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Exchange Rate and Balance of Payment: An Autoregressive Distributed Lag (Ardl) Econometric Investigation on Nigeria

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Abstract: *This study examines the impact of exchange rate on balance of payment in Nigeria, using annual data from 1971 to 2012. The empirical methodology employed autoregressive distributed lag (ARDL) co-integration estimation technique to detect possible long-run and short-run dynamic relationship between the variables used in the model. The study also tested the Marshall-Lerner (ML) condition to see if it is satisfied for Nigeria. The results provided evidence in favour of a positive and statistically significant relationship in the long-run and also a positive but statistically insignificant relationship in the short-run between balance of payment and exchange rate. The results further revealed that depreciation/devaluation improves balance of payment and that Marshall-Lerner (ML) condition subsists for Nigeria. The study recommends policies that will discourage excessive importation and promote incentive based export promotion programmes. It further recommends diversification of the economy and the promotion of entrepreneurial development in Nigeria.*

Keywords: *Exchange Rate, Autoregressive Distributed Lag Model, Balance of Payment, Marshall-Lerner Condition.*

I. Introduction

Exchange rate is a fundamental macroeconomic variable that guides investors on the best way to strike a balance between their trading partners (Odili, 2007). Exchange rate refers to the price of one currency (the domestic currency) in terms of another (the foreign currency). The balance of payment on the other hand is a country's state of affairs in international trade (Beatrice, 2001). A relationship therefore exists between exchange rate and balance of payment since there cannot be international trade if a country's currency is not priced in another country so as to allow trade across-boarders. Consequently, nations in the pursuit of macro-economic goals of healthy external balances as reflected in their balance of payment (BOP) positions find it imperative to enunciate an exchange rate policy (Oladipupo and Onotaniyohuwo, 2011).

The objectives of exchange rate policies were tailored towards the achievement of the overall macro-economic goal of internal and external balance in the medium and long term. Internal balance refers to the level of economic activity consistent with the satisfactory control of inflation, while external balance means balance of payments equilibrium or sustainable account deficit financed on a lasting basis by expected capital inflow (Ogbonna, 2011).

Before the oil boom of the early 1970s, Nigerian was predominantly an agrarian country being sustained by the agricultural sector. Nigeria was less dependent on importation of finished goods since domestically produced substitutes were available at a reasonable price. The real exchange rate of the naira to a dollar was 0.52798 (CBN 2005), and the naira experienced favourable balance of payment.

The oil boom of the 1970s led to large earnings in foreign exchange. Naturally, oil revenue is very volatile due to wild oscillations in oil's spot and future US $ price per barrel and to unpredictable changes in OPEC assigned oil quotes, of which Nigeria has been a member since 1958 following the commercial discovery of oil in Oloibiri, in Rivers State Nigeria, in 1956. The absence of suitable fiscal rules and a proper finance management framework for oil-related risks, in Nigeria's variable oil and fiscal revenues in the 1980s and 1990s have led to boom-and-burst-type of fiscal policies that have generated large and unpredictable movements in government deposits and current account balances (Odili, 2007). This led to the devaluation of the naira following the adoption of the structural adjustment programme (SAP) in 1960. The implication of a devalued naira is that Nigeria's foreign trade structure did not satisfy the Marshall-Lerner condition for a favorable balance of payment adjustment (Umoru and Eboreime, 2013).

The Nigeria's foreign structure is characterized by export of crude oil whose prices are inelastic and therefore not responsive to policy instruments especially in the short run and has led to constant depreciation of domestic currency. Since the nation's imports and exports appear to be non-responsive to exchange rate policies, this study intends to investigate the impact of exchange rate dynamics on balance of payment in Nigeria. This study will answer the following research questions:

1) How has exchange rate impacted the balance of payment position in Nigeria?
2) Is the Marshall-Lerner condition observable in Nigeria? For the purposes of logical sequence, this research work is organized as follows. First introduction, followed by theories of exchange rate behavior, the next section is the review of related empirical literature, followed by exchange rate regimes, research methodology, results and discussions and then conclusion.

II. Literature Review

2.1 Theories on Exchange Rate Behaviour

Views on how the rate of national currencies, are determined, are varied. Over the years economists have attempted to explain what determines the rate at which one currency exchange for another. These views have culminated into different approaches, theories or models with which we can try to identify or isolate any functional or causal relationship between the exchange rate and some other macroeconomic variables. There have been basically, two different theories or approaches to exchange rate behaviour – the elasticity and monetary approaches or theories.

2.1.1 Elasticity Approach

Elasticity explanations of the behavior of exchange rates stress on trade flows as the basic determinants of exchange rates. The theory links the demand for foreign exchange to the demand for foreign goods and services. Under the model, the balance of payments, especially the current account balance, is used as a measure of the forces of demand and supply of foreign exchange. For example a surplus in a country's balance of payments indicates that the supply of foreign currency exceeded the demand for it. In the absence of any other transactions in the balance of payments, this balance will tend to put pressure on the price of foreign currencies against the domestic currency and cause their values to depreciate vis-à-vis the local one. The main trust of this approach is the substitution effects in consumption and production induced by relative price change resulting from exchange rate devaluation.

