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Review Article

EMPIRICAL ANALYSIS OF THE NIGERIA'S BALANCE OF PAYMENTS DISEQUILIBRIUM

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ABSTRACT

This study examines the factors responsible for Nigeria's balance of payments (BOP) disequilibrium within the period of 1970–2012. The time series data on seven macroeconomic variables, namely current account, money supply (M2), trade openness, trade balance, inflation, real exchange rate, and debt service were collected from Central Bank of Nigeria statistical bulletin. Ordinary least square method was employed in analyzing the data, and the findings show that all the variables used were responsible for BOP disequilibrium in Nigeria. The result further suggests that only inflation and trade balance out of the six variables have a significant impact on Nigeria's BOP disequilibrium. Besides, all the variables came out with their expected a priori expectations except inflation which displayed a positive sign against its expected negative sign. Fiscal and monetary authorities should jointly target inflation using appropriate measures so that Nigeria's domestic product (export) would be less expensive at the detriment of import to prevent current account deficit. Nigerian government should also increase its productive and exporting capacity beyond primary products and crude oilso that the persistent current account challenges would be addressed and economic growth/development would be attained.

Keywords: Balance of payment, Disequilibrium, Current account.

BACKGROUND TO THE STUDY

In the modern world, there is mutual interdependence of various national economies considering the fact that no country is completely self-sufficient. In the course of this interaction, there is usually a compiled record to show the position of each country which can be described as balance of payments (BOP).

According to Jhingan (2008) [13], the BOP of a country is a systematic record of all its economic transactions with the outside world in a given year. The BOP of a country is constructed on the principle of double entry book-keeping whereby each transaction is entered on the credit and debit side of the balance sheet. When payment is received from a foreign country, it is a credit transaction. When payment is made to a foreign country, it is a debit transaction. The BOP account of a country comprised two accounts, namely the current account and capital account.

Simon (2004) describes balance of payments (BOP) as an accounting record of all monetary transactions between a country and the rest of the world. These transactions include payment for the country's export and import of goods, services, financial capital, and financial transfer.

Adam (2004) identifies two principal part of BOP accounts as the current account and the capital account [1]. The current account shows that the net amount a country is earning if it is in surplus or spending if it is in deficit. The capital account records the net change in ownership of foreign assets (Orlin 1996).

The computation of both the credit and debit sides of current account and capital account can result in either equilibrium or disequilibrium. When $B=R_f=P_f$, the BOP is in equilibrium, where B represent the BOP, R_f receipts from foreigners, and P_f payment made to foreigners. When $R_f \neq P_f$, it becomes disequilibrium. BOP disequilibrium can be surplus or deficit. When $R_f-P_f>0$, it implies that receipt from foreigners exceed payments made to foreigners, and there is surplus in the BOP. On the other hand, when $R_f-P_f<0$ or $R_f<P_f$, there is deficit in the BOP as the payments made to foreigners exceed receipt from foreigners [13].

Disequilibrium in this work is conceptualized from both the deficit and surplus perspective since it is a source of economic instability, threat to economic growth and development as well as other negative impact on the economy. The cardinal aim of every government in Nigeria from the regime of Tafawa Balewa up till date is to get the BOP position right. This cardinal aim has inspired every major turn of policy; setting of bank rates, changes in taxes, regulation of incomes, the restructuring of industry, introduction of export rebates, control of money supply, level of local government expenditure, etc. The current account deficit (CAD) in the BOP has been a problem for Nigeria because it adds to the already large indebtedness of Nigeria to the rest of the world. International credit is like a drug to us even though we know the harm it does to us. The BOP problem has reached an unviable proportion and has become a binding constraint in the realization of the government objective. It has been undermined by a relatively poor non-oil export performance, high import bill, stagnated agriculture, high taste for foreign goods and services, continuous fall in the country's foreign exchange, inflationary pressure, inefficient manufacturing sector, and mis-handling of the oil boom. This research work is necessitated by the fact that disequilibrium in the Nigeria's BOP account has generated questions concerning the causes, its impact on social progress and what policies to adopt to achieve favorable BOP position (European Journal of Business and Management). To understand the impact and adopt the right policy option to address this scenario, it is, therefore, pertinent to start with the root cause.

