

BALANCE OF PAYMENT CRISES IN NIGERIA: THE ROLE OF EXCHANGE RATE

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Abstract

The liberalization of the foreign exchange market in Nigeria in the mid-1980 had caused persistent movement in exchange rate which had led to deleterious effect on the balance of payment position in the country. This paper examines the effect of exchange rate on aggregate balance of payment (BOP), current account balance and capital account. Earlier studies in the country focused on the effect of exchange rate on aggregate BOP. Autoregressive Distributed Lags (ARDL) approach to cointegration was adopted to estimate the models. This was followed by the short-run error correction model. It was found that exchange rate appreciation had adverse effect on BOP and current account balance. However, no statistically significant effect of exchange rate on capital account was obtained. Additionally, inflation rate was found to have negatively affected the BOP in the country. An effective management of the exchange rate by the monetary authority is essential to yield a favourable balance of payment position in Nigeria.

Keywords: Exchange Rate, Current Account, Capital Account, Balance of Payment, Autoregressive Distributed Lags

INTRODUCTION

There is an ongoing debate by policy makers and academics on the appropriate exchange rate regime to achieve macroeconomic objectives of developing and emerging economies. The choice of exchange rate regime has as a wide range of effects on macroeconomic performance

and balance of payment position of a country. Deliberate exchange rate appreciation by the monetary authority in an economy with less export could have detrimental effect on real sector, general price level and trade. Since the breakdown of the Bretton Woods' system in 1973, many developed and developing countries had adopted floating exchange rate system. The floating exchange rate regime though has its merits, however, it has resulted to several episodes of volatility in exchange rate with some implications for trade, external reserves, inflation, money supply and economic growth.

Nigeria has witnessed several exchange rate policies and regimes; however, these policies had not led to the achievement of a favourable balance of payment position in the country. After the adoption of the Structural Adjustment Program (SAP) in Nigeria in 1986, the foreign exchange market was deregulated. The deregulation policies led to fluctuation in exchange rate. However, the monetary authority frequently intervenes in the foreign exchange market to reduce the extent of depreciation of naira. During the SAP period the balance of payment (BOP) statistics recorded some deficits. Naira to dollar exchange rate depreciated from N0.99 per dollar in 1986 to N9.00 per dollar in 1990. During the same period, BOP recorded deficits. For instance, between 1985 and 1990, BOP deficits increased from N339.60 million to N4.51 billion. Although the current account was in surplus mainly through the revenue derived from the export of crude oil, a large amount of the deficits incurred were from the capital account. The deficits in the BOP were due to increase importation of food products, textiles, automobiles, machinery and equipments (Central Bank of Nigeria annual reports and statement of account, 2005).

In the mid-1980, when Nigeria started recording huge balance of payments deficits and depletion of the foreign reserve, policy makers were in favour of devaluation of naira. This was expected to reduce pressure on external reserve as well as BOP. However, after the devaluation of naira, the economy was far from recovery. Available statistics from the Central bank of Nigeria (CBN) show that both the current and capital account recorded deficits in 1987, 1988 and 1989. Hence, exchange rate devaluation did not significantly improve external reserve, trade and economic performance in the country.

Due to the continuous exchange rate volatility and deficits in balance of payment in Nigeria, the investigation on exchange rate dynamics and balance of payment in Nigeria is still subject to further findings because the persistence changes in exchange rate has increased uncertainty in international trade transactions in the country. Previous empirical studies in Nigeria, notably, Oladipupo and Onotaniyohuwo (2011), Iyoboyi and Muftau (2014), Tijani (2014) generally focused on the effect of exchange rate on the aggregate balance of payments without considering the various components of the balance of payments. Our study intends to fill

the gap by investigating the effect of exchange rates on various components of BOP and the aggregate BOP. This will help to determine the magnitude of the impact of exchange rate on various components of BOP.

Therefore, this study aims to examine the effect of exchange rate dynamics on BOP and its components in Nigeria. Specifically, the study will investigate the effect of exchange rate on current account, capital account and the overall BOP in the country. This study covers the period between 1971 and 2014 due to persistent reforms in the foreign exchange market and more importantly, erratic balance of payment positions. Availability of data also informed the choice of the period.

The rest of the paper is organized as follows: section two is on overview of exchange rate regimes and balance of payment profile of Nigeria. Section three is on literature review. Here, theories on exchange rate and balance of payment will be reviewed. Some empirical findings in the previous studies will be documented. Next is the theoretical framework and methodology in section four. Section five is on analysis of data and discussion of results. Section five concludes the paper.

OVERVIEW OF EXCHANGE RATE AND BALANCE OF PAYMENT PROFILE IN NIGERIA

Development in Nigeria's Exchange Rate

After the establishment of the Central Bank of Nigeria (CBN) in 1958 and the enactment of exchange control acts in 1968, Nigeria operated fixed exchange rate regime. Over a decade, after the establishment of CBN, Nigeria's pound was used as the medium of exchange with easy convertibility to British pounds (Egwaikhide *et al*, 2015). In 1973, Nigeria's pound was changed to naira due to the devaluation of British pounds in 1967. The over-valuation of naira that resulted during the exchange control regime led to massive importation of finished products which had deleterious effect on balance of payment, external reserves and domestic production of the country. Under the exchange control acts, Naira was subjected to administrative management and control by the CBN. Between 1961 and 1970, Naira-Dollar exchange rates were fixed at 0.7143.

The development in the oil sector led to huge foreign exchange earnings in the country in the early 1970s. There was increased in foreign exchange receipts in the foreign exchange market (FEM). By 1975, Naira appreciated against US Dollar following the increased capacity of the CBN to manage foreign exchange from the proceeds derived from oil exploration. Also, the CBN embarked on deliberate action on Naira appreciation to enable the industrial sector to source its inputs from abroad and for the implementation of the Import Substitution Industrialization (ISI) strategy. The exchange rate as at 1980 was 0.54 naira to a dollar.