Another aspect of elasticity approach to balance of payment – exchange rate relationship is the Marshall-Lerner (ML) condition (Marshall, 1923, Lerner, 1944). The theory states that when a country devalues its currency, the domestic prices of its import are raised and the foreign prices of its exports are reduced. Thus, devaluation helps to improve BOP deficits of a country by increasing its exports and reducing its imports. But the extent to which it will succeed depends on the country's price elasticities of domestic demand for imports and foreign demand for exports. The main substance of Marshall –Lerner condition is that when the sum of price elasticities of demand for exports and imports in absolute terms is greater than unity, devaluation will improve the country's balance of payments' i.e.,

$n_x + n_m > 1$ ---------- (1)

where: n_x is the demand elasticity of exports and n_m is the demand elasticity for imports.

On the other hand, if the sum of price elasticities of demand for exports and imports, in absolute terms is less than unity,

$n_x + b_m < 1$ ---------- (2)

Devaluation will worsen (increase the deficit) on the balance of payment.

If the sum of these elasticity in absolute terms is equal to unity

$n_x + n_m = 1$ ---------- (3)

Devaluation has no effect on the balance of payment situation which will remain unchanged.

A variant of the elasticity approach is the purchasing power parity (PPP) hypothesis. This is one of the leading hypotheses about the forces that determine exchange rate. It states that "the rate of exchange between two currencies depends on their relative purchasing power in the countries, in which they circulate, making allowance for cost of transaction and the effects of import duties or purchase taxes." There are two versions of the PPP hypothesis – the absolute and the relative versions (Caves and Jones, 1977).

The absolute version follows directly from the "Law of one price". This law proposes that perfectly competitive market causes a particular good to sell everywhere at the same price. However, many market imperfections exist and these could make the absolute purchasing power parity to be unrealistic. But it mighty still holds in its relative version.

The relative version of PPP relates changes over time in an equilibrium exchange rate to changes in a country's relative price levels. In other words, the relative version of the hypothesis in practice, presupposes a comparison of relative inflation rates among countries (Olukole, 1992). Olukole further explained that for a country, as a whole, the PPP involves the comparism of aggregate inflation rates or aggregate changes in prices. To determine exchange rate at this aggregate level, the PPP postulates that if the inflation rate in a given country accelerates relative to other countries, the country's currency would tend to depreciate relative to the other countries. This means that a relatively high internal price level will tend to bring about a deprecation of the

currency on the foreign exchange market, just as a fall in price internally would tend to cause it to appreciate (Ndiomu, 1993).

2.1.2 The Monetary Theory

The monetary theory of exchange rate determination is one of the most recent. It is indeed a very popular model that has generated a lively debate in International Economics and Finance. The theory is last in the well-known tradition of the monetarists or the monetarist school, which regards money as the major, prime move in an economy. Thus the monetary approach, as it is sometimes called, directs attention to the money stock as a primary determinant of the level of exchange rates. Its major thrust is the assertion that exchange rate fluctuations are largely explicable in terms of variations in the relative supplies of national currencies. Within the context of this view point, the monetary approach suggest that the money supply could be used to forecast movement of exchange rates, and that there exists an observable causal relationship between exchange rates and changes in money supply.

Levacic and Rebmann(1982) pointed out that by the monetarists model, changes in economic variables affect the exchange rate through their impact on the demand for and supply of money balances. The theory thus stresses the view that the supply of and demand for money are strong forces in determining a country's external position. An increase in the demand for a country's money will lead to surpluses in the balance of payments while an increase in the supply of money, all things being equal, will give rise to deficits.

The monetary approach concerns itself with the deficit on monetary account, which in principle, consists of the items that affect the domestic monetary base (Ardalan, 2003). The approach emphasizes the monetary aspects of the balance of payments and looks beyond merchandise trade and incorporates the important role of financial assets (Melvin, 1992). The main thesis of the monetary approach to exchange rates is that a country's exchange rate dynamics is essentially a monetary phenomenon, and that any observed disequilibrium in the balance of payments can be eliminated through an adroit manipulation of monetary variables especially domestic credit, under controlled exchange rate, absence of sterilization by the monetary authorities, and stable demand for money function (Akpansung, 2013). It treats the supply of money as endogenous by assuming a feedback from the balance of payments through changes in international reserves to changes in the money, monetary liabilities of the central bank. Under this approach, money market disequilibrium is seen as a crucial factor provoking balance of payments disequilibrium. Imbalances in the balance of payments will restore equality between the demand for and supply of money in the absence of official intervention. This implies, however, that external disequilibrium is transitory and will self-equilibrate in the long-run (Johnson, 1976; Duasa 2005, Ve'gh, 2011).