Since Nigeria is not an exception to BOP challenges, this work will specifically focus on the various prevailing factors accounting for her BOP disequilibrium.

In Nigeria, BOP has been a matter of concern to economists, policymakers as well as the economic agents as a whole. This is because the growth and performance of the Nigerian economy are determined by both domestic economic activities and foreign transactions on goods and services.

Before the discovery of oil in the 1960s, Nigeria was confronted with limited capacity to accumulate domestic savings earnings to finance investment. Government was unable to generate sufficient foreign exchange due to persistent BOP deficit arising from the reliance on mono product primary export which is not competitive in the international market. After the discovery of crude oil and its exportation in the 1970s, one would expect that more foreign exchange earnings will accrue to the economy and economy would be able to take viable projects that

will lay a basis for sustainable growth and development. However, Nigeria total debt rose from 9.6% in 1980 to 24.1% in 1985 while the real gross domestic product (GDP) declined by 3.8% between 1980 and 1985. The ratio of fiscal deficits to GDP reached a peak of 11.0% in 1994 while the real GDP growth rate (GDPG) was <4.0 in the period 1994–2000 [19].

Going by the above context, it is obvious that Nigeria's BOP are often unfavorable with severe and negative effects ranging from a decrease in aggregate demand which lead to a contraction along supply, low level of economy's output, increase unemployment, increase in international borrowing as well as a fall on the exchange rate. Due to the above deplorable condition, it is pertinent to trace out those factors responsible for the BOP disequilibrium.

The following research questions shall guide this study:

1. Do money supply, real exchange rate, trade openness, inflation, trade balance, and external debt responsible for Nigeria's BOP disequilibrium?
2. To what extent do money supply, real exchange rate, trade openness, inflation, trade balance, and external debt contributes to Nigeria's BOP disequilibrium?

The main objective of this study is to determine the factors responsible for disequilibrium in Nigeria's BOP. The specific objectives are stated as follow:

1. To ascertain whether money supply, real exchange rate, trade balance, inflation, trade openness, and external debt are responsible for Nigeria's BOP disequilibrium.
2. To determine the impact of money supply, real exchange rate, trade balance, inflation, trade openness, and external debt on Nigeria's BOP disequilibrium.

The hypotheses are stated as follows:

H_{01}: Money supply, real exchange rate, trade balance, inflation, trade openness, and external debt do not cause BOP disequilibrium in Nigeria.

H_{02}: Money supply, real exchange rate, trade balance, inflation, trade openness, and external debt do not have significant impact on Nigeria's BOP disequilibrium.

This research is undertaken within Nigerian context and is billed to span through the period of 42 years, that is, from 1970 to 2012.

This research work will be of great importance to the following:

1. It will help the government of Nigeria in addressing BOP difficulties using the identified causes.
2. The work will also serve as a pedestal (foundation) for other researchers who may be interested in conducting their research on this similar topic.
3. This work would equally be of great help to policy analysts in understanding the modern trade patterns and how economic policies of the government affect the BOP of countries
4. The work would aid economic advisers in recommending to the government the right policies to be employed in addressing BOP challenges.

REVIEW OF RELATED STUDIES

Akpudozie (2008) [5] conducted a study to investigate monetary and macroeconomic variables that affect BOP in Nigeria for the period of 1970–2005. The study was done using ordinary least square (OLS) method to find out the individual influences on the persistent occurrence of BOP deficit. The empirical results showed that the BOP as regard to Nigeria is not purely a monetary phenomenon. Imoisi, (2010), examined the trends in Nigeria's BOP position from 1970-2010 using an econometric analysis. The log-linear regression was adopted to ascertain the impact of these independent variables (exchange rate, inflation rate, and interest rate) on the dependent variable (BOP). The result shows that the independent variables appeared with the correct sign and thus, conforms to economic theory, but the relationship between BOP and inflation rate was not significant. However, the relationship between BOP, exchange rate, and interest rate was significant.

