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FOREIGN EXCHANGE MARKET PRESSURE AND FINANCIAL DEVELOPMENT IN NIGERIA

Ojapinwa, T. V.
Department of Economics,
University of Lagos, Lagos-Nigeria

Rotinwa, B. O.
Department of Economics,
University of Lagos, Lagos-Nigeria

Abstract

Despite the increasing pressure on the domestic currency that has culminated into both the loss of international reserves and nominal value of currency over the years in Nigeria, the effect of the phenomena on financial development has not been adequately studied. Within Dornbusch's (1976) overshooting model which establishes that, large foreign exchange rate fluctuations may be detrimental to economic performance; this study analyzes the effect of exchange market pressure on financial development in Nigeria. The study employs annual time series dataset from 1960 to 2015. Empirical findings from autoregressive distributed lag (ARDL) and vector error correction models suggest that, exchange market pressure has resulted into financial sector disequilibrium overtime in Nigeria. To bridge this demand and supply of foreign exchange gap, government may need to adopt measures such as economic diversification anchored on comparative advantage. This policy may naturally lead to boosting of domestic investment, export oriented strategy and reduces the pressure in the financial sector of Nigeria economy.

Key words: Foreign Exchange, Financial Development, Market, Pressure, Nigeria

1. Introduction

The international markets' environment has experienced substantial changes in the form of extreme unpredictability in exchange rates, greater capital mobility and a series of worldwide financial crises during the last couple of decades. Many of the most dramatic financial collapses in middle income developing countries during recent years, including the Mexican crisis, Asian crisis and the Argentine crisis, included a breakdown of the domestic financial system as an important component. There is a widespread contention that currency collapses in the developing countries is one of the main sources of reserve and nominal currency loss in the countries. Currency collapses are, by definition, the result of an excessive pressure in the exchange markets, the determinants of which, as well as its consequences in terms of economic performance, have been a matter of study for several decades now. Since the currency market imbalance that the exchange market pressure (EMP) gauges is unobservable in a direct manner, EMP has been traditionally measured according to the adjustments that are necessary to correct such imbalance (García and Malet, 2005; Agarwal, 2012).

Maybe the most known amongst those measures is the one proposed by Girton and Roper (1977) (G-R hereafter). These authors calculate EMP as 'the volume of intervention necessary to achieve any desired exchange rate target', such intervention being understood as either currency market operations or adjustments in the exchange rate (or both). Thus, EMP is measured as the loss of nominal value of the domestic currency (adjustment via price) plus the loss of foreign exchange reserves of the domestic monetary authority (adjustment via quantity). G-R derived this particular measure of EMP from a monetary model – a model of the supply and demand for domestic currency. This model suggests that there is a relationship between financial system and EMP and between output growth and EMP. In spite of the presence of credit in the monetary model – and despite the fact that some second-generation models of currency crises had highlighted the influence of weak financial system on the probability of suffering a financial crisis – the empirical studies about EMP performed in the 1990s and beyond, tend to omit the financial system stability variable. The objective of this paper is to evaluate the episodes of the pressure in the foreign exchange market and provide empirical evidence on its impact on financial development in Nigeria. This is owing to the importance of foreign exchange in international economic transactions in Nigeria. The obvious downside of such omission is the risk of bias in the results regarding the relations between financial

Correspondence concerning this article should be addressed to Ojapinwa, Department of Economics, University of Lagos, Lagos-Nigeria (e-mail: ojapinwa@yahoo.com)

development and EMP; and, in general, an excessive simplification of the events surrounding a financial crisis.

Financial development, which stability depends on the disequilibrium arising as a result of excess demand of foreign currency, is a process of reducing the costs development of acquiring information, enforcing contracts, and making transactions (IBRD, 2015). Financial development occurs when financial instruments, markets and intermediaries ease the effects of information, enforcement and transactions cost, as well as provide the key functions of the financial sector in the economy. This is really important, as it plays a massive role in economic development. It promotes economic growth through capital accumulation and technological progress by increasing the savings rate, mobilizing and pooling savings, producing information about investment, facilitating and encouraging the inflows of foreign capital and optimizing the allocation of capital (World Bank, 2017).