2.2 Review of Related Empirical Literature

A number of studies have been carried out on the relationship between exchange rate and balance of payment. In spite of the many empirical studies, on the subject, the impact of exchange rate on balance of payment remains ambiguous.

Ho (2004), examined the import demand function of Macao by testing two popular models: (a) aggregate and (ii) disaggregate. The Johansen – Juselius co-integration tests were employed to find out if the relevant economic variables are co-integrate in the long-run. It was observed that co-integration relationship exist in both scenarios (constant and trend; and constant) of the disaggregated model. The result revealed that the disaggregated model is more appropriate to explain the import demand of Macao.

Yoon (2009), shows that the real exchange rate demonstrated different patterns of behavior depending on the exchange rate regime in place. The study provided evidence that real exchange rate series behave as stationary processes during the fixed exchange rate regime. The study acknowledged the fact that more stationary episodes were found during the gold standard and the Bretton-Woods periods than during the flexible exchange rate periods.

Chen (2003), explained that an increase in price rigidity in the event of the uncertainty caused by exchange rate volatility (i.e. firms becomes unwilling to change their prices due to the possibility of later reversion to exchange rate). Apart from this, volatility would account for much of inability of purchasing power parity (PPP) in cross – country analyses and decrease the speed of mean adjustment towards PPP. The study concluded that there is a positive significant coefficient for exchange rate volatility i.e. the higher the exchange rate volatility the sticker the prices were.

Dutta and Ahmed (2006), using co-integration and error correction model approaches investigated the behavior of Indian aggregated import demand during the period 1971-1995. The results obtained indicated that import volume is co-integrated with relative import price and real GDP. The output of the import demand in India is largely explained by real GDP and generally less sensitive to import price changes.

Rose (1990), examined the empirical relationship between the real effective exchange rate and aggregate real trade balance for major OECD countries in the post-Bretton Woods era. Using a variety of

parametric and non-parametric techniques, the results suggest that there is little evidence that the exchange rate significantly affect the trade balance.

Oladipupo and Onotaniyohuwo (2011), investigated the impact of exchange rate on the Nigerian external sector (the balance of payments position) using the ordinary least square (OLS) method for data covering the period between 1970 and 2008. The result revealed that exchange rate has a significant impact on the balance of payment position.

Imoisi (2012), examined the trends in Nigerian's Balance of payments position from 1970-2010 using an econometric analysis. The study carried out a multiple regression analysis using the ordinary least square method for both linear and log linear form. The results showed that the independent variables appeared with the correct sign and thus, conform to economic theory, but the relationship between Balance of payments and inflation rate was not significant. However, the relationship between Balance of payments, Exchange rate and interest rate were significant.

Salasevicius and Vaicious (2003), used the VECM to test for Marshall-Lerner condition in the exchange rate-trade balance relationship in the Baltic States. The study found that Lithuania met the Marshall-Lerner condition, but Estonia did not, while the result of Latria was ambiguous.

Ogbonna (2011), examined the empirical relationship between the real exchange rate and aggregate trade balance in Nigeria. The study tested Marshall-Lerner conditions to see if it is satisfied for Nigeria. The result showed no co-integration for the trade balance model. The results further revealed that depreciation/devaluation improves balance of payment and Marshall-Lerner (ML) condition holds for Nigeria.

Rasaq (2013), analysed the impact of exchange rate volatility on macroeconomic variables, using correlation matrix, ordinary least square (OLS) and Granger causality test, the findings of the study showed that exchange rate volatility has a positive influence on Gross Domestic Product, Foreign Direct Investment and Trade Openness, but with negative influence on the inflationary rate in the country.

Umoru and Odjegba (2013),analysed the relationship between exchange rate misalignment and balance of payments (BOP) mal-adjustment in Nigeria over the sample period of 1973 to 2012 using the vector error correction econometric modeling technique and Granger Causality Tests. The study revealed that exchange rate misalignment exhibited a positive impact on the Nigeria's balance of payments position. The Granger pair-wise causality test result indicated a unidirectional causality running from exchange rate misalignment to balance of payments adjustment in Nigeria at the 1 percent level. The inconsistency in the research results of the various studies reviewed therefore motivated this study.

2.3 Overview Of exchange Rate Regimes in Nigeria

In Nigeria, foreign exchange management policies have traversed the extremes of fixed and flexible regimes with a view to achieve the following major objectives.

Preserve the value of the domestic currency, the naira, maintain a favourable external reserves position; and ensure price stability. The immediate post-independence era witnessed a regime of fixed exchange rate in Nigeria. Up till 1967, the naira was at parity with the British pound until when the latter was devalued by Britain. From 1967 to 1974, naira was fixed to the US dollar, and thereafter the naira was fixed using import weighted baskets of currencies of Nigeria's seven trading countries (US dollar, British pound, German Mark, French Franc). However, all the various exchange rate policies could not lead to the realization of the stated objectives. As a result, a flexible exchange rate policy was adopted in 1986, following the introduction of the structural Adjustment Programme (SAP).