Ahmad, (2010), analyzed the BOP for Pakistan through monetary approach for the period of 1980–2008. This study utilizes the reserve flow equation, cointegration test and error-correlation model to analyze whether glut money supply influences the BOP variable or not. The result shows that the role of monetary variables for Pakistan's BOP does not determine BOP empirically. Three significant relationships found between GDPG and Net Foreign Assets (NFA) are considered as a positive relationship while between domestic credit extension and NFA are considered as a negative relationship, between interest rate, while NFA is considered as a negative relationship as mentioned by the monetary approach to BOP. Some variables proposed that monetary approach plays a significant role, but monetary actions are not only options for authorities to correct the BOP disequilibrium.

According to Khemraj (2006), studied the monetary policy from a work of Guyana a tiny economy in (ARICOM) region. Monetary policy is motivated by the IMF's financing programming model. The financial programming model holds that the money supply is largely exogenous in the sense that control of the monetary bases gives the central bank control of money. Money supply can, therefore, be targeted to hit specific target paths of broad money and hence control inflation and bring stability to the BOP.

There exist studies on causes of BOP disequilibrium within Nigeria and outside Nigeria. Empirical consensus view that BOP is a monetary phenomenon however, some of them posited that even though monetary approach played a significant role, BOP is not only a monetary approach.

Going by the various studies done in Nigeria, it is pertinent to emphasize that almost all of them have their respective shortcomings that prompted this present study. For example in work done by Onedibe (2010) [19], on the determinants of BOP in Nigeria from 1983 to 2007, he focused on the impact of foreign direct investment on economic growth rather than factors causing BOP disequilibrium. He used GDP as a dependent variable, foreign direct investment and inflation as independent variables. The study did not take into consideration the possibility of non stationarity as well as long run relationship in the variables. The present study will use Augmented Dickey-Fuller (ADF) test to account for non stationarity in the variables as well as cointegration test. Akpudozie, (2003), investigated causes of BOP disequilibrium in Nigeria using the current account as his proxy to capture (BOP) dependent variable and some explanatory variables, inflation as a core variable was excluded. The researcher intends to fill the gap using inflation as one of his exogenous variables. The study also spans from 1970 to 2012 as previous studies reviewed used data that ended either 1995, 2000, 2002, 2008, and latest 2010.

METHODOLOGY

The OLS regression model is used as the statistical framework for this research work. In the regression context, the OLS estimation techniques are chosen due to its relevance to the nature of the problem under investigation. The OLS is best linear unbiased estimator [12].

The specification of the econometric model will be based on the monetary approach to the BOP. The model has the following dependent and independent variables:

BOP=Current account
M2=Money supply
TOPN=Trade openness
TRBL=Trade balance
REXR=Real exchange rate
INF=Inflation rate
EXD=External debt

From the above variables, the mathematical function of the model is stated below.

$$BOP = f(M2, TOPN, TRBL, RER, INF, EXD) \quad (1)$$

Where variables remain the same as defined above.
From Equation (1), the mathematical or deterministic equation of the model is stated as:

$$BOP = \beta_0+\beta_1 M2+\beta_2 TOPN+\beta_3 TRBL+\beta_4 REXR+\beta_5 INF+\beta_6 EXD \quad (2)$$

The stochastic or econometric form of the model is given as:

$$BOP = \beta_0+\beta_1 M2+\beta_2 TOPN+\beta_3 TRBL+\beta_4 REXR+\beta_5 INF+\beta_6 EXD+\mu_1 \quad (3)$$

Where μ_1 = error or disturbance term
β_0 = Intercept or constant
β_1–β_6 = Coefficients or slope of the regression variables.

Note that, the inclusion of the error term (μ_1) makes the model amenable to econometric estimation because it takes care of other variables that may have been omitted.

Stationarity/unit root test
The tests are conducted for each of the time series variables. The general form of ADF test is estimated by the following regression:

$$\Delta Y_t = \beta_1+\delta Y_{t-1}+\sum\alpha\Delta Y_{t-1}+\varepsilon_t \quad (a)$$

$$\Delta Y_t = \beta_1+\beta_2 t+\delta Y_{t-1}+\sum\alpha\Delta Y_{t-1}+\varepsilon_t \quad (b)$$

Where Y is time series variable under study, t is a linear time trend, Δ is the first difference operator, β_1 is the constant, n is the optimum number of lags in the dependent variable, Σ is the summation sign, and ε_t is a pure white noise error term.