This study is justified on the ground that empirical evidence on the subject matter is still sparse in most developing and emerging economies. Exchange rate fluctuations have important implications for macroeconomic management as they impact key variables such as trade balance, domestic output, unemployment and inflation. However, EMP and its possible effects is important for effective management of the macro economy, particularly for emerging economies like Nigeria because it occurs through an international-spill over channel and it entails understanding the role of domestic and external factors, international capital flows, and capital controls. Considering the fact that a fast depreciating local currency can create instability within macroeconomic variables, which can serve as a hindrance to the growth of any nation, it is pertinent to evaluate the connection that exists between EMP and financial development, as financial development plays a crucial role in the overall development of a nation. In this regard, the rest of the paper is organized into five sections. Following the introduction, is a review of literature. Section3is the theoretical framework and methodology. 4describes the. Section 4presents and discusses the results and section 5concludes with proposed policy implications.

2. Literature Review

2.1 Conceptual Review of Exchange Market Pressure

Exchange market pressure can be traced to Girton and Roper (1977), who introduced a monetary model of the pressure and applied it to the post-war Canadian dollar. The index was measured as the sum of exchange rate change and change in international reserves, scaled by base money. In the context of a monetary approach to balance of payments, exchange rate and international reserves influence the equilibrium, both in the money market and the foreign exchange market. Girton and Roper (1977) showed how excess demand on foreign currency can cause changes in the price of foreign exchange and alter the position of foreign reserves. Weymark (1995; 1998) derived EMP through a small open economy model and established a model-independent definition of EMP. She stressed that EMP is not synonymous with the exchange rate that would have been observed under a pure float because expectations associated with a pure float will differ than those held under the policy actually implemented. Weymark further asserted that EMP is 'therefore best viewed as a measure of the size of external balance, and, as such, is a useful measure of the magnitude of speculative attacks'. This model-free definition of EMP became generally adopted in the EMP literature. However, Weymark (1998) also concluded that structural EMP measures remain model specific and, thus, suffer from the limitations of the underlying model. According to her, 'EMP measures the total excess demand for a currency in international markets as the exchange rate change that would have been required to remove this excess demand in the absence of exchange market intervention, given the expectations generated by the exchange rate policy actually implemented'.

A further contribution made by Eichengreen, Rose and Wyplosz (1995) is the inclusion of interest rate as a component element of EMP. They argued that a high increase in interest rate is a form of central bank response to speculative attacks, which demonstrates the pressure experienced by the domestic economy. This definition implies a direct observable measure of EMP in situation whereby the domestic currency is freely floating. Therefore, EMP is often measured as a weighted sum of exchange rate

depreciation, interest rate differentials and international reserve loss and is frequently applied to the analysis of emerging market currencies and crisis identification.

According to Aizenman et al. (2015), external factors and domestic factors play a significant role in driving exchange market pressure for emerging market countries, with a larger impact. These factors can either emanate from the demand or supply side. The external demand factors include interest rate, current account position, domestic inflation, changes in a country's income, monetary and fiscal policies and contagion effects while the supply factors are capital reversal and domestic credit changes (CBN, 2016).

For the domestic factors, import dependence, foreign debt and interest rate affects the intensity of the pressure in the foreign exchange market from the demand side while political stability and commodity prices affects from the supply side (CBN, 2016).When exchange market pressure is attributed to massive capital outflow, the currency of the domestic economy is expected to depreciate demand for foreign currency, while if it is attributed to massive capital inflow, the currency of the domestic economy is expected to appreciate due to increased demand for domestic currency and reduced demand for foreign currency (CBN, 2016).

EMP affects Gross Domestic Product and its growth, with reference to expenditure side, output comprise: consumption, investment, government operations and net exports. EMP may have positive or negative effects on economic growth depending on the workings of the economy. When EMP arises as a result of massive capital outflow, exports of an economy becomes relatively cheaper, thereby improving its competitiveness in the international market. Imports, on the other hand, become more expensive for domestic consumers. In other words, EMP helps to increase the demand for the country's exports and switches demand towards domestically produced goods thereby reducing imports (CBN, 2016).

It also affects inflation through the exchange rate channel. Taking a scenario where a surge in capital inflow leads to nominal exchange rate appreciation, EMP would lead to low inflation as imports are perceived to be less expensive. If EMP occurs when foreign investors repatriate their currencies (capital reversal) or when they stop bringing in their currencies suddenly (sudden stops), the foreign exchange market may come under pressure depreciating the domestic currency. If the country has a strong export sector, competitiveness of export goods may improve. However, a high import demand would lead to a transfer of foreign prices to the domestic economy worsening the value of the domestic currency.