The oil glut in early 1980s, led to crisis in the foreign exchange market. There was excessive demand for foreign exchange with low supply in the foreign exchange market due to the sharp fall in price of crude oil in the international market. At this time, the CBN realized it cannot continue to operate a fixed foreign exchange regime this led to the abolishment of exchange control and some steps were taken to deregulate the foreign exchange market.

In 1986, Two tiers of foreign exchange market were introduced, namely, the first tier and second tier foreign exchange markets. The first tier was administratively managed by the CBN and the prices were referred to as the official rate. The second tier foreign exchange market was established as part of the federal government strategies towards Structural Adjustment Programme (SAP). In the second tier foreign exchange market the allocation and determination of exchange rate were conducted using the market auction system. The objectives of exchange rate policy under the SAP were to preserve the value of the domestic currency, enhancing competitiveness of domestic industries and to promote local production as well as diversify the economy (CBN, 1990).

Further, the CBN introduced the Bureau de Change in 1989 to deal with the foreign exchange needs of the private sector. Exchange rate depreciated from N3.32 per dollar in 1985 to N9.00 per dollar in 1990 (see table 1). Due to the depreciation of naira, the CBN pegged the official foreign exchange rate to US dollar in 1994. Consequently, the Bureau de Change was restricted as the only agent for foreign exchange transaction (The parallel market was affirmed by the CBN to be illegal) in the Second tier market.

Some notable development occurred in the foreign exchange market in the 1990s. One is the introduction of Autonomous foreign exchange market in 1995 for the sales of foreign exchange to end users through authorized dealers by the CBN. Second, in 1999, the foreign exchange market was further liberalized by the establishment of Inter-Bank foreign exchange market (IFEM). The IFEM was devised to boost the supply of foreign exchange in the economy and facilitate the funding of inter-bank operations through the privately earned foreign exchange (CBN, 2002).

In 2002, the Dutch Auction System (DAS) was introduced due to pressure on the demand for foreign exchange and fall in external reserve. The operation of the DAS allowed the CBN to determine the amount of foreign exchange to be sold in the price that buyer quoted (Omojinite and Akpokodje, 2010). Further development in the FEM led to the introduction of whole sale Dutch Auction system in 2006 which was in operation till 2008. By 2009, retail Dutch Auction System (RDAS) was introduced as a result of increased depletion in external reserve and to further ration the allocation of foreign exchange. CBN maintained the rDAS as the mechanism for the management of foreign exchange. During the last quarter of 2014, high

exchange rate volatility was witnessed due to excessive demand pressure and other development in the external sector, mainly the sudden crash of crude oil price in the international market. Between 2005 and 2014 exchange rate depreciated from N129 per dollar to 155.74 (CBN, 2014).

Table 1 shows the evolution of Nigeria's exchange rate, external reserves and crude oil prices. Since exchange rate movement has strong implication on external reserve and oil price, it is pertinent to present the data that shows the development of the economic variables. Additionally, the dynamics of nominal exchange rate is depicted in figure 1. Several reforms in the foreign exchange market were responsible for the trends in exchange rate that is presented.

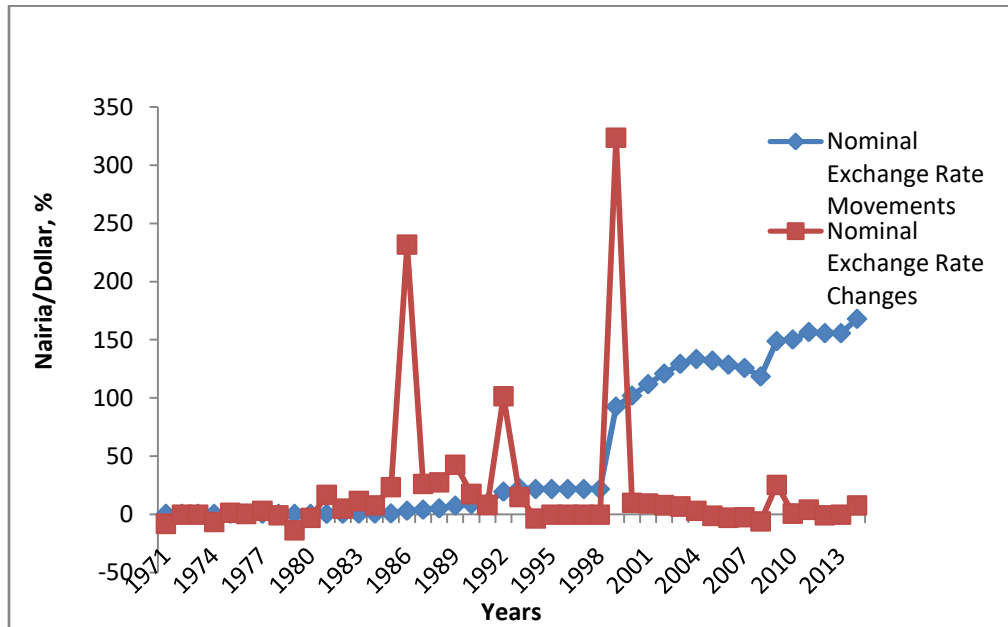
Table 1: Exchange Rate, External Reserves and Crude Oil Prices

| Years | NER (N/\$) | External Reserve US\$ Million | Crude Oil Price USD/ Barrel |
|--------------|-----------------------|------------------------------------------|----------------------------------------|
| 1971-1975 | 0.63 | 1238.56 | 5.53 |
| 1976-1980 | 0.63 | 3014.29 | 20.32 |
| 1981-1985 | 2.93 | 1549.53 | 30.13 |
| 1986-1990 | 13.74 | 3863.21 | 17.01 |
| 1991-1995 | 21.89 | 4472.18 | 17.16 |
| 1996-2000 | 52.09 | 5571.04 | 19.29 |
| 2001-2005 | 125.58 | 12512.30 | 32.44 |
| 2006 | 128.65 | 37456.09 | 61.00 |
| 2007 | 125.83 | 45394.31 | 69.04 |
| 2008 | 118.57 | 58474.38 | 94.10 |
| 2009 | 148.90 | 77152.31 | 60.86 |
| 2010 | 150.29 | 37358.71 | 77.38 |
| 2011 | 153.86 | 32639.80 | 107.46 |
| 2012 | 157.50 | 43830.00 | 109.45 |
| 2013 | 157.31 | 42850.00 | 105.87 |
| 2014 | 158.55 | 37220.33 | 63.28 |

Source: Compiled by the authors' based on data from CBN and OPEC

In figure 1, notable changes in nominal exchange rate are observed between 1984 and 1986 as well as 1998 and 2001. Some of the factors that led to high depreciation in exchange rate during the periods include, depletion in external reserves, oil price shocks and erratic government policies occasioned by frequent changes in government. Nominal exchange rate shows gradual depreciation in most of the years considered.