Error correction model (ECM)

$$U_t = Y_t-\beta_1-\beta_2 X_i-\beta_3 \quad (a)$$

The ECM is expressed in the form;

$$\Delta BOP_t=\beta_0+\beta_1\Delta M2_t+\beta_2\Delta TOPN_t+\beta_3\Delta TRBL_t+\beta_4\Delta REXR_t+\beta_5\Delta INF_t+\beta_5\Delta EXD_t+\beta_6 Ut_{-1}+\varepsilon_t \quad (b)$$

Where;
Y = Dependent variable,
X_i = Independent variables,
ε_t = White noise error term,
U_{t-1} = The lagged value of the error term in equation (a),
β_0 = Intercept term.

β_1, β_2, β_3, β_4, and β_5 are the relative slope coefficients and partial elasticity of the parameters, and ΔBOP_t, $\Delta M2_t$, $\Delta TOPN_t$, $\Delta TRBL_t$, $\Delta REXR_t$, ΔINF_t, and ΔEXD_t are stationary series of the original variables used in the regression model.

NORMALITY TEST

This is carried out to test if the error term follows the normal distribution. Symbolically, whether $\mu_t \sim N(0, \delta_2)$. The normality test that would be used in this study is Jarque-Bera (JB) test of normality. If the value of the JB calculated is less than its critical value, obtained from the Chi-square distribution table at the specified degree of freedom, then the error term is normally distributed and vice versa. The null hypothesis is rejected if the calculated JB value is greater than its table value. Furthermore, if a histogram is plotted and it has a bell-like a shape, then the series is normally distributed and the null hypothesis will be accepted. However, if there is evidence of skewness in the histogram, then the series is not normally distributed.

The JB test is usually specified as:

$$JB = n/_6(S^2+(k-3)^2)/_{24}$$

Where S = Skewness; K = Kurtosis and n = degree of freedom.

Hypothesis testing
H_0: JB = 0 (the error term follows a normal distribution).

The JB statistic asymptotically follows the Chi-square distribution with two degrees of freedom, one for skewness and one for kurtosis.

Decision rule
Reject H_0 if $JB_{cal} > JB_{tab}$ (0.05) with two degrees of freedom, do not reject if otherwise or if the probability value is sufficiently low, reject the H_0.

MULTICOLLINEARITY TEST

One of the assumptions of OLS is the assumption of no multicollinearity among the regressors in the model. Thus, the multicollinearity test is carried out to check whether two or more explanatory variables are exerting the same influence on the dependent variable. If such a relationship exists among the regressors, it becomes difficult to determine their coefficients. In carrying out this test, a simple rule of thumb is used to search for high pair-wise or zero-order correlation between two regressors. The correlation matrix table would be used for this test. If the correlation coefficient between any pair of regressors is in excess of 0.8, then there is multicollinearity between the two variables [12].

HETEROSCEDASTICITY TEST

One of the assumptions of the random variable μ_t is that its probability distribution should be constant over all observations of X_i, that is, the variance of each disturbance term is the same for all values of the explanatory variables. The aim of this test is to see whether the error variance of each observation is constant or not. Non-constant variance can cause an estimated model to yield a biased result. White's general heteroscedasticity test would be adopted for this purpose.

The null hypothesis for the test is:
H_0: $\beta_0=\beta_1=\beta_2=\beta_3=\ldots=\beta_5=0$ no heteroscedasticity
H_1: $\beta_0\neq\beta_1\neq\beta_2\neq\beta_3\neq\ldots\neq\beta_5\neq0$ heteroscedasticity

Where: β_2, β_3, and β_5 are coefficients of the auxiliary regression.