Following the failure of previous macroeconomic policies to turn round the economy, Nigeria adopted SAP in September 1986. The major element of which was the pursuant of a realistic exchange rate. With the introduction of SAP, the second-tier Foreign Exchange Market (SFEM) was established. SFEM was expected to produce a market determined exchange rate that would remove the over-valuation of the naira which persisted in the pre-SAP era. Since 1986, various exchange rate policies, ranging from dual exchange to unified exchange rate system in 1987 were adopted.

In 1994, regulation of the 'Forex' market was re-introduced with rate fixed at N22.00 per US dollar. However, because of inherent abuses and bureaucratic bottlenecks associated with regulation, the Autonomous Foreign exchange Market (AFEM) was introduced following the promulgation of Foreign exchange (Monitoring and Miscellaneous Provisions) Decree 17 of 1995 and the abolition of Exchange Control Act of 1962. Under AFEM, CBN was to intervene in the market at short notice.

The failure of AFEM led to the introduction of inter-bank Forex Market (IFEM), a pre-cursor to the Dutch Auction System (DAS) in October 25, 1999. IFEM was aimed at, among other things, deepening inter-bank Forex market as well as having a stable naira exchange rate. The IFEM therefore was intended to diversify the supply of foreign exchange in the economy by encouraging the funding of the inter–bank operations from privately-earned foreign exchange rate. Development in IFEM namely, persistent high demand for Forex, continued depreciation of the naira with the premium between official rate and those in parallel market widening

from ₦7.0470 per US dollar in 1999 to ₦16.3808 per US dollar in 2002, and continued depletion of reserves position led to its abandonment and the re-introduction of DAS in July 22, 2002.

DAS, as a means of exchange rate management was not new in Nigeria as it was practiced in 1987 and 1990-91. It was re-introduced to address the failure of IFEM. Specifically, it was aimed at achieving the following objectives:

1) Determination of exchange rate of the naira.
2) Conserve external reserve position;
3) Reduce the premium between official rate and that of the parallel market and;
4) Ensure stability of the naira exchange rate.

The DAS was conceived as a two-way auction system in which both the CBN and authorized dealers would participate in the foreign exchange market to buy and sell foreign exchange. The CBN is expected to determine the amount of foreign exchange it is willing to sell at the price buyers are willing to buy. The 'marginal rate', which by definition is the rate that clears the market, represents the "ruling" rate at the auction.

In order to further liberalize the market, narrow the arbitrage premium between the official inter-bank market and bureau de change segments of the markets and achieve convergence, the CBN introduced the wholesale Dutch Auction system (WDAS) on February 20, 2006. This was meant to consolidate the gains of the retail Dutch Auction System as well as deepen the foreign exchange market in order to evolve a realistic exchange of the naira. Under this arrangement the authorized dealers were permitted to deal in foreign exchange on their own accounts for onward sale to their customers.

III. Methodology and Data

This study focused on Balance of payment (BOP) as the dependent variable and exchange rate as the independent or explanatory variable. In order to test if Marshall – Lerner condition holds for Nigeria, total import and total export were included as explanatory variables. Based on the theoretical background, this study will estimate the following functional relationship:

$$BOP = f(EXR, XM, IM) \quad \text{----------} \quad (4)$$

Where:

BOP is Balance of payment, EXR is exchange rate, XM is total export, IM is total import.

The balance of payment model in this study draws from the same logic as the Marshall-Lerner condition, but differs only on the expression of the balance. While Marshall-Lerner expressed balance of payment as net export (X – M), this study followed the methodology used by Boyd (2001) and salasevicius and vaicius, (2003) to take their ratio (X/M) since according to salasevicius and vaicius (2003), trade built in this way in a logarithmic model gives the Marshall-Lerner condition in an exact form rather than approximation.

The Linear approximation of the functional form of the model expressed in natural logarithm is of the form.

$$\mathbf{BOP} = \alpha_0 + \alpha_1 \text{In EXR} + \alpha_2 \text{In } X_m + \alpha_3 \text{In Im} + \mu_t \quad \text{----------} \quad (5)$$

where, In is the natural logarithm, BOP is the balance of payment, EXR is the real exchange rate, X_m is total export, Im, is total import, μ is the stochastic error term, α_o is the constant term and $\alpha_{1...}\alpha_3$ represents the coefficients of the explanatory variables.

The coefficient of InEXR gives the Marshall-Lerner condition of $n_x + n_m > 1$.

The decision rule here is that if the value of the coefficient of InEXR is positive, it implies high import/export demand elasticity, meaning that ML condition subsists and that depreciation of exchange rate improves balance of trade in Nigeria. But, if the value of the coefficient of InEXR is found to be negative, it indicates that the ML condition does not hold and thus depreciation of the domestic currency worsens the balance of trade in Nigeria.

