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O.M. Fakiyesi

THE DEMAND FOR FOREIGN CURRENCIES IN NIGERIA:
AN EMPIRICAL ANALYSIS

Mrs. O. M. Fakiyesi *

Abstract

The effective management of the foreign reserves and the exchange market in Nigeria continue to pose challenges to the Central Bank of Nigeria. From inception to date and particularly after the structural adjustment programme of 1986, different foreign exchange policies had been formulated not only to reduce the demand for foreign currencies, but also to enhance the supply and conserve the level of international reserves. These policies achieved varying degrees of success. Against this background, this paper utilized the error correction framework in identifying relevant factors that impact on the demand for foreign currencies in Nigeria. The essence of our results was that the demand for foreign currency in Nigeria was a stable function in the long run of past levels of demand, the level of liquidity, lagged values of the real exchange rates and the premium between the autonomous and parallel exchange rates, the level of international transactions measured through the current account balance, the domestic inflation rate and the real treasury bill rates in Nigeria.

INTRODUCTION

In Nigeria the annual disbursement of foreign exchange increased from $0.9 billion in 1970 to an all time high of $25.3 billion in 1981 and thereafter declined to $13.0 billion in 2002. Conversely, foreign exchange inflows into the country via proceeds on export of goods and services, foreign capital inflow such as loans and investments, unrequited transfers, and interests on international reserves measured through the overall balance of payments had been predominantly negative fluctuating between $-1994.0 billion in 1992 and US$23.6 billion in 1997 when it attained its peak.

A major implication of the substantial net outflow is the continuous drain on international reserves. Substantial foreign debt payments had accumulated over the years, which increased debt servicing obligations, and exerted pressures on reserves. The economy was further characterized by depreciation of the naira/dollar exchange rate from ₦0.7143 in 1970 through ₦81.59 in 1996 to ₦128.14 in 2002. This fed into higher prices of

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***Mrs. O.M. Fakiyesi** is an Assistant Director, Governor's Office Department, Central Bank of Nigeria, Abuja. The author is particularly indebted to Dr O.J. Nnanna and Dr. A.F. Odusola, for helpful comments on earlier drafts.

imports, while prices of exports declined and worsened non-oil exports, which had not been particularly impressive, as the economy remained largely dependent on the oil sector. In addition, low levels of domestic real interest rates discouraged exporters from repatriating their earnings, while households lost their confidence in the naira and capital flight ensued as the limited resources were diverted to private foreign deposit accounts.

Various policies were introduced to stem the high demand for foreign currencies, guard against the rapid depletion of external reserves, discourage the accumulation of payments arrears, reduce incidences of capital flight and restore confidence in the national currency. Specifically, trade and exchange controls were abolished in Nigeria with the introduction of the Structural Adjustment Programme in 1986 to free the market from rigidities that had hitherto permitted misallocation of resources, allow the determination of the exchange rate by market forces, and address the issue of the overvaluation of the naira. The Second Tier Foreign Exchange Market (SFEM) was introduced along with the liberalization of the external sector and had gone through various stages of metamorphosis including the Interbank Foreign Exchange Market (IFEM) to the present-day Dutch Auction System. Further liberalization of the external sector entailed the suspensions on open accounts and bills for collection that were introduced in 1994. These were subsequently lifted in 1997 in addition to limits on basic and business travel allowances, and expatriate home remittances. Export Processing Zones were also created to diversify and enhance the foreign exchange base as well as stimulate the non-oil sector. Other incentives to promote exports were the duty drawback, the manufacture-in-bond schemes, and the establishment of the Nigerian Export-Import Bank (NEXIM) all aimed at increasing the supply of foreign exchange and reducing the pressures on the market.