White has shown that sample size (n) multiplied by R^2 obtained from the auxiliary regression asymptotically follows the Chi-square distribution with degrees of freedom equals the number of regressors in the auxiliary regression.

$$n.R^2 \sim \chi^2_{0.05}df$$

Decision rule
Reject H_0 if $n.R^2 > \chi^2_{0.05}$ df, otherwise do not reject it.

AUTOCORRELATION TEST

Another important classical linear regression model assumption about the random variable μ_t is that there is no serial autocorrelation entering the Population Regression Function (PRF). Gujarati (2009) [12] stated that the aim of this test is to see whether the errors correspond to different observations are serially correlated or not. Uncorrelated errors are desirable, symbolically, $E(u_i, u_j) = 0$. The Durbin Watson d-test is adopted for this test. Hence, we compare the established lower limit dl and upper limit du of Durbin Watson based on 5% level of significance and k degrees of freedom.

Where: k = number of explanatory variables excluding the constant (Table 1).

Hypothesis testing
H_0: ρ=0 (no autocorrelation) versus H_1: ρ>0,

Decision rule
Reject H_0 at α level if dw<du, that is, there is statistically significant positive autocorrelation. H_0: ρ=0 versus H_1: ρ<0.

Decision rule
Reject H_0 at α level if the estimated (4−*dw*) <du, that is, there is statistically significant evidence of negative autocorrelation. H_0: ρ=0 versus H_1: ρ≠0.

Decision rule
Reject H_0 at 2α level if d < du or (4−dw) < du, that is, there is statistically significant evidence of autocorrelation, positive or negative.

Specification error test
This is the test conducted to check if the model is correctly specified. The Ramsey reset test will be used in conducting the test.

The functional form of the model is specified as:

$$BOP = f(M2, TOPN, TRBL, REXR, INF, EXD) \quad (1)$$

The mathematical form of the model is specified as:

$$BOP_t = \beta_0+\beta_1 M2_t+\beta_2 TOPN_t+\beta_3 TRBL_t+\beta_4 REXR_t+\beta_5 INF_t+\beta_5 EXD_t \quad (2)$$

This econometric form of the model is specified as:

$$BOP_t = \beta_0+\beta_1 M2_t+\beta_2 TOPN_t+\beta_3 TRBL_t+\beta_3 REXR_t+\beta_4 INF_t+\beta_5 EXD_t+\mu t \quad (3)$$

For estimation purpose, the model is re-specified as:

$$BOP_t = \beta_0+\beta_1 M2_t+\beta_2 TOPN_t+\beta_3 TRBL_t+\beta_3 REXR_t+\beta_4 INF_t+\beta_5 EXD_t+\mu t \quad (4)$$

DATA ANALYSIS AND RESULTS

Annual time series data were employed from secondary sources, covering the period of 42 years, from 1970 to 2012. Data sources are Central Bank of Nigeria (CBN) Statistical Bulletins 2010 and 2012 editions. The software employed is Microsoft Excel and E-views 6.0.

Unit roots test result
In this study, the ADF unit roots tests were employed to test for the time series properties of model variables. The null hypothesis is that the variable under investigation has a unit root against the alternative that it does not. The decision rule is to reject the null hypothesis if the ADF statistic value exceeds the critical value at a chosen level of significance (in absolute term). These results are presented in Table 2.

The researcher assumed a 5% critical value and the Mackinnon criteria was certified at this level of significance.

Table 1: Durbin Watson d-test: Decision rules

Null hypothesis	Decision rule	Condition (IF)
No positive autocorrelation	Reject	0<dw<dl
No positive autocorrelation	No decision	dL≤dw≤du
No negative autocorrelation	Reject	4-dl<dw<4
No negative autocorrelation	No decision	4-du≤dw≤4-dl
No autocorrelation, positive or negative	Do not reject	du<dw<4-du

Table 2: Result of unit root/stationarity test

Variables	ADF cal	ADF tab	Order of integration
BOP	−5.307940	−2.933158	I (1)
LOG (M2)	−7.584892	−2.935001	I (1)
LOG (TOPN)	−5.854459	−2.935001	I (1)
TRBL	−6.479889	−2.933158	I (0)
REXR	−5.925868	−2.935001	I (1)
INF	−4.277779	−2.935001	I (1)
EXD	−4.120568	−2.935001	I (1)

Source: Researcher's estimation using E-views- 6.0. ADF: Augmented Dickey-Fuller

After the first difference, all the non-stationary variables became stationary except TRBL which is stationary at level form. On this basis, the null hypothesis of non-stationarity is rejected and we, therefore, conclude that the variables are stationary and integrated of order one (I(1)).