Figure 1: Nominal Exchange Rate Dynamics



Balance of Payment Profile of Nigeria

An analytical summary of BOP is presented in Table 2. Also, figure 2 illustrate the movement in the current account balance, capital account balance and overall BOP balance as percentage of GDP. The charts show evolution of current account balance, capital account balance and overall balance of payment position of Nigeria between 1971 and 2014.

The disequilibrium in the BOP will be better appreciated when expressed as percentage of GDP. The current account, capital account and BOP as percentage of GDP are depicted in the table 2. The balance of payment recorded surpluses from 1971 to 1980; this was majorly attributed to the oil sector which revenue increased the buoyancy of the external position. Although the capital account recorded surplus between 1981 and 1985, the overall balance of payment witnessed a deficits averaged N2,749.10 million (see table 2). In the reference period, the BOP deficit was 4.78% of GDP.

Nigeria's external position worsen between 1986 and 1990, the capital account deficit averaged N16,258.36 million. This resulted to a BOP deficit of 8.14% of GDP. Further, development in external sector led to capital and financial account deficits between 1996 and 2000 (see table 2). However, the overall BOP position as a percentage of GDP was 2.3 from 2001 to 2005. The improvement in the BOP was reflected in the current account balance through the contributions of the oil sector. Consequently, in 2006 and 2007, the BOP posted a substantial surplus as it was 9.63% and 5.46% of GDP, respectively. Remarkable improvement in the current account during these periods contributed significantly to the overall BOP balance.

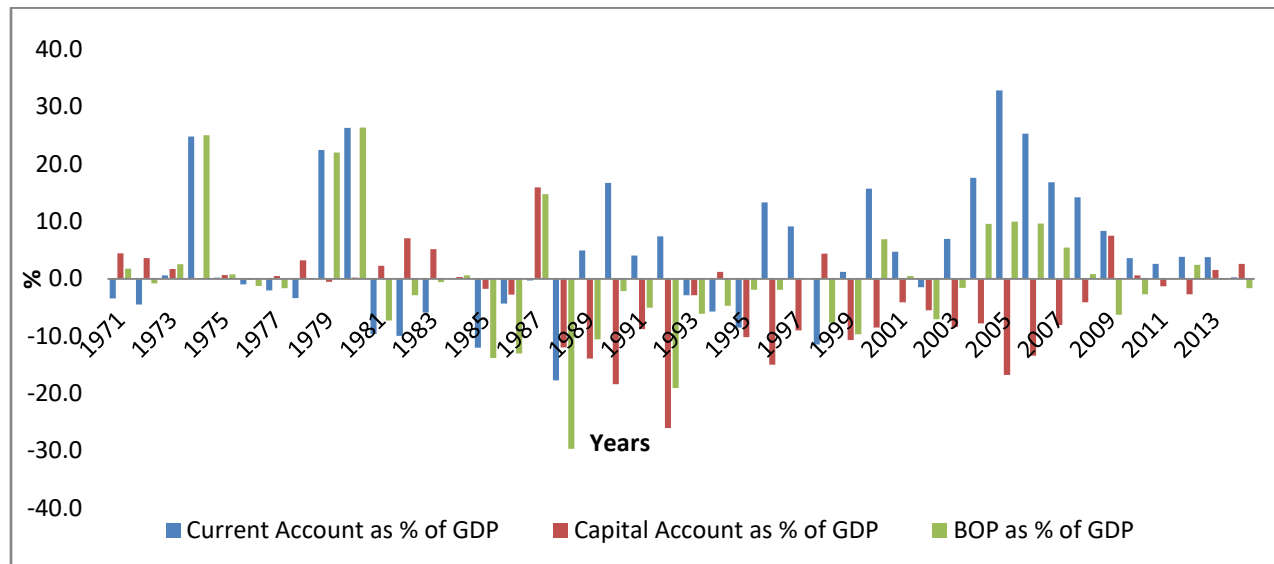
Conversely, in 2009 and 2010, external sector statistics shows BOP deficits of 6.31% and 2.73% of GDP, respectively (see figure 2). A marginal surplus was posted in 2011; this could be attributed to the improvement in the current account. The deficits of N1,949 billion recorded in 2012 on the capital account was offset by surplus of N2,736 billion posted on the current account. This development was as a result of the increase in the volume of merchandise export. The decline in oil price in the international market from \$105.9 per barrel to \$63.3 per barrel (see table 1) between 2013 and 2014 resulted to BOP deficits of 0.19% and 1.66% of GDP obtained during period. In this period, increased in average import from 10.9% of GDP to 12.3% of GDP worsen the overall BOP position in the country (CBN, 2014).