EMP influences gross domestic investment and foreign investment through the capital flows channel. It leads to sudden changes in the prices of assets which in turn poses a threat to financial stability of the economy. When EMP arises as a result of massive capital outflow, foreign investment reduces, particularly portfolio investment which is more liquid and can be moved faster than direct investment. Alternatively, when capital inflow in terms of portfolio and direct investment results to EMP, foreign investment increases (CBN, 2016).

2.2 Conceptual Review of Financial Development

According to IMF (2016), financial development is a multidimensional process. With the passage of time, financial sectors have evolved across the globe and modern financial systems have become multifaceted. For example, while banks are typically the largest and most important, investment banks, insurance companies, mutual funds, pension funds, venture capital firms, and many other types of nonbank financial institutions now play substantive roles. Similarly, financial markets have developed in ways that allow individuals and firms to diversify their savings, and firms can now raise money through stocks, bonds, and wholesale money markets, by-passing traditional bank lending. The constellation of such financial institutions and markets facilitates the provision of financial services.

A financial system consists of financial institutions, commercial banks and financial markets (e.g. stock and bond markets). At a broader level, a robust and efficient financial system promotes growth by channelling resources to their most productive uses and fostering a more efficient allocation of resources. A stronger and better financial system

can also lift growth by boosting the aggregate savings rate and investment rate, speeding up the accumulation of physical capital. Financial development also promotes growth by strengthening competition and stimulating innovative activities that foster dynamic efficiency (Agarwal, 2012).

Financial sector development in developing countries and emerging markets is part of the private sector development strategy to stimulate economic growth and reduce poverty (Wikipedia, 2017). Financial development takes place when financial instruments, markets and intermediaries work together to reduce the cost of information, enforcement and transactions. A solid and well-functioning financial sector is a powerful engine behind economic growth. It generates local savings, which in turn lead to productive investments in local business. The financial sector provides the rudiments for income growth and job creation.

2.3 Theoretical Review

2.3.1 Flow- Oriented Model

Flow-oriented model developed by Dornbusch and Fisher (1980), assumes that a country's current account and trade balance performance are two important factors of exchange rate determination, hence, stock prices and exchange rates are positively related. This model claims that changes in exchange rates alter the international competitiveness of a firm as well as the balance of trade position, and thus exchange rate changes affect real income and output in a country. Share prices of companies are influenced by exchange rate changes and future cash flows of firms. This implies that exchange rate changes lead to stock price returns, and that they are positively correlated.

The model maintains that a causal relationship runs from the exchange rate to the stock prices. In other words, exchange rate movements affect the stock prices. Exchange rate changes affect the competitiveness of firms through their impact on input and output prices (Joseph 2002). When the exchange rate appreciates, exporters will be negatively affected. An appreciation of the currency will cause their goods and services to be dearer on the international market. This will cause their exports to decline, as they will be seen as expensive by buyers on the international market. This will result in them losing competitiveness internationally. Consequently, their profits will decline and if profits decrease the firms will lose competitiveness on the domestic stock market. Their attractiveness on the domestic stock market will decrease and this will result in their stock prices decreasing in value. Resultantly, a negative relation between domestic currency and stock price can be confirmed.

2.3.2 Stock-Oriented Model

Stock-oriented model emphasizes the capital account as the major determinant of exchange rate. This model which was developed by Branson and Frankel (1983), show exchange rates as serving the supply and demand for financial assets such as stocks and bonds. This approach suggests that an increase in stock prices induces investors to demand more domestic assets and thereby causes an appreciation in the domestic currency, implying that stock prices lead exchange rates and that they are negatively related. The appreciation of the domestic currency attracts more foreign capital and investments into the domestic market, which then leads to further currency appreciation. There are two subsets in this category, namely monetary models and portfolio balance models**.**

Monetary Models of Exchange Rates

Monetary models seek to explain how changes in the domestic and foreign supply and demand for money, both directly and indirectly, influence the exchange rate. The monetary model of exchange rate determination is more classical in spirit, in that prices are assumed to be flexible also in the short run. The essential elements of the monetary theory of exchange rates are best illustrated with a variant of the log-linear Cagan-type flexible price two-country model. The domestic money supply, m^s_t, is assumed to be exogenous and completely controlled by the central bank. The demand for money, m^d_t, is assumed to depend on price level, p_t, real income, y_t, and the level of nominal interest rate, i_t. The real demand for money varies positively with the level of income and negatively with the level of interest rate. Both the income elasticity, β_1, and interest rate semi-elasticity, β_2, of the demand for money are assumed to be the same in both the domestic and foreign countries. The foreign country is assumed to be identical to the domestic country. With foreign variables denoted by an asterisk and all variables except interest rates expressed