Cointegration test result
The variables used in this study are integrated of order one (I(1)), but we have to check if their linear combination is stationary. To test for this, the Augmented Engle-Granger test was used, which is simply applying ADF test to the residuals of the OLS regression result.

From the result, since $t_{cal}>t_{tab}$, that is, (|−7.029473|) > (|−2.933158|) at 5% critical value, we reject the null hypothesis of non-stationarity and conclude that it is stationary and therefore, the variables used in this model are cointegrated.

ECM
Due to the establishment of long-term relationship among the variables, there is a need to test whether a short run equilibrium relationship exists among the variables or not. This was done using the ECM. The error term is treated as the equilibrium error. This is used to tie the short-run relationship of the dependent variable to its long-run value:

$$U_t = Y_t-\alpha_1-\alpha_2 Xi-\alpha_{3t} \quad (a)$$

The ECM is expressed in the form;

$$\Delta BOP=\alpha_0+\alpha_1\Delta LOG(M2)_t+\alpha_2\Delta LOG(TOPN)_t+\alpha_3\Delta TRBL_t+\alpha_4\Delta REXR_t+\alpha_5\Delta INF+\alpha_6\Delta EXD\alpha_7 U_{t-1}+\varepsilon_t \quad (b)$$

Where
Y = Dependent variable
Xi = Independent variable

Table 3: Augmented Engle Granger cointegration test

Variable	T-calculated value	T-critical value	Integration
Residual	−7.029473	−2.933158*	I (0)

*Denotes 5% critical value

Table 4: ECM result

Variable	Coefficient	Std. error	t-Statistic	p
C	12176.19	22767.17	0.534814	0.5963
DLOG (M2)	18351.64	29688.15	0.618147	0.5406
DLOG (TOPN)	−296039.9	166146.3	−1.781803	0.0837
D (TRBL)	0.000420	1.30005	32.36211	0.0000
D (REXR)	−390.3688	334.1683	−1.168180	0.2509
D (INF)	−278.5776	2111.903	0.131908	0.8958
D (EXD)	−0.017485	0.039197	−0.446088	0.6584
RESIDUAL(-1)	−1.135625	0.169284	−6.708401	0.0000

Source: Researcher's estimation using E-views- 6.0. ECM: Error correction model

Table 5: OLS estimates dependent variable: Balance of payments

Variable	Coefficient	Std. error	T-Statistic	p
Constant	864917.1	469910.0	1.840602	0.0739
LOG (M2)	−2771.476	22387.25	−0.123797	0.9022
LOG (TOPN)	−188028.5	127146.0	−1.478839	0.1479
TRBL	0.000422	2.00E-05	21.09121	0.0000
REXR	−547.7455	346.8736	−1.579093	0.1231
INF	2439.009	548.5141	4.446574	0.0001
EXD	0.028834	0.022776	1.265971	0.2137
R^2=0.944160		R- squared adjusted=0.934853		
F-Statistic=101.4489		Prob (F- statistic)=0.000000		

Durbin – Watson Stat=2.177335

Table 6: The T- statistic test table

Variables	t-statistic	Critical value (α)	Decision rule	Conclusion
Constant	−1.840602	±2.032	Do not reject H_0	Statistically insignificant
LOG (M2)	−0.123797	±2.032	Do not reject H_0	Statistically insignificant
LOG (TOPN)	−1.478839	±2.032	Do not reject H_0	Statistically Insignificant
TRBL	21.09121	±2.032	Reject H_0	Statistically significant
REXR	−1.579093	±2.032	Do not reject H_0	Statistically insignificant
INF	4.446574	±2.032	Reject H_0	Statistically significant
EXD	1.265971	±2.032	Do not reject H_0	Statistically insignificant

α=0.05

Table 7: The F-statistic test table

F-statistic	F0.05 (6,36)	Decision rule	Conclusion
101.4489	2.38	F_{cal}>2.38	Statistically significant

Since F-statistic=101.4489>F0.05 (6.36) = 2.38, we reject H_0 and conclude that, at 5% level of significance, the overall significance of the parameters is statistically different from zero, implying a good fit

ε_t = White noise error term
U_{t-1} = The lagged value of the error term in equation (a).