For the empirical analysis, the study used annual data collected from the Central Bank of Nigeria (CBN) statistical bulletin. The data covered the period 1971 to 2012. All data used in the analysis were in the log form. Unit root test was carried out to make sure none of the variables was integrated of the order two or higher, as that will violate the use of the ARDL.

A prior expectation based on economic theory is that as exchange rate (EXR) depreciates/devaluation (increases) Balance of payment position will improve since net export balance is increased while import balance is decreased.

3.1 Model Estimation Technique

The model estimation technique chosen for the study is the autoregressive distributed lag (ARDL) bound testing approach to co-integration. The study first of all looked at the` time series properties of the data used in the analysis since the ARDL stipulates that none of the variables should be more than I(1).
This study therefore estimates the following regression equation.

$$\Delta InBOP = \alpha_o + \sum_{k=1}^{p1} \alpha_1 \Delta In\ BOP_{t-1} + \sum_{k=1}^{P2} \alpha_2 \Delta InEXR_{t-1} + \sum_{k=1}^{p3} \alpha_3 \Delta In\ XM_{t-1} + \sum_{k=1}^{p4} \alpha_4 \Delta In\ Im_{t-1} + \lambda ECM_{t-1} + \beta_1 InBOP_{t-1} + \beta_2 InEXR_{t-1} + \beta_3 In\ XM_{t-1} + \beta_4 In\ IM_{t-1} + \mu_t \text{------(6)}$$

Where ΔInBOP is the log difference of the balance of payment, ΔIn EXR is the log difference of the exchange rate, ΔInXM is the log difference of total export, and ΔInIM is the log difference of total import. α_1, α_2, α_3, α_4 represents the short-run coefficient and β_1, β_2, β_3, β_4, represents the long-run coefficient of balance of payment, exchange rate, export and import respectively. ECM_{t-1} represents the error correction term lagged for one period, while λ is the coefficient for measuring speed of adjustment. It measures how fast errors generated in one period are corrected in the following period and μ_t is the stochastic error term.

IV. Results and Discussion

Unit Roots

The long-run relationship between balance of payment and exchange rate, export and import crucially depends on the co-integration and stationarity properties of the series. This study employed two unit root tests: (1) ADF test, (2) the stationarity test suggested by Kwiatkowski et al., (1992). The augmented Dickey Fuller (ADF), tests the null of unit root, whereas, KPSS, tests the null of stationarity. The results are shown in table 1.

Table 1:Unit Roots and Stationarity Tests results

Variable	ADF		KPSS	
	Levels	1st Diff	Levels	1st Diff.
BOP	0.6245	0.0134**	203.16	2.0481 **
EXR	0.4156	0.0353 **	2341.33	135.425 *
XM	0.5124	0.0201 **	206.338	2.11429 **
IM	0.9242	0.000 ***	100.01	1.006 ***

Note: *, **, *** denotes, significance at 10, 5, and 1 percent level of significance respectively.
Source: Researcher's compilation from E-views 8.0 WIN processed.
The test results revealed that all variables are I(1) and that they fulfill the conditions under which ARDL can be used (Table 1). None of the variables is I(2) hence ARDL can be used to analyse data for this study.

The study adopts autoregressive distributed lag (ARDL)approach to co-integration developed by Pesaran and Shin (1995) because it can be applied regardless of the stationarity properties of the variables in the model and allows for inferences on both long run and short run-estimations simultaneously, which is not possible under other alternative co-integration procedures (see Engle and Granger (1987), Johansen and Juselius (1990),. In other words, this strategy may be applied irrespective of whether the series are I(0) or I(1).

Co-integration

Trade 2 depicts the results of the co-integration status of the model employed in this study using the ARDL Bound test.

Table 2: Co-integration Testing using ARDL Bound Test.

Equation	F-statistic	Lower bound	Upper bound	Remark
		1(0)	1(1)	
BOP	2.8490	3.47	4.57	Conclusively co-integrated

Source: E-views 8.0 WIN result and Table CI. V – Critical Value Bounds for the F-Statistic.
Note: The asymptotic critical value bound for the balance of payment model was obtained from Table (1(v): Unrestricted intercept and unrestricted trend (Pesaran et al., 2001). For K = 4. In the balance of payment model, lower bound I(0) = 3.47 and upper bound I(1) = 4.57 at 5% percent significance level. The lag structure was selected based on the Schwarz information criterion.

The results showed that there were long-run relationships in the model. The balance of payment model exhibited long-run relationship when the vectors of variables (exchange rate, export and import) were normalized on balance of payment. The long-run relationship of variables is presented in Table 3.