Table 2: Analytical Statement of BOP

| Years | Current Account Balance (N'Million) | Capital Account Balance (N'Million) | Overall Balance (N'Million) | Current Account Balance as % of GDP | Capital Account Balance as % of GDP | Overall Balance as % of GDP |
|-----------|----------------------------------------------|-------------------------------------------|--------------------------------|----------------------------------------------|----------------------------------------------|--------------------------------------|
| 1971-1975 | 842.94 | 166.72 | 1029.58 | 3.5 | 2.1 | 5.85 |
| 1976-1980 | 4,084.38 | 215.12 | 4290.34 | 8.5 | 0.6 | 9.08 |
| 1981-1985 | (4,031.54) | 1,222.80 | (2,749.10) | (7.5) | 2.6 | (4.78) |
| 1986-1990 | (5,499.50) | (16,258.36) | (12,704.62) | (0.1) | (6.2) | (8.14) |
| 1991-1995 | (41,159.9) | (35,596.12) | (79,355.56) | (1.1) | (9.3) | (7.36) |
| 1996-2000 | 213,450.0 | (265,025.74) | (57,048.45) | 5.6 | (7.8) | (3.10) |
| 2001-2005 | 1,555,699.0 | (983,083.13) | 84621.0 | 12.1 | (8.5) | 2.3 |
| 2006 | 4,698,047.1 | (2,491,546.58) | - | 25.3 | (13.4) | 9.63 |
| 2007 | 3,478,374.8 | (1,666,525.44) | -2.32831E-10 | 16.8 | (8.1) | 5.46 |
| 2008 | 3,455,650.3 | (992,280.30) | 2.32831E-09 | 14.2 | (4.1) | 0.81 |
| 2009 | 2,064,890.2 | 1,862,597.81 | -9.77889E-09 | 8.3 | 7.5 | (6.31) |
| 2010 | 1,970,592.1 | 305,561.31 | - | 3.6 | 0.6 | (2.73) |
| 2011 | 1,641,463.2 | (831,406.39) | 3.0268E-09 | 2.6 | (1.3) | 0.07 |
| 2012 | 2,736,448.3 | (1,949,196.86) | -4.19095E-09 | 3.8 | (2.7) | 2.44 |
| 2013 | 2,996,627.0 | 1,209,069.77 | - | 3.7 | 1.5 | (0.19) |
| 2014 | 201,098.7 | 2,064,778.97 | 9.31323E-10 | 0.3 | 2.6 | (1.66) |

Source: Authors' computation based on data gathered from CBN bulletin

Figure 2: Current Account, Capital Account and BOP as Percentage of GDP



LITERATURE REVIEW

Theories of balance of payment and exchange rate proliferate in the economic literature. The orthodox theories of balance of payment include the elasticity approach, absorption approach and monetary approach to balance of payment. The theories show the various implications of devaluation of a single country's currency in the world economy on real income and balance of payments.

The elasticity approach to balance of payment provides explanation on the effect of devaluation on current account balance. Two direct effects of devaluation on the current account balance could be drawn from this approach. One works to reduce the deficits; the other makes the deficits worse. If the sum of the foreign elasticity of demand for export and the home country elasticity of demand for import is greater than unity, devaluation will improve the current account. However, if the sum of the foreign elasticity and home country elasticity is less than unity devaluation will result to deterioration of the balance of payment (Pilbeam, 1998). The elasticity approach to balance of payment has been criticized to neglect income and expenditure effects of exchange rate changes. It focused on partial equilibrium analysis and ignores supply conditions and cost changes due to devaluation.

Absorption approach to balance of payment was originally developed by Alexander (1952) and extended by Johnson (1958). This approach allows for the introduction of income effects to the analysis of the effects of devaluation. Current account balance can be viewed as the difference between domestic output and domestic spending. In this approach, the effect of devaluation on balance of payment works through marginal propensity to absorb. If the marginal

propensity to absorb is less than unity, an increase in income will raise income to absorption ratio, hence, leads to improvement in the current account.

The monetary approach to balance of payment pioneered by Whitman (1975), Frenkel and Johnson (1976) suppresses the traditional distinction between exports, imports and non-traded goods. The balance of payment is considered as a monetary flow that can only be explained by disequilibrium in the stock. It focuses on the disequilibrium between the demand for and supply of money that leads to balance of payments deficits or surpluses. Hence, balance of payment disequilibrium is a reflection of disequilibrium in the money market. A major criticism of the absorption and monetary approaches to balance of payment is that it suggests that an improvement in trade balance implies an improvement in balance of payment due to inflows of international money. These theories emphasize on stock adjustment process, and not flow disequilibrium.

Krugman (1979) developed a theoretical model of balance of payment crises. He showed that speculative attack on reserves occurs when investors change the composition of their portfolios, reducing the proportion of domestic currency and raising the proportion of foreign currency. These activities produce variation in the relative yields of domestic and foreign currencies. When government is no longer able to defend the exchange rate the domestic currency begins to depreciate.

In the same vein, Obstfeld (1983) advanced the Krugman's theory and demonstrated how expectation of subsequent devaluation affects the timing of balance of payment crises. In the model, the timing of balance of payment crisis is a function of the expected devaluation and the length of the transitional period of floating before new exchange parity begins. It was argued that speculative attack on the currency could emanate when the market realizes that the current exchange rate cannot be defended.

Empirical studies on the relationship between exchange rate and balance of payment had shown mixed findings. The variation in the results depends on exchange rate regime of the economy under consideration as well as the proportion of export, import in the balance of trade and exchange rate. Lane and Milesi-Ferratti (2002) explored the long-run links between net foreign asset position, the trade balance and the real exchange rate. The analysis focused on a sample of 20 OECD countries between 1970 and 1998. The result revealed a negative long-run relationship between the trade balance and real exchange rate. The study highlighted the significant of difference in rates of returns on external assets and liabilities in determining the dynamics of net foreign assets. In a panel study of 22 developing countries, Santos-Paulino and Thirlwall (2004) estimated the effect of trade liberalization on export growth, import growth, the

balance of trade and the balance of payment. It was found that liberalization stimulated export growth, but increased import worsen of balance of trade and payments.

Husain, Mody and Rogoff (2005) focused on regime durability of exchange rate among advanced, emerging and developing economies. It was noted that pegs were favourable for durability and relative low inflation in developing countries. However, for developed economies, floats were durable and led to higher growth. Regime neutrality and managed float system seems to be favourable in emerging markets. Pooled regression was used by Shambaugh (2004) to investigate the effect of fixed exchange rate on monetary policy. Countries considered were classified as pegged and nonpegged. It was reported that fixed exchange rate forced countries to follow the monetary policy of the base country more closely than floating rate countries.