in logarithms, monetary equilibria equating supply and demand for money in the domestic and foreign country respectively are given by;

$$m_t^s = m_t^d = p_t + \beta_1 y_t - \beta_2 i_t \quad (2.1)$$

$$m_t^{s*} = m_t^{d*} = P_t^* + \beta_1 y_t^* - \beta_2 i_t^* \quad (2.2)$$

The purchasing power parity;

$$e_t = p_t - p_t^* \quad (2.3)$$

The uncovered interest-rate parity holds continuously;

$$i_t = i_t^* + E_t(e_{t+1}) - e_t \quad (2.4)$$

The notation $E_t(e_{t+1})$ represents the value that the rational market participants expect the domestic currency to take in period t+1,conditional on the information available in period t. Uncovered interest-rate parity in equation (2.4) means that if the foreign exchange market is efficient and the market participants risk neutral and if for example domestic currency is expected to appreciate, the expected foreign exchange gain from holding domestic rather than foreign currency must be exactly offset by the opportunity cost of holding funds in domestic rather than foreign currency. This is to say that, in the flexible-price monetary model, domestic and foreign assets are freely traded perfect substitutes. Thus, the domestic and foreign bond markets are regarded as a single market, which implies that foreign exchange policy conducted through unsterilized foreign exchange interventions, and monetary policy conducted through money market interventions, cannot be separated.

The implications of the model is that current and expected domestic and foreign money supplies determine current and expected domestic and foreign price levels and changes in current and expected relative price levels determine changes in the current exchange rate, which implies that current and expected domestic and foreign money supplies determine current changes in the exchange rate. The real variables influence the exchange rate only indirectly through changes in the demand for domestic money. Interest rate differentials between domestic and foreign bonds only reflect expected changes in the future exchange rate and hence in future domestic and foreign money supplies.

Portfolio Balance Models

At the same time that the monetary theory of exchange rate determination was being developed, an alternative model based on financial portfolio-balance analysis was being developed. McKinnon and Oates (1966) extended the Mundell-Fleming model by replacing the formulation in which capital flows were determined by the flows of foreign exchange passing through the foreign exchange market, by a new, more realistic specification where capital flows are a consequence of adaptations to stocks of financial assets. This means that the necessary condition for equilibrium is that outstanding stocks of national monies and other financial assets is willingly held by the market participants at the equilibrium market price. Furthermore, the central role of wealth variables was recognized; individuals allocate their wealth among domestic and foreign monies and bonds, and money demand depends not only on income, but also on wealth and interest rates. Shifts in the international distribution of wealth induced, for example, by current account imbalances create shifts in relative asset demands. The asset markets are rebalanced with a change in the exchange rate. Therefore, the current account plays a prominent role in exchange rate determination. On the other hand, exchange rate changes affect the trade balance and current account and hence net foreign assets. Thus the portfolio-balance model describes a dynamic feedback mechanism between foreign asset accumulation and exchange rates. The feedback mechanism continues to operate until the current account is in balance and the change in net foreign assets is zero.

2.3.3 Dornbusch Overshooting Hypothesis

A key assumption in economics is the rationality in behaviour of economic agents. Dornbusch (1976) extends the Mundell-Fleming model of exchange rate dynamic in an open economy with perfect capital mobility to include rational expectations. The hypothesis states that in an open economy where the economic agents have rational expectations, the nominal exchange rate can overshoot its value in the long run. Rogoff (2002) explains the Dornbusch overshooting model with two relationships as follows;

$$i_{t+1} = i^* + E_t(e_{t+1} - e_t) \quad (2.5)$$

The uncovered interest rate parity is depicted by equation (2.5), where i_{t+1} is domestic interest rate, i^* is the foreign interest rate, $E_t(e_{t+1} - e_t)$ is the expected rate of depreciation of the foreign exchange, e is the log values of the exchange rate and E_t denotes the market expectations based on information at time t.

$$M_t - P_t = -\eta i_{t+1} + \theta Y_t \quad (2.6)$$

Money demand equation is denoted equation (2.6), where M is the log of money supply, P is the log of domestic price level, η and θ are positive parameters (that is interest rate elasticity money of demand and income elasticity supply of money respectively) and Y is the log of domestic output.