The policies achieved limited success due in the main, to the lack of adequate policy coordination and a conducive environment. The country was yet to achieve internal and external balance as the volume of transactions in the foreign exchange market grew tremendously over the years without corresponding growth in economic activities measured by the national product. This had posed a continuous challenge to the effective management of the foreign reserves, a primary mandate of the Central Bank of Nigeria (CBN). The tendency known as round-tripping was for the deposit money banks to buy available foreign currencies from the CBN, at a lower rate and dispose of same at a premium on the parallel market thus making abnormal profits at the cost of real developments of the economy. Banks had also been involved in the use of free-funds whereby end-users under-invoice imports, pay lower duties, or move illegal funds across borders.

In this context, the objectives of this study were to identify the determinants of demand for foreign currencies in Nigeria, and investigate the stability of the demand for foreign currency function. This was premised on the provision of adequate policy recommendations that would keep demand for foreign currencies within tolerable limits. To that end, monthly data on demand for foreign currencies specified in the US dollar on the autonomous market for the period January 1996 to December 2002 were analyzed.

This paper was structured as follows. Immediately after the introduction, Section II reviewed the literature underpinning our study. Section III described the methodology while Section IV presented and analyzed the results of our findings. The conclusions and policy implications of the study were contained in section V.

2.0   THEORETICAL BACKGROUND AND LITERATURE REVIEW

The prices of a domestic currency in terms of other foreign currencies are usually established in the foreign exchange market thus enabling companies, fund managers and banks buy and sell foreign currencies. The motivations behind the demand for foreign currencies include capital flows arising from transactions to settle payments from international trade. In this context, the demand for foreign exchange is hinged on its function as a medium of exchange. Second, in countries with high and variable inflation, the domestic currency may be a poor store of value. Good substitutes in such countries are foreign currencies held to protect real wealth. Third, investors in foreign currency denominated assets such as US equities and bonds demand foreign currency as a direct hedge for the exchange risk associated with anticipated foreign currency liabilities or to reduce the overall variability of investment portfolio in the domestic currency These stimuli form the basis for the transactions, precautionary and speculative demand for foreign currency.

The demand for foreign currency as a means of payment, a hedge in currency substitution, or as an investment choice depends on a number of factors. These are identified in the literature as the level of national output, the rate of inflation, real interest rate, changes in national wealth measured through the current account, financial risk and political risk. Increases in national output, under conditions of rigidities in domestic production, feed into higher levels of imports to generate higher demand for foreign currency and depreciate

the exchange rate. When the rate of inflation rises, domestic prices increases relative to foreign prices and imports become cheaper but exports are uncompetitive and the exchange rate depreciates. Similarly, an increase in domestic interest rates relative to foreign interest rate will tend to allow an appreciation of the exchange rate.

The foreign exchange market literature is replete with various models of exchange rate determination that had been propounded and empirically tested. These models include the monetary interpretation of exchange rate determination under which exchange rates are deemed to move promptly to maintain international linkage of prices without corresponding changes in terms of trade. The model established that relative changes in money supply, interest rates and real income affect the exchange rate. Most of the empirical evidence were predicated on flexible and sticky commodity prices Bilson (1978). Flaws were, however, identified in this theory of exchange rate determination as it ignored factors considered important to exchange rate determination such as changes in current account and expected price changes Dornbusch (1980). A variant of the earlier model known as the portfolio-balance approach was developed and tested as it assumed imperfect capital substitutability Rodriguez (1980). The Mundell-Fleming model later emerged as the modern asset approach to exchange rate determination and was hinged on perfect capital mobility. The model assumed that domestic prices are fixed in home currencies so that the exchange rate sets the terms of trade Frenkel (1980).

Aside from models on exchange rate determination, a number of models had highlighted the dynamics behind currency crisis. These models explained why countries abandon an exchange rate regime in favour of another regime. They emphasized bad economic fundamentals, the role of speculative agents in precipitating a currency crisis, and the contagion effect in otherwise solid currency arrangements.