The interaction of exchange rate fluctuation and balance of payment of industrialized and developing countries was examined by Kandil (2009). It was reported that in industrial countries with flexible exchange rate system, exchange rate depreciation reduces imports and increases capital flows. However, exchange rate appreciation increases imports and worsen the current account balance across developing countries.

In the quest to validate empirically the monetary approach to balance of payment in Mexico, Martinez (1999) employed Mexico quarterly data between the first quarter of 1971 and the second quarter of 1988. The monetary approach to balance of payment was not supported in the study. It was found that monetary authority adjusts domestic assets to neutralize exogenous balance of payments deficits. In a similar study on Mexican economy, Ibarra and Blecker (2015) revealed that the impact of exchange rate changes on trade balance is negligible due to the increasing integration of export industries into global supply chains.

Some studies in Nigeria have provided mixed results on the relationship between exchange rate and balance of payments, notably, Oladipupo and Onotaniyohuwo (2011) investigated the impact of exchange rate on the Nigerian external sector between 1970 and 2008 using an ordinary least square (OLS) technique. It was reported that exchange rate has a significant impact on the balance of payments position. Iyoboyi and Muftau (2014) employed the vector error correction model to investigate the impact of exchange rate depreciation on the balance of payments. The result shows evidence of bidirectional causality between balance of payment and exchange rate. Further, the variance decomposition indicates that exchange rate changes does not account for a significant variation in balance of payments. Similarly, Tijani (2014) empirically examined balance of payment adjustment mechanisms focusing on the monetary channel in Nigeria between 1970 and 2010. A positive relationship between the balance of payment, domestic credit, exchange rate and balance of trade was obtained. The

study show that monetary measures contribute greatly to the balance of payment position. Earlier empirical works in Nigeria failed to examine the effect of exchange rate on various components of balance of payments, such as, current account and capital account.

RESEARCH METHODOLOGY

Model

A model of exchange rate and balance of payment crisis that was developed by Kouri (1976) with slight modification by Krugman (1979) provides a useful framework for this study. Two exchange rate regimes were considered in the model. First, the freely floating exchange rate; where the exchange rate is determined by the market. Second is the fixed exchange rate, where government holds reserve of foreign currency and exchanges foreign for domestic money at a rate. Under the floating exchange rate system, changes in expectation are observed in the changes in exchange rate. However, under fixed exchange rate regime, it is reflected in changes in government reserves.

The reasons for exchange rate changes in a flexible exchange rate system are three folds: increase in domestic money supply, a change in private holdings of domestic assets or a change in expected rate of inflation. Exchange rate appreciation is proportional to the real money supply and negatively to the balance of payment. Hence, in a flexible exchange rate system, exchange rate appreciation would negatively affect balance of payment position.

In a fixed exchange rate system, government holds a stock of foreign money and uses to stabilize the exchange rate. However, government reserves cannot be reduced to zero, hence, it is impossible to peg the exchange rate forever. Pegging option of the government will be distorted during balance of payment crisis or dwindle reserve.

The Marshall-Lerner condition posits that exchange rate depreciation would lead to improvement in balance of payment through the expansion of output and export provided that the sum of price elasticity of demand for export and demand for import are greater than unity. Hence, in the empirical model for this study, we expect depreciation to improve the balance of payments.

There are five major variables that could significantly affect the balance of payments and its components (current account and capital account); these are real effective exchange rate, money supply, inflation and oil price. Here, all these variables are considered in the analysis. Based on the relationship between the variables of interest, the empirical model for the study can be expressed as follows:

$$BOP = f(reer, MS, Inf, Oilp) \quad (1)$$

$$CA = f(reer, MS, Inf, Oilp) \quad (2)$$

$$KA = f(reer, MS, Inf, Oilp) \quad (3)$$

Where, the dependent variable in equation 1 is balance of payment BOP ; $reer$ is the real effective exchange rate; MS is the broad money supply; Inf is the inflation rate; $Oilp$ is oil price. The dependent variables in equation 2 and equation 3 are current account (CA) and capital account (KA), respectively. Oil price is included in the model due to the dependency of Nigeria's economy on crude oil. Essentially, balance of payment positions are affected by crude oil prices.

Estimation Technique

Autoregressive Distributed Lags Model

The Autoregressive Distributed Lags (ARDL) approach of Pesaran and Shin (2001) is employed to examine the relationship between balance of payment, exchange rate and other variables of interest. ARDL is used to test the existence of long run relationship and to determine the elasticities of the variables. This procedure is appropriate to determine cointegration among variables that are stationary at level and first difference as in the case of this study. It involves the estimation of the following Unrestricted Error Correction Model (UECM):

$$\begin{aligned} \Delta BOP_t = & \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta BOP_{t-i} + \sum_{i=0}^n \alpha_{2i} \Delta reer_{t-i} + \sum_{i=0}^n \alpha_{3i} \Delta MS_{t-i} + \sum_{i=0}^n \alpha_{4i} \Delta Inf_{t-i} + \sum_{i=0}^n \alpha_{5i} \Delta Oilp_{t-i} \\ & + \delta_1 BOP_{t-1} + \delta_2 reer_{t-1} + \delta_3 MS_{t-1} + \delta_4 Inf_{t-1} + \delta_5 Oilp_{t-1} + u_{1t} \end{aligned} \quad (4)$$

$$\begin{aligned} \Delta CA_t = & \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta CA_{t-i} + \sum_{i=0}^n \beta_{2i} \Delta reer_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta MS_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta Inf_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta Oilp_{t-i} \\ & + \omega_1 BOP_{t-1} + \omega_2 reer_{t-1} + \omega_3 MS_{t-1} + \omega_4 Inf_{t-1} + \omega_5 Oilp_{t-1} + u_{2t} \end{aligned} \quad (5)$$

$$\begin{aligned} \Delta KA_t = & \rho_0 + \sum_{i=1}^n \rho_{1i} \Delta KA_{t-i} + \sum_{i=0}^n \rho_{2i} \Delta reer_{t-i} + \sum_{i=0}^n \rho_{3i} \Delta MS_{t-i} + \sum_{i=0}^n \rho_{4i} \Delta Inf_{t-i} + \sum_{i=0}^n \rho_{5i} \Delta Oilp_{t-i} \\ & + \lambda_1 BOP_{t-1} + \lambda_2 reer_{t-1} + \lambda_3 MS_{t-1} + \lambda_4 Inf_{t-1} + \lambda_5 Oilp_{t-1} + u_{3t} \end{aligned} \quad (6)$$