Table 3: Estimated Long-Run Coefficient ARDL Model

Variables	Coefficient	Std. Error	t-Statistics	P-value
c.	0.05465	0.03921	1.39378	0.1102
LN BOP-1	0.15755	0.06338	2.58581	0.0184
LN EXR – 1	0.83641	0.18340	4.56058	0.0196
LN XM – 1	-0.67677	0.17190	-3.93682	0.0813
LN IM - 1	-0.54201	0.19027	-2.84864	0.0282

Source: Research Estimation results from E-views 8.0 WIN Processed.
Estimated Long-Run coefficients using the ARDL Approach; ARDL(1) selected based on Schwarz information criterion; Dependent variable is LNBOP-1, 40 observations used for estimation from 1971 to 2012.

The long-run test statistics revealed that the exchange rate (LN EXR-1) has a long-run effect on Balance of payment. The coefficient of exchange rate variable 0.83641 is positive as expected and statistically significant at 5 percent level. It suggests that in the long-run, a decrease (appreciation) of 10 percent in exchange rate will lead to an increase (improvement) in balance of payment by 8.36 percent in Nigeria. The result also suggests that the Marshall-Lerner (ML) condition holds for Nigeria. This result is consistent with the findings of salasevicuis and Vaicious (2003) for Lithuania and Ogbonna (2011) for Nigeria. The coefficient of export variable was negatively signed as expected but statistically insignificant at 5 percent level of significance. This suggests that export products in Nigeria are basically dominated by oil exports whose demand and supply elasticity is inelastic. The implication here is that, though the volume of export may have increased it does not respond to the market forces of demand and supply.

The coefficient of import was negative and statistically significant. This is in contrast to a priori expectations. The implication of this is that import demand is inelastic to relative prices. This appears to be a reflection of low substitutability between domestically produced goods and imported ones.

Error correction Model (ECM)

The error correction model (ECM) provides a framework for establishing links between the short-run and long-run approaches to econometric modeling. The result of the balance of payment error correction model is presented in Table 4.

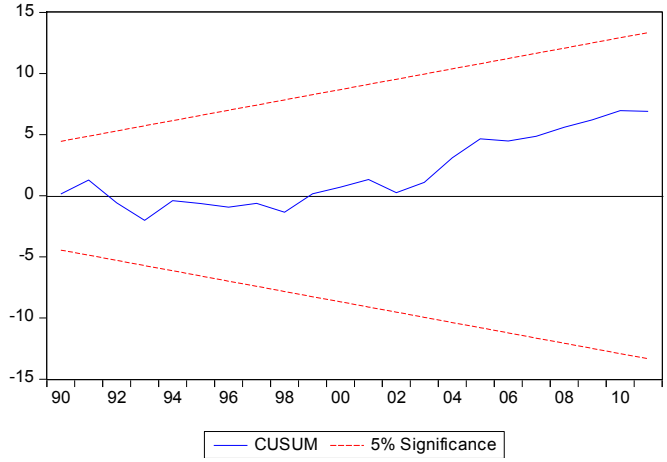
Table 4: Estimated Error Correction Results for the ARDL Model

Regressor	Coefficient	Std. Error	T-Statistic	P-value
C	0.02438	0.01651	1.47668	0.1326
D(BOP(-1))	0.06473	0.16355	0.39578	0.6265
D(EXR(-1))	1.62461	1.34833	1.20491	0.1618
D(XM(-1))	-0.233254	0.91347	-0.25457	0.6100
D(IM(-1))	0.06242	0.16959	0.36806	0.4241
ECM(-1)	-0.32465	0.10514	-3.08779	0.0050
R^2 = 0.8251				
Adj. R^2 = 0.6808				
F-Statistics (4, 37) = 12.6257[0.000]				
DW = 2.08				

Source: Research estimation Result from E-views 8.0 WIN processed

Error correction representation for the selected ARDL model; ARDL (1) selected based on Schwaz information criterion (SIC); Dependent variable is D(BOP(-1)); 40 observations used for estimation from 1971 to 2012.

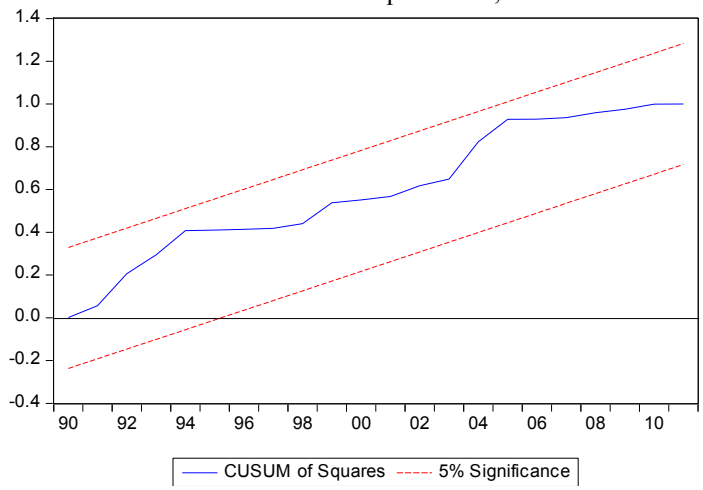
Figure 1: Plot of cumulative sum of recursive residuals of the ARDL model to test for the stability of the estimated parameters:



Source: Research result 8.0 WIN Processed

Straight lines represent critical bounds at 5 percent significance level.