Interpretation of ECM
The coefficient of the lagged error term (U_{t-1}) a priori is expected to be negative and statistically significant, implying that, if BOP in the previous period is above its equilibrium value, it will start falling in the next period, to correct the error, hence the ECM.

A summary of the ECM result is, however, presented below:

From Table 4, the error-correction term is statistically significant and displays the appropriate (negative) sign. This implies that overlooking the cointegration of the variables would have introduced misspecification in the underlying dynamic structure. Summarily, the results suggest that money supply, trade openness, trade balance, real exchange rate, inflation rate, and external debt are cointegrated, that is, they have long-run equilibrium relationship, and are also closely tied together in their short-run dynamics.

Interpretation of the OLS estimates
From Tables 5 and 6, all the variables are statistically insignificant at 5% level except for inflation rate and trade balance. This goes a long way to depict the core variables of the model.

The F-statistic test
If F_{cal}>F(k-1, n-k), reject H_0, do not reject H_0 if otherwise.

Where,

Fα (k-1, n-k) is the critical F – value at the chosen level of significance (α) and (k-1) degrees of freedom (df) for the numerator and (n-k) degrees of freedom (df) for the denominator; K = number of parameters used in the regression.

Test for multicollinearity
One of the assumptions of OLS is the assumption of no multicollinearity among the regressors in the model. In carrying out this test, a simple rule of thumb is for us to search for high pair-wise or zero-order correlation between two regressors. If the correlation coefficient is in excess of 0.8, then multicollinearity is a serious problem (Gujarati and Sangeetha 2007:367).

From the result obtained, there is high collinearity between LOG(TOPN) and LOG(M2), REXR, and LOG(TOPN).

TEST FOR AUTOCORRELATION

The Durbin-Watson d-test is adopted for this test. Hence, we compare the established lower limit dl and Upper limit du for Durbin Watson based on 5% level of significance and k degrees of freedom.

Where K = number of explanatory variables excluding the constant.

Hypothesis testing
H_0: There is no positive or negative autocorrelation.
H_1: There is autocorrelation.

Decision rule
Reject H_0 at α level if d<du does not hold, otherwise do not reject H_0.

Dl<dw<4-dl,

N=43, K=6, Dw=2.177335, Dl=1.175, Du=1.854

1.175<2.177335<2.825

Since dl<dw<4-dl holds, we accept H_0 and conclude that there is no statistical significant serial autocorrelation.

Test for specification error
The CLRM also assumes that the regression is correctly specified. The Ramsey reset test is used to check this assumption. This test follows the F-distribution.

Hypothesis
H_0: μ=0 (no specification error)

H_1: μ≠0 (specification error)

Level 5% with k-1=N1 and n-k=N2df

NB: The first k exclude the intercept while the second k include the intercept.

K-1 (6–1 = 5) and n-k (43–7) N1=5 and N2=36)df

Decision rule
Reject H_0, if F_{cal}> F_{tab}, otherwise, do not reject H_0

Thus F_{cal}=2.448325, and F_{tab}=2.45

Since F_{cal} (2.448325)<F_{tab} (2.45), we accept the null hypothesis of no specification error and we conclude that the model is correctly specified.

SUMMARY

The main objective of this study is to investigate the factors responsible for Nigeria's BOP disequilibrium. To accomplish this task, two research objectives, two hypothesis, and two research questions were developed to guide the study. Time series data from CBN statistical bulletin within the time frame of 1970 to 2012 on seven macroeconomic variables were used. ADF test was used to test for the stationarity of the variables and the result shows that only trade balance was stationary at level form, while the remaining variables were stationary at first difference.