ARDL bound testing procedure is based on the Wald statistics (F-statistics) for cointegration analysis. The null hypothesis of no cointegration is tested under the asymptotic distribution of the F-statistics. Given the ARDL model in equations 4, 5 and 6, the null and the alternative hypotheses can be expressed as follows:

$$\begin{aligned}
H_0 &= \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5; & H_1 &= \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \\
H_0 &= \omega_1 = \omega_2 = \omega_3 = \omega_4 = \omega_5; & H_1 &= \omega_1 \neq \omega_2 \neq \omega_3 \neq \omega_4 \neq \omega_5 \\
H_0 &= \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5; & H_1 &= \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5
\end{aligned}$$

Two sets of critical values were reported by Pesaran *et al* (2001) and Narayan (2005). One requires that all variables in the ARDL model are $I(0)$, while, the other is based on the assumptions that variables are $I(1)$. The null hypothesis of no cointegration would be rejected if the computed F-statistic exceeds the upper bound $[I(1)]$ of the critical value. However, if the falls below the lower bound, then the null hypothesis of no cointegration cannot be rejected. The test is inconclusive if the F-statistic falls between the within the bounds.

Although the ARDL model will show the existence of long run relationship among the variables, the short run dynamics of the model will be estimated using the error correction model (ECM). Engle and Granger (1987) suggest that ECM captures disequilibrium situation among the variables, mainly when combining variables that are stationary at levels and first difference. The error correction model for this study take the following forms:

$$\begin{aligned}
\Delta BOP_t &= \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta BOP_{t-i} + \sum_{i=0}^n \alpha_{2i} \Delta reer_{t-i} + \sum_{i=0}^n \alpha_{3i} \Delta MS_{t-i} + \sum_{i=0}^n \alpha_{4i} \Delta Inf_{t-i} + \sum_{i=0}^n \alpha_{5i} \Delta Oilp_{t-i} \\
&+ \eta_1 ECM_{t-1} + \nu_{1t} \\
\Delta CA_t &= \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta CA_{t-i} + \sum_{i=0}^n \beta_{2i} \Delta reer_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta MS_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta Inf_{t-i} + \sum_{i=0}^n \beta_{5i} \Delta Oilp_{t-i} \\
&+ \eta_2 ECM_{t-1} + \nu_{2t} \\
\Delta KA_t &= \rho_0 + \sum_{i=1}^n \rho_{1i} \Delta KA_{t-i} + \sum_{i=0}^n \rho_{2i} \Delta reer_{t-i} + \sum_{i=0}^n \rho_{3i} \Delta MS_{t-i} + \sum_{i=0}^n \rho_{4i} \Delta Inf_{t-i} + \sum_{i=0}^n \rho_{5i} \Delta Oilp_{t-i} \\
&+ \eta_3 ECM_{t-1} + \nu_{3t}
\end{aligned}$$

Where,

η_1, η_2 and η_3 are the parameters for the speed of adjustment. ECM_{t-1} is the lagged error correction term.

Data Sources and Measurement

The data used were obtained from various publications. Data on balance of payment, current account, capital account, money supply and inflation were obtained from the Central Bank of Nigeria statistical bulletin. The data on crude oil prices were collected from Energy Information Association (EIA). Crude oil prices are measured in dollars per barrel. Real effective exchange rate was obtained from International Monetary Fund's International Financial Statistics. The real

effective exchange rate was computed by adjusting for relative prices of home and foreign countries.

RESULTS AND DISCUSSION

Unit Root Test

The result of the unit root test is presented in table 3. All variables of interest are tested at level and first difference. Also, the series were tested at both constant as well as constant and trend. It was found that balance of payment (BOP), current account balance, (CA), capital account balance (KA) and inflation (Inf) were stationary at level. Other variables to be employed in the analysis, namely, real effective exchange rate (reer), money supply (MS) and oil price were stationary at first difference. Thus, the null hypothesis of non stationarity can be rejected at 5% significance level for BOP, CA, KA and Inf. However, we do not reject the null hypothesis of no stationarity for reer, ms and oilp at 5% significance level. The result obtained from the stationarity test indicate a combination of I(0) and I(1) variables in the series, hence, the autoregressive distributed lags approach to cointegration and the error correction model will be appropriate for this study.

Table 3: Augmented Dickey-Fuller Unit Root Test

| Series | Level Constant | Level Constant & trend | First Diff. Constant | First Diff. Constant & trend | Decisions |
|--------|-------------------|---------------------------|-------------------------|---------------------------------|-----------|
| BOP | -6.538798*** | -7.187913*** | -6.795366*** | -6.702335*** | I(0) |
| CA | -3.963145*** | -4.744578** | -7.011951*** | -6.909107*** | I(0) |
| KA | -3.908733*** | -3.829878*** | -8.335478*** | -5.807303 | I(0) |
| reer | -2.748511* | -3.050007 | -4.027470*** | -4.278916 | I(1) |
| MS | -2.753959* | -3.072233 | -7.402294*** | -7.286133*** | I(1) |
| Inf | -3.058519** | -3.316542* | -5.651128*** | -5.614566*** | I(0) |
| Oilp | -1.366384 | -1.909703 | -4.677168 | -4.575781 | I(1) |

*, **, *** represent statistical significance at 10%, 5% and 1% levels respectively.