Specifically on the Nigerian economy, Essien (1984) identified the determinants of imports from the European Community, Japan and the United States. which were price inelastic Using annual series covering the period 1975 – 1982. Nnanna (1985) estimated the elasticity of demand for foreign exchange and the exchange rate of the naira to decide if devaluation is an effective policy for reducing the level of imports or the pressure on the foreign exchange budget in the economy. His results suggested that a downward adjustment in the nominal naira/dollar exchange rate would permit a minimal reduction in the demand for foreign currency. Money supply on the other hand was found to be significant in explaining fluctuations in demand for foreign currencies. Aizenman (2003)

revealed that sovereign risk and costly tax collection to cover fiscal liabilities led to a relatively large precautionary demand for international reserves in the Far East.

3.0   METHODOLOGY

A cointegration time series analysis was utilized to determine the existence or otherwise of a long run equilibrium relationship between demand for foreign currencies defined here in terms of the US dollar balances and the explanatory variables. For ease of presentation, the data on demand for foreign currencies in Nigeria dm_t was available only for the US dollar as all other currencies were converted into this unit of measurement. The dependent variable was in real terms as it was deflated by the inflation rate in the US. The long-run currency demand equation and the expected signs of the coefficients are specified as:

$$dm_t = f(m_t \quad e_t \quad pm_t \quad r_{ust} \quad r_{nt} \quad f_{nt} \quad cab) \quad \text{..............................} \quad (1)$$
$$ + \quad\;\; - \quad\;\; + \quad\;\; + \quad\;\; - \quad\;\; + \quad\;\; -$$

where dm_t is real dollar balances, m_t is real money balances a measure of liquidity at time t. Similar to the demand for money literature, broad money supply was used in this analysis to capture the speculative demand for foreign currencies in Nigeria. The real exchange rate e_t defined as the naira/dollar exchange rate multiplied by the relative consumer price index (CPI) for the US to the Nigeria CPI with the same base year 1995 was included as an explanatory variable based on the notion that Nigerians hold foreign currencies as a hedge against real depreciation of the naira. The real premium between the parallel and autonomous exchange rates pm_t was defined as the difference between the real autonomous and parallel exchange rates. Real interest rates on United States treasury bills r_{ust} measured the profitability of holding foreign currencies while the opportunity costs were the real interest rates on Nigerian Treasury Bills r_{nt} and the Nigerian rate of inflation f_{nt}. The real current account balance cab_t was included to measure the transactions demand for foreign currencies

Each of the variables was tested for stationarity using the Phillips-Perron unit root test with the Engle-Granger test conducted to determine the presence or otherwise of cointegration amongst the variables. The null hypothesis of the study was that the demand for foreign currencies in Nigeria was unstable.

Notationally:

H_o = demand for foreign currencies was unstable
H_A = demand for foreign currencies was stable.

Where we accepted the alternative hypothesis that the variables satisfy the standard Engel-Granger (1987) conditions, we held that a long-run relationship was confirmed by the stationarity of the undifferenced residual series. The error correction model was consequently determined to study the short-run dynamics of the relationship.

The demand for foreign currencies in Nigeria might probably be dependent on the lagged values of the endogenous as well as the exogenous variables, consequently the appropriate lag structure of the equation was specified using the general to specific procedures.

The data on m_t, e_t, pm_t and dm_t were obtained from sources within the CBN while data on the United States and Nigerian consumer price index, and treasury bill rates r_{ust}, r_{nt}, f_{nt} were sourced from International Financial Statistics (IFS) via the internet. The annual current account balance cab_t was disaggregated using monthly export figures obtained from IFS tables and complemented by data from the Research Department of the CBN.

4.0   PRESENTATION AND ANALYSIS OF RESULTS

The Phillips-Perron unit root test indicated that all the variables were I(1) series at the 99 percent confidence level thus satisfying the Engel-Granger (1987) condition for cointegration. The result of the static regression model is specified below:

$$
\begin{aligned}
dm_t = \quad & 0.2313 \; + \; 0.0014 m_t \; - \; 0.0545 e_t \; - \; 0.0269 pm_t \; + \; 0.2062 r_{ust} \; + \; 0.045 r_{nt} \\
& (0.10) \qquad (7.79) \qquad\;\; (1.54) \qquad\quad (0.55) \qquad\quad (1.47) \qquad\quad (0.96) \\
& + \; 0.0778 f_{nt} \; - \; 0.0749 cab_t \qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad (2) \\
& \;\;\; (1.1) \qquad\;\; (1.51)
\end{aligned}
$$

R^2 = 0.8378
Adj. R^2 = 0.8228
DW   = 1.834
 F   = 56.0714

where the variables are as earlier defined, and the figures in parenthesis are the student t values.