According to Tu and Feng (2009), the Dornbusch model had enjoyed extensive utility by monetary economists, as it combine the Keynesian short-run analysis and the Monetarist long run approach to macroeconomic modelling.

2.4 Empirical Literature

In their seminal paper, Girton and Roper (1977) applied monetary model of exchange rate determination to measure the EMP index in Canada. They measured EMP as a function of domestic credit, money supply growth, domestic output and world (USA) output. Their finding showed that, the Canadian central bank had little influence in pursuing independent monetary policy through the fixed exchange rate regime. The result further showed that under managed floating regime, an increase in domestic credit mirrored the change in exchange rate, change in the level of foreign reserves or the combination of both. The G-R EMP model was also applied by Connolly and Silveira (1979) to Brazilian data. The G-R EMP model was modified, thus money demand, money supply, purchasing power parity and money equilibrium. The outcome showed that growth in domestic credit significantly impacted on EMP through depreciation in the exchange rate and loss in foreign reserves.

Adjasi and Biekpe (2005) investigated the relationship between stock prices and exchange rate movement in Ghana, South Africa, Egypt, Kenya, Mauritius and Nigeria. He made use of a VAR model to examine the relationship between exchange rates and stock prices. Findings from their study revealed that there was no long-run stable relationship between stock market prices and exchange rates for Egypt, Ghana, Kenya, Mauritius, Nigeria and South Africa. Lopes and Santos (2010) compared the performance of Cape Verde and Mozambique concerning financial credibility as measured by Exchange Market Pressure. Drawing on previous research by Macedo *et al*. (2009), they expanded their analysis, using several definitions of 'financial credibility', all related to different angles on EMP indices. The authors concluded that financial credibility has been very good for Cape Verde and fairly good for Mozambique.

Horvath *et al.* (2014) examined whether pre-crisis leading indicators help explain pressures on the exchange rate (and its volatility) during the global financial crisis. They used a unique data set that covers 149 countries and 58 indicators, and estimation techniques that are robust to model uncertainty. Their results are threefold: First and foremost, they realised that price stability plays a pivotal role as a determinant of exchange rate pressures. More specifically, the currencies of countries that experienced higher inflation prior to the crisis tend to be more affected in times of stress. Second, they investigated potential effects that vary with the level of pre-crisis inflation. Their results revealed that an increase in domestic savings reduces the severity of pressures in countries that experienced a low-inflation environment prior to the crisis. Lastly, they found evidence of the mitigating effects of international reserves on the volatility of exchange rate pressures.

Raji *et al*(2014) applied monetary model of EMP to Nigerian economy over the period 1970 to 2010. Dynamic Ordinary Least Square (DOLS) was adopted for the analysis, which revealed that domestic credit has stable significant negative relationship with EMP. The findings also provide evidence that Nigeria monetary authorities absorbed most of the EMP by adjusting foreign reserves. Gilal and Byrne (2015) examined the determinants of Exchange Market Pressure (EMP) in a panel of forty countries, using fixed effects and instrumental variable (i.e. two stage least squares) estimation methods that includes cross section effects for

evaluating the determinants of exchange market pressure in a panel of up to forty countries. They considered whether EMP is related to a range of other macroeconomic indicators, policy variables and trade openness. They concluded that capital controls was associated with weaker currencies, especially for advanced countries.

Aizenman and Binici (2015) studied the ways domestic and external global factors affected the exchange market pressure before and after the global financial crisis as well as the role of these factors during the Federal Reserve's tapering episode. Utilizing a comprehensive database on capital controls, they investigated whether control measures have a significant impact on mitigating exchange market pressure associated with capital flows. Using quarterly data over the 2000–2014 period and a dynamic panel model estimation, they found that external factors played a significant role in driving exchange market pressure for both OECD countries and emerging market countries, with a larger impact on the latter. While the effect of net capital flows on exchange market pressure is muted, short-term gross portfolio inflows and outflows comprise important factors that account for exchange market pressure. Short-term portfolio flows and long-term foreign direct investment flows have a significant impact on exchange market pressure for emerging market economies and no significant effect for OECD countries. Capital controls seem to significantly reduce the exchange market pressure although the economic size of this impact is highly dependent on the institutional quality.

3. Theoretical Framework and Methodology

Dornbusch's (1976) overshooting model was path-breaking, used not only to describe exchange rate overshooting but also the 'Dutch disease', exchange rate regime choice and commodity price volatility. The model is