Cointegration Test and Error Correction Model Estimation

The ARDL bound testing approach was used to test the existence of cointegration among the variables employed in the study. In addition, the error correction model was conducted to determine the short-run dynamics of the variables. The estimations were divided into three, based on the objectives of the study. Similarly, discussion of results are in three panels; namely,

panel A, B and C. First panel examines the relationship between balance of payment, real effective exchange rate, money supply, inflation and oil price. Second is on the relationship between current account, real effective exchange rate, money supply, inflation and oil price. The third panel investigates the relationship between capital account, real effective exchange rate, money supply, inflation and oil price.

In the ARDL results, the null hypothesis of no cointegration will be rejected if the F-statistics is higher than the upper bound. However, if the F-statistics is below the lower bound the null hypothesis of no cointegration cannot be rejected. The result will be inconclusive if the F-statistics is between the lower and upper bound.

Panel A

The analysis of the long-run relationship between balance of payment, real effective exchange rate, money supply, inflation and oil price gives the F-statistics of 9.94, which is above the upper bound of the Pesaran's table at 5% significance level (see Appendix A). This indicates the existence of long run relationship between balance of payment, real effective exchange rate, money supply, inflation and oil price. Hence, the null hypothesis of no long run relationship can be rejected.

Table 4: ARDL Bounds Test (E-view 9.5 output)

Null Hypothesis: No long-run relationships exist

| Test Statistic | Value | K |
|----------------|----------|---|
| F-statistic | 9.942793 | 4 |

The long run coefficients of the ARDL estimates are presented in table 5. In the estimate, balance of payment is the dependent variable. It can be observed that real effective exchange rate, inflation and oil price exert significant effect on balance of payment. Accordingly, the coefficients of the parameters suggest that a 10% appreciation of domestic currency leads 0.6% deterioration of balance of payment position. Inflation results to a deleterious effect of balance of payment. Its coefficient shows that a 10% increase in inflation, can worsen balance of payment position by 5%.

Noteworthy is the negative coefficient of the oil price, which is contrary to expectation since the country is an oil exporting economy. Here, a 10% increase in oil price can lead to about 1.6% deterioration of balance of payment. However, this value is only significant at 10%

level. This suggests that oil price increase has not led to substantial improvement in balance of payment of Nigeria.

Table 5: Long Run Coefficients
Dependent Variable: BOP

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|--------|
| REER | -0.058893 | 0.022727 | -2.591275 | 0.0236 |
| MS | 0.155254 | 0.257068 | 0.603940 | 0.5571 |
| INF | -0.505931 | 0.147741 | -3.424441 | 0.0050 |
| OILP | -0.159589 | 0.076591 | -2.083649 | 0.0592 |
| C | 18.350816 | 6.884676 | 2.665458 | 0.0206 |

The result of the short-run dynamic relationship between balance of payment, real effective exchange rate, money supply, inflation and oil price is presented in table 6. The result shows that inflation, three-period lag of real effective exchange rate and two-period lag of money supply are statistically significant at 1% and 5% levels, respectively. Although the coefficient of real effective exchange rate is negative in the first and second periods, it reveals a positive sign over is three-period lag. This implies that exchange rate appreciation would lead to decline in the balance of payment in the short-run while over time exchange rate appreciation tends to improve BOP. In line with the result obtained from the long-run coefficient, increase in inflation would lead to detrimental effect on balance of payment. The error correction coefficient is significant and of the right sign. It shows that about 90% of the disequilibrium in the previous year would be corrected in the current year. This implies a high speed of convergence to long-term equilibrium after a short term shock.

Table 6: ARDL Cointegrating and Long Run Form for BOP Model

| Dependent Variable: BOP Sample: 1980 2015 Included observations: 32 | | | | |
|---------------------------------------------------------------------------|-------------|------------|-------------|--------|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| D(REER) | 0.003887 | 0.017950 | 0.216567 | 0.8322 |
| D(REER(-1)) | -0.050502 | 0.024315 | -2.077025 | 0.0599 |
| D(REER(-2)) | -0.052297 | 0.024678 | -2.119223 | 0.0556 |
| D(REER(-3)) | 0.093763 | 0.016641 | 5.634396 | 0.0001 |
| D(MS) | 0.123474 | 0.152120 | 0.811684 | 0.4328 |
| D(MS(-1)) | 0.105790 | 0.162976 | 0.649115 | 0.5285 |
| D(MS(-2)) | -0.458701 | 0.193705 | -2.368047 | 0.0355 |

| | | | | |
|-------------|-----------|----------|-----------|--------|
| D(INF) | -0.451193 | 0.069660 | -6.477063 | 0.0000 |
| D(OILP) | 0.080185 | 0.082738 | 0.969145 | 0.3516 |
| D(OILP(-1)) | -0.030146 | 0.100070 | -0.301253 | 0.7684 |
| D(OILP(-2)) | 0.091414 | 0.082672 | 1.105748 | 0.2905 |
| CointEq(-1) | -0.908291 | 0.160972 | -5.642528 | 0.0001 |

Panel B

In panel B, the ARDL bound test on the relationship between current account balance, real effective exchange rate, money supply, inflation and oil price is presented in table 7. A long run relationship was obtained for the variables used. The result of the F-statistics is greater than the critical value of the upper bound in the Pesaran table (see appendix). Accordingly, the null hypothesis of no long-run relationship can be rejected at 1% level of significance.

Table 7: ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

| Test Statistic | Value | k |
|----------------|----------|---|
| F-statistic | 7.269522 | 4 |

The long run coefficients of the variables are depicted in table 8. Here, only real effective exchange rate exerts statistically significant effect on current account balance in Nigeria. This implies that a 10% appreciation in exchange rate reduces the current account balance by 0.5%. Hence, exchange rate appreciation would cause more deficits in the current account balance in Nigeria. Other determinants of current account balance used in the study, namely, money supply, inflation and oil price are not statistically significant at the conventional levels.