From the result, the cointegrating Durbin Watson statistic was higher than the co-efficient of determination (R^2) thus it cannot be spurious. The result also indicated that in the short run five of the explanatory variables were correctly signed which were the level of money supply m_t; the real exchange rate e_t, the real treasury bill rate in the United States r_{ust}; the level of inflation in the country f_{rt}; and the current account balance cab_t. In line with apriori expectations and the findings of Nnanna (1985) the level of real money balances was very significant in the determination of demand for foreign currencies even at the 99 percent confidence level. Other variables that exerted weak form influences on the demand function were the real exchange rate, the rate of interest on US treasury bills, and the current account balance. A contradictory implication of the result was that the higher the level of real interests in Nigeria, the higher the demand for foreign currency suggesting that real interest rates do not send adequate signals on economic fundamentals. Rather, economic agents interpret changes in real interest rates as pointers to further weakening of the naira.

Next, the existence of a long-run equilibrium relationship was tested based on the Engel-Granger tests on the generated residuals series. The residual series were stationary at level further assuring convergence and satisfying the criteria for using the error correction model. With this result we rejected the null hypothesis that the demand for foreign currencies in Nigeria was unstable and accepted the alternative hypothesis of presence of cointegration in the variables even at the 99 percent confidence level.

The appropriate lag structure of the model was subsequently analyzed based on the general to the specific simplification procedures using the first difference of all the variables and lags of up to three months and utilizing the Wald coefficient restrictions test as insignificant variables were eliminated. In addition, the lagged error term (ECM) was included and estimated using ordinary least squares (OLS). After eliminating insignificant variables we obtained the parsimonious long-run demand for foreign currency in Nigeria with lagged dependent variable as follows:

$ddm_t =$ $\quad$ - 0.1082 + $\quad$ 0.2184 $ddm_t(-1)$ + 0.0007dm_t + 0.1495$de_t(-3)$ - 0.1297$dpm_t(-3)$
$\quad\quad\quad\quad\quad$ (1.54) $\quad\quad\quad$ (2.20) $\quad\quad\quad\quad$ (2.34) $\quad\quad\quad\quad$ (2.89) $\quad\quad\quad$ (3.49)

$\quad\quad\quad\quad\quad$ + 0.1181r_{nt} + 0.1097$r_{nt}(-2)$ + 0.1353df_{nt} $\quad$ -0.1516$df_{nt}(-1)$ + 0.1243$df_{nt}(-2)$
$\quad\quad\quad\quad\quad\quad$ (1.93) $\quad\quad\quad$ (2.90) $\quad\quad\quad\quad$ (2.05) $\quad\quad\quad\quad$ (2.23) $\quad\quad\quad\quad$ (3.1)

$\quad\quad\quad\quad$ - 0.089$dcab_t$ - 0.0778$dcab_t(-3)$ – 0.703 $\quad ECM(-1)$ .... $\quad\quad$ (3)
$\quad\quad\quad\quad\quad$ (2.02) $\quad\quad\quad$ (1.75) $\quad\quad\quad\quad$ (8.84)

$\quad\quad\quad$ R^2 = 0.65
$\quad\quad$ Adj. R^2 = 0.59
$\quad\quad\quad$ DW = 1.75
$\quad\quad\quad\quad$ F = 10.45