The result obtained based on the objectives and the developed hypothesis shows that: Money supply (M2), trade openness, inflation, real exchange rate, trade balance, and external debt are responsible for Nigeria's BOP disequilibrium within the period of 1970–2012. The

Table 8: Correlation matrix

	LOG (M2)	LOG (TOPN)	TRBL	REXR	INF	EXD
LOG (M2)	1.000000	0.879451	0.195886	−0.766850	0.764689	0.637483
LOG (TOPN)	0.879451	1.000000	0.190264	−0.852009	0.734281	0.459185
TRBL	0.195886	0.190264	1.000000	−0.191781	0.229027	−0.019034
REXR	−0.766850	−0.852009	−0.191781	1.000000	−0.565675	−0.478303
INF	0.764689	0.734281	0.229027	−0.565675	1.000000	0.488401
EXD	0.637483	0.459185	−0.019034	−0.478303	0.488401	1.000000

Table 9: Durbin-Watson d-test

Null hypothesis	Decision rule	Condition
No positive autocorrelation	Reject	0<d < dl
No positive autocorrelation	No decision	dL<d < du
No negative autocorrelation	Reject	4-dL<d < 4
No negative autocorrelation	No decision	4-du<d < 4-dL
No autocorrelation (positive or negative)	Do not reject	du<d < 4-du

result also shows that inflation and trade balance have a significant impact on Nigeria's BOP disequilibrium while other variables used in the model such as money supply (M2), trade openness, real exchange rate, and debt service do not have a significant impact on Nigeria's BOP disequilibrium within the period.

CONCLUSION

The present study makes a modest attempt to investigate the factors responsible for Nigeria's balance of payment disequilibrium for the period 1970–2012. In view of the proceeding analysis and empirical evidence undertaken in this study, it is, therefore, justifiable to conclude that money supply, trade balance, inflation, trade openness, real exchange rate, and debt service are really responsible for Nigeria's BOP disequilibrium. However, this does not mean that they are the only factors responsible for disequilibrium in Nigeria's BOP since most of the variables used are not statistically significant except inflation and trade balance. Therefore, it is pertinent to acknowledge that other factors (variables) are also responsible for Nigeria's BOP disequilibrium. Further work may also be done since most of the work conducted on this study focused only on the current account which is just one component of BOP account, subsequent researchers should as well research on the study using the capital account as a dependent variable and other explanatory variables such as government spending and interest rate. Besides, both the time and content of the study should be extended beyond 1970–2012.

Policy implication and recommendations

The result shows that inflation and trade balance have a significant impact on Nigeria's BOP disequilibrium while other variables used in the model such as money supply (M2), trade openness, real exchange rate, and debt service do not have a significant impact on Nigeria's BOP disequilibrium. Thus:

Fiscal and monetary authorities should jointly target inflation using appropriate measures so that Nigeria's domestic product (export) would be less expensive at the detriment of import to prevent CAD.

Since trade balance is one of the major determinants of favorable current account position, Nigerian government should increase its productive and exporting capacity beyond primary products and crude oil. That is, effort should be made to ensure the production and exportation of industrial products so that the persistent current account challenges would be addressed and economic growth/development would be attained.

Devaluation of domestic currency should be pursued for the purpose of achieving a favorable exchange rate to foreigners to attract foreign demand for domestic products while making import more expensive. If this is done, the current account would always be favorable.

To achieve internal balance in Nigeria's BOP, expansionary fiscal policy would be more effective since an increase in government spending can automatically lead to an increase in interest rate as well as an increase in income (disposable income). The increase in interest rate would lead to capital account surplus since capital tends to move to where it is highly rewarded. On the other hand, the current account balance would be in deficit through the increase in income since export would be less than import (export<import). In view of these two opposing effects, that is, surplus and deficit in the capital and current account, respectively, BOP would likely be in equilibrium since the two opposing effects would counsel each other.

Furthermore, Nigeria's monetary authority should avoid expansionary monetary policy because it can lead to an increase in income and a decrease in interest rate which can cause a deficit in both current and capital account, respectively. These effects suggest unfavorable BOP position with negative devastating effects on the economy.

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