Table 8: Long Run Coefficients

Dependent Variable: Current account (CA)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|--------|
| REER | -0.046380 | 0.018804 | -2.466463 | 0.0203 |
| MS | -0.118184 | 0.247977 | -0.476592 | 0.6375 |
| INF | -0.186217 | 0.134864 | -1.380773 | 0.1787 |
| OILP | -0.005029 | 0.079449 | -0.063300 | 0.9500 |
| C | 17.685420 | 8.754684 | 2.020109 | 0.0534 |

Table 9 presents the estimates of the short-run dynamic relationship between current account balance and other variables of interest in this study. Similar to the long run result obtained, the real effective exchange rate shows a statistically significant effect on current account. Hence,

both in the short-run and long-run, exchange rate appreciation could affect the current account balance negatively. However, the magnitude of the long-run coefficient exceeds its short-run. Further, the coefficient of inflation in the result is negative and significant. This indicates that a rise in price level could adversely affect the current account position in the country. The error correction coefficient is significant and it has the right sign. The coefficient suggest about 73% of the disequilibrium in the previous year would be corrected in the current year.

Table 9: ARDL Cointegrating and Long Run Form

Dependent Variable: CA

Sample: 1980 2015

Included observations: 35

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|-------------|-------------|------------|-------------|--------|
| D(REER) | -0.034067 | 0.013698 | -2.487016 | 0.0194 |
| D(MS) | -0.086808 | 0.180198 | -0.481736 | 0.6339 |
| D(INF) | -0.269603 | 0.104337 | -2.583956 | 0.0155 |
| D(OILP) | 0.164822 | 0.114960 | 1.433734 | 0.1631 |
| CointEq(-1) | -0.734514 | 0.142154 | -5.167031 | 0.0000 |

Panel C

The discussions of the relationship between capital account, real effective exchange rate, money supply, inflation and oil price are presented in panel C. Table 10 shows the F-statistic of the ARDL model. The value of the F-statistic is greater than the upper bound of the critical value in the Pesaran's table (see appendix). Hence, the null hypothesis of no long-run relationship between the variables can be rejected at 1% significant level.

Table 10: ARDL Bounds Test

Null Hypothesis: No long-run relationships exist

| Test Statistic | Value | k |
|----------------|----------|---|
| F-statistic | 7.275471 | 4 |

Table 11 presents the long-run coefficients of the variables under study. Here, oil price exerts a statistically significant effect on capital account. The coefficient shows that a percentage increase in oil price leads to 0.14% increase in the country's capital account. However, other variables employed in the study, namely, real effective exchange rate, money supply and

inflation are not statistically significant at the conventional levels. The significance of the oil price in the nation economy and its contribution to the capital account are shown in these findings.

Table 11: Long Run Coefficients

Dependent Variable: Capital Account (KA)

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|--------|
| REER | 0.017261 | 0.015153 | 1.139139 | 0.2688 |
| MS | 0.192484 | 0.145905 | 1.319244 | 0.2028 |
| INF | 0.063862 | 0.087207 | 0.732306 | 0.4729 |
| OILP | 0.141197 | 0.049509 | 2.851935 | 0.0102 |
| C | -19.875330 | 5.069010 | -3.920949 | 0.0009 |

The result of the short-run dynamics and long-run form of the effect of real effective exchange rate, money supply, inflation and oil price on capital account is presented in table 12. A statistically significant relationship was obtained for real effective exchange rate and capital account at its three period lag. Contrary to theory, the positive coefficient of the real effective exchange rate at its third lag suggests that exchange rate appreciation could improve capital account position of the country. Although, the coefficients of real effective exchange rate are negative in the first and second lag, no statistically significant relationship was obtained. This suggests a moderate effect of exchange rate on capital account in the short-run. A high speed of adjustment was obtained in the model given the coefficient of the error correction term in table 12.

Table 12: ARDL Cointegrating and Long Run Form

Dependent Variable: KA

Sample: 1980 2015

Included observations: 35

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|-------------|-------------|------------|-------------|--------|
| D(REER) | 0.005761 | 0.022891 | 0.251684 | 0.8040 |
| D(REER(-1)) | -0.013311 | 0.035944 | -0.370330 | 0.7152 |
| D(REER(-2)) | -0.062997 | 0.034669 | -1.817123 | 0.0850 |
| D(REER(-3)) | 0.044344 | 0.021366 | 2.075405 | 0.0518 |
| D(MS) | 0.212721 | 0.156489 | 1.359332 | 0.1900 |

| | | | | |
|-------------|-----------|----------|-----------|--------|
| D(INF) | -0.066767 | 0.105396 | -0.633493 | 0.5340 |
| D(OILP) | -0.087165 | 0.098558 | -0.884402 | 0.3875 |
| D(OILP(-1)) | -0.151925 | 0.107882 | -1.408252 | 0.1752 |
| CointEq(-1) | -1.105135 | 0.202090 | -5.468533 | 0.0000 |

CONCLUSION

Theories and empirical studies have explained the role of exchange rate in the balance of payment position of a country. In this study, three equations were estimated by using ARDL procedure to examine the effect of exchange rate, money supply, inflation and oil price on the aggregate balance of payment, current account and capital account in Nigeria. The F-statistics obtained from the bound cointegration test shows a stable long run relationship among BOP, current account, capital account, exchange rate and other variables of interest.

The coefficients of the long run model show that a 10% appreciation in exchange rate would lead to 0.5% and 0.4% deterioration in the balance of payment and current account balance, respectively. However, the effect of exchange rate on capital account was not statistically significant. In the short-run error correction model, exchange rate was found to be statistically significant at various lags in the BOP equation and at level in the current account equation.

Nigeria's monetary authority efforts should be directed towards effective exchange rate management that would lead to favourable consequence on the balance payment position in the country.

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APPENDIX

Critical Value Bounds Test

| | | |
|--------------|----------|----------|
| Significance | I0 Bound | I1 Bound |
|--------------|----------|----------|

| | | |
|------|------|------|
| 10% | 2.45 | 3.52 |
| 5% | 2.86 | 4.01 |
| 2.5% | 3.25 | 4.49 |
| 1% | 3.74 | 5.06 |