments, it must be noted that if the policy recommendations are taken seriously and implemented effectively, in due course there is the possibility that terms of trade shocks will be reduced to its barest minimum and thereby relieve the balance of payments of its adverse effects.

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APPENDIX A: Unit Root Tests Results

PANEL A: AUGMENTED DICKEY-FULLER [ADF] TEST RESULTS @ 95 PERCENT		
Variables	ADF Test Statistic	Critical Value
EXR	-4.8088***	-2.5399
INF	-6.6599***	2.5399
FVN	-5.3355***	-2.5399
BOP	-5.6668***	-2.5399
TNS	-5.6298***	-2.5399
OPS	7.7089***	-2.5399
GDP	-5.5386***	-2.5399
MSS	-6.3369***	-2.5399
PANEL B: AUGMENTED DICKEY-FULLER [ADF] TEST RESULTS @ 99 PERCENT		
Variables	ADF Test Statistic	Critical Value
EXR	-4.8088***	-3.5568
INF	-6.6599***	-3.5568
FVN	-5.3355***	-3.5568
BOP	-5.6668***	-3.5568
TNS	-5.6298***	-3.5568
OPN	7.7089***	-3.5568
GDP	-5.5386***	-3.5568
MSS	-6.3369***	-3.5568
PANEL C: PHILLIPS-PERRON [PP] TEST RESULTS @ 95 PERCENT		
Variables	PP Test Statistic	Critical Value
EXR	-8.8074***	-3.6572
INF	-6.6579***	-3.6572
FVN	-6.9965***	-3.6572
BOP	-9.6668***	-3.6572
TNS	-9.6298***	-3.6572
OPN	7.7089***	-3.6572
GDP	-13.5386***	-3.6572

MSS	-10.3369***	-3.6572
PANEL D: PHILLIPS-PERRON [PP] TEST RESULTS @ 99 PERCENT		
Variables	PP Test Statistic	Critical Value
EXR	-8.8074***	-3.9525
INF	-6.6579***	-3.9525
FVN	-6.9965***	-3.9525
BOP	-9.6668***	-3.9525
TNS	-9.6298***	-3.9525
OPN	7.7089***	-3.9525
GDP	-13.5386***	-3.9525
MSS	-10.3369***	-3.9525
NOTE: *** indicates *I(1)* variables		

APPENDIX B: Co-integration Test Results: Engle-Granger Approach

Variables	**Philips-Person Test Statistic**	**Critical Value @ 95%**	**Statistical Inferences**
Residual series	-5.6675	-2.6155	Co-integrated
Residual series	-6.35323	-3.9655	Co-integrated
Variables	Augmented Dickey-Fuller Test Statistic	Critical Value @ 95%	Statistical Inferences
Residual series	-3.3592	-2.5565	Co-integrated
Residual series	-3.9965	-2.6155	Co-integrated
Variables	Philips-Person Test Statistic	Critical Value @ 99%	Statistical Inferences
Residual series	-9.3562	-5.3356	Co-integrated
Residual series	-10.5653	-5.6235	Co-integrated
Variables	Augmented Dickey-Fuller Test Statistic	Critical Value @ 99%	Statistical Inferences
Residual series	-5.3692	-2.3986	Co-integrated
Residual series	-5.2663	-2.5399	Co-integrated

APPENDIX C: Simultaneous Equation Results for BOP and TOT Adjustment in Nigeria

Regressors	Regressands	
	BOP Equation	**TOT Equation**
	Coefficient (T-values)	Coefficient (T-values)
D(EXT)	-1.6535*** (-5.354)	-1.023*** (-3.354)
D(INF)	-1.832 (1.543)	
D(FVN)	0.555*** (9.328)	
$D(BOP)_{(t-1)}$		0.348 (1.353)
$D(TNS)_{(t-1)}$	-1.035*** (-10.236)	
D(OPN)		0.182*** (9.333)
D(GDP)		1.638*** (5.265)
D(MSS)	0.967 (1.553)	
D(DBT)	0.532** (2.254)	-1.112*** (-10.329)
Intercept	1.683*** (5.265)	1.633*** (5.202)
$ecm_{(t-1)}$	-0.8523*** (-9.235)	-0.5379*** (-3.598)
F-statistic, Un-adjusted (Adjusted) R^2	48.02, 0.9325 (0.9322)	35.59, 0.7932 (0.7579)
LM Serial correlation, Normality	0.2635, 0.0046	0.2293, 0.3566
Note: ***(**) indicates statistical significance @1%, 5% levels respectively		