Figure 2: Plot of cumulative sum of square, of recursive residuals of the ARDL model to confirm the stability of the estimated parameter;



Source: Research Result from E-views 8.0 WIN Processed.
Straight lines represent critical bounds at 5 percent significance level.

The estimation result in table 4 revealed that ECM is correctly signed with negative sign. The coefficient of the ECM of -0.32465 suggests a moderate adjustment process. About 33 percent of the disequilibrium of the previous period is adjusted back to the long-run equilibrium in the current period.

The coefficients of exchange rates, exports and imports in the error correction model of 1.62461, -0.23254, and 0.06242 respectively are correctly signed but are not statistically significant at the 5 percent level of significance. A plausible explanation to this is that Nigeria's export is mainly crude oil while, import is finished goods that do not have competitive domestic substitutes both of which have inelastic price elasticities.

Therefore changes in exchange rate do not significantly influence them in the short run. Nigeria should therefore consider exchange rate management as a long-run fixed rather than short term on balance of payment. Overall, the findings of this study demonstrated that the exchange rate plays important role in the performance of balance of payment in Nigeria.

The high value of R^2 (0.8251) for the model, shows overall goodness of fit of the model and that variation in the balance of payment can be explained with the changes in the exchange rate. Durbin Watson statistics of 2.08 indicates that there is no autocorrelation in the series. The F-statistics (12.6257 [0.000]) measuring the joint significance of all regressors in the model are statistically significant at the 5 percent level of significance.

The plot of the stability tests of the model are presented in figures 1 and 2 (CUSUM and CUSUMSQ). The cusum and cusumsq are plotted against the critical bound at the 5 percent significance level. The result

showed that the model is stable since the critical bounds at 5 percent fell in between the two 5 percent lines, the implication is that the results can be used for policy prescription.

V. Conclusion and Recommendations

The study analysed the impact of exchange rate on the balance of payment position in Nigeria from 1971 to 2012. The empirical results from the ARDL bounds testing procedure revealed that a long-run relationship exists between exchange rate and balance of payment in Nigeria. The elasticity of the exchange rate coefficient in the balance of payment model was positive and statistically significant at 5 percent level, thus balance of payment position in Nigeria responded positively to exchange rate policies and Marshall-Lerner condition holds for Nigeria.

In contrast to the long-run estimation result of the model, the short-run coefficient of exchange rate variable was not statistically significant. This implied that change in exchange rate do not influence the balance of payment position in Nigeria in the short run. The dynamic error correction mechanism revealed that the speed of adjustment to the long run equilibrium position from the previous period to the current is moderate. The ECM coefficient was correctly signed with a negative sign.

The policy implication of the estimation results is simple, depreciation/devaluation improves balance of payment and that Marshall-Lerner (ML) condition subsists for the Nigeria economy, exchange rate management in Nigeria must be seen from the long-run perspective rather than short-run effect. To reduce the excessive balance of payment deficit, the need to discourage over-reliance on imported goods and the promotion of domestic export produce is very imperative. This can only be achieved if the Nigerian economy is diversified and entrepreneurial development promoted, in the presence of fiscal discipline.

References

[1]. Akpansung, A.O. (2013), 'A Review of Empirical Literature on Balance of Payment as a Monetary Phenomenon'. Journal of Emerging Trends in Economics and Management Sciences (JETEMS) 4(2): 124-132.

[2]. Ardalan, K. (2003), 'The Monetary Approach to Balance of Payments. A Review of the Seminal on Long-Run Empirical; Research, Proceedings of the Academy of Economics and Economic Education, 6(2): 9-24.

[3]. Beatrice, K.M. (2001), 'Long-Run and Short-Run Determinants of the Real Exchange Rate in Zambia', Working Papers No. 40. Available at http://www.handels.gu.se/econ/

[4]. Boyd, D., Caporale, G.M. and Smith, R. (2001), 'Real Exchange Rate Effects on the Balance of Trade: Co-integration and the Marshall-Lerner condition: International Journal of finance and Economics, 6:187-200.

[5]. Caves, R.E. and Jones, R.W. (1981),' World Trade and Payments': An Introduction, Canada. Litter Brown and Company Inc, pp. 112.

[6]. Central Bank of Nigeria (2005), 'The Foreign exchange Market in Nigeria'. (Online). Available: http://www.cenbank.org/intops/fxmarket.asp.

[7]. Chen, S.S. (2003), Revisiting the Interest Rate-Exchange Rate Nexus: A Markov Switching Approach, International Finance 0303002, econ WPA Revised.