$\quad\quad$ where $ddm_t =$ $\quad$ first difference of the real dollar balances
$\quad$ dm_t $\quad\quad$ = $\quad\quad$ first difference of real money balances
$\quad$ de_t $\quad\quad\quad$ = $\quad\quad$ first difference of the real exchange rate
$\quad$ dpm_t $\quad\quad$ = $\quad\quad$ first difference in the real premium between the official and the
$\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ parallel market rate, etc.
$\quad$ ECM $\quad\quad$ = $\quad\quad$ error correction model

From the result, in the long-run the immediate past information on the level of demand for foreign currencies; the current level of liquidity; the 3 months lagged real exchange rate and premium between the official and the parallel market rates; past values of the real Nigerian treasury bill rate; recent and past trends in inflationary pressures; as well as the current account balance; drove the currency market. All the variables were found significant at the 99 percent confidence level in explaining variations in the demand for foreign currencies in Nigeria. The result confirmed our earlier notion that increased liquidity fed directly into the foreign exchange market. The fact that past information on the real exchange rate and the premium between the autonomous and the parallel market rates impacted on current demand in the currency market might be indicative of market inefficiency. The higher the level of real interest rates on Nigerian treasury bills the higher the demand for foreign currency. Clearly, interest rates do not send accurate signals to market operators. The effect of general price increases confirmed the notion that residents hedged against expected depreciation in the domestic currency by holding foreign currencies.

The dynamic model performed relatively well with R² value of 0.65 and adjusted R² of approximately 0.59 indicating that 65 percent of the variations in the demand for foreign currencies were explained by fluctuations in the specified explanatory variables. The lagged residual term, measured by the $ECM(-1)$ apart from being significant had the expected negative coefficient of –0.703. The coefficient was lower than 1 in absolute value, indicating that the adjustment process was stable and that *ddm* adjusted toward its long-run value in less than a month.

The Jarque-Bera test confirmed normality and the ARCH test rejected heteroskedasticity in the disturbance term. The RESET (1) and RESET (4) tests accepted the null hypothesis of no general misspecification in the models. The stability of the long-run demand for foreign currencies equation was tested on the basis of the Chow Forecast F-test and the results supported the assumption of stability. The stability of the model was also confirmed based on the recursive residuals, and the one-step-ahead forecast errors for large sample size. Where the model was stable, the recursive residuals were expected to have a zero mean and constant variance.

5.0   CONCLUSION

The demand for foreign currencies in Nigeria has been shown to be a stable function in the long run of past information on demand, the level of liquidity, and the current account balance. Clearly these variables explained the transactions demand for foreign currencies in the country. The significance of inflationary pressures confirmed that residents protect their real wealth by hedging in foreign currencies. Other significant variables were the 3 months lagged real exchange rate and premium between the official and the parallel market rates, past values of the real Nigerian treasury bill rate. The real US interest rate though it exerted some weak form influence in the short-run was insignificant in the long-run indicating that Nigerian investors do not consider the marginal fluctuations in this variable in reducing overall variability of investment choices.

The policy implications of our results are that in the short-run keeping growth in liquidity within tolerable limits can significantly reduce pressures on the demand for foreign currencies in Nigeria. Furthermore, as anticipated, the higher the real exchange rate as well as the current account balance, the lower the demand for dollar balances. Thus

efforts must aim at stimulating exports and achieving internal balance. An exogenous consideration, however, in the short-run was the level of real US treasury bill rates that had minimal effects on demand for dollar balances.

In the long run, enhanced foreign exchange market efficiency by the CBN such that past information on the level of demand did not impact on current demand would reduce pressures on the market. Fiscal prudence guaranteed to keep growth in liquidity in abeyance to achieve low inflationary rates would further curtail demand. Managing the premium between the parallel and the autonomous exchange rate to low or even negative levels and allowing real interest rates to adequately send signals to market operators were identified as viable policy options. Stimulation of growth in exports to enhance current account balance that would render the external sector more buoyant and reduce pressures on the balance of payments could also be emphasised.

We hope that this study would stimulate more work in this important area to provide a road map for effective foreign currency market management.

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