[8]. Duasa, J. (2005), 'The Malaysian Balance of Payments: Keynesian Approach Versus Monetary approach', up 20550. 1075841570. Pdf.

[9]. Dutta, D. and Ahmed, M. (2006), 'An Aggregate Import Demand Function for India: A Co-integration Analysis'. School of Economics and Political Science, University of Sydney NSW 2006 Australia.

[10]. Engel, R.F. and Granger, C.W. (1987), "co-integration and Error Correction: Representation, estimation, and testing", Econometrical Vol. 50, 987-276.

[11]. HO, W.S. (2004), 'Estimating Macao's Import demand functions' Monetary Authority of Macao.

[12]. Imoisi, A.I. (2012),' Trends in Nigeria's Balance of Payments: An Empirical Analysis from 1970-2010', European Journal of Business and Management, Vol. 4, No. 21; 210-217.

[13]. Johansen, S. and Jesulius, K. (1990), 'Maximum Likelihood Estimation and Inference on Co-integration: With Application to the Demand for Money'. Oxford Bulletin of Economics and Statistics 52, 169-210.

[14]. Johnson, H.G. (1976), 'The Monetary Approach to Balance of Payments Theory', Journal of Finance and Quantitative Analysis, Vol. 2, No. 3, Pp. 129-143.

[15]. Kwiatkowski, D., Phillips, P.C.B., Schmidt, P. and Shin, Y. (1992), 'Testing the Null of Stationarity against the Alternative of a Unit Root', How Sure are we that Economic Time Series have a Unit Root? Journal of Economics, 54, 159-178.

[16]. Lerner, A.P. (1944), 'Economics of Control: Principles of Welfare Economics'. The Macmillian Company. N.Y.

[17]. Levacic, R., and Rebmann, A. (1982), 'Macroeconomics; London, Macmillian Publishers Ltd, Pp. 89-100.

[18]. Marshall, A. (1923), 'Money, credit and commerce', London, Macmillan.

[19]. Melvin, M. (1992), International Monetary and Finance. Third Edition, New Work: Jarper Collins Publishers Inc.

[20]. Ndiomu, A.M. (1993), 'Applied Economics in Banking and Finance for Nigeria students, Port Harcourt; Pan Unique publishers, Pp. 77-79.

[21]. Odili, O. (2007), 'Exchange Rate Dynamics and Macroeconomic Instability in emerging Market Economics: The Nigerian experience (1980-2003). Unpublished M.Sc. (International Economics and Finance) Thesis, Rivers state university of Science and Technology, Port Harcourt, Nigeria.

[22]. Ogbonna, B.C. (2011), 'The Impact of Exchange Rate Variation on Trade Balance: Evidence from Nigeria; 1970 – 2005'. JORIND, 9(2), 393-403.

[23]. Oladipupo, A.O. and Onotaniyohuwo, F.O. (2011), 'Impact of Exchange rate on Balance of Payment in Nigeria', African Research Review Vol. 5, No. 21, 73-88.

[24]. Olukole, R.M. (1992), 'Exchange Rate Developments in Nigeria', CBN Bullion, Vol. 16, No 1 Jan/March pp. 38-45.

[25]. Pearson, M.H., Shin Y. and Smith, J.R. (2001), 'Bounds Testing Approach to the Analysis of Level Relationships', Journal of Applied economics, 16: 289-326.

[26]. Pesaran, M.H. and Shin, Y. (1995), 'An Autoregressive distributed Lag Modeling Approach to Co-integration Analysis.DAE working Paper, No. 9514.
[27]. Rasaq, A.D. (2013), 'The Impact of Exchange Rate Volatility on the Macro- Economic Variables in Nigeria. European Scientific Journal, Vol. 9, No. 7, 152-165.
[28]. Rose, A.K. (1990), 'Exchange Rates and Trade Balance'. Some Evidence from Developing Countries', Economic letters, 34, 271-275.
[29]. Salasevicius, R. and Vaicius, P. (2003), 'exchange rate Relationship: Testing the Marshall-Lerner Condition in the Baltic States. SSE Riga Working Papers 2003: 13(48).Stockholm School of Economics in Riga.
[30]. Umoru, D. and Eboreime, M.I. (2013),' The J-curve Hypothesis and the Nigerian Oil Sector', The ARDL Bounds Testing Approach. European Scientific Journal London, United kingdom Vol. 9, No 4: 314-332.
[31]. Umoru, D. and Odegba, O.P (2013), exchange Rate Misalignment and Balance of Payment Adjustment in Nigeria. European Scientific Journal, Vol. 9, No. 13, 260-273.
[32]. Ve'gh, C.A. (2011), Open economy Macroeconomics in Developing Countries. MIT press.
[33]. Yoon, G. (2009), 'Are Real Exchange Rates more likely to be Stationary during the Fixed Nominal Exchange Rate Regime?'Applied Economic Letters, Vol., 16, Pp. 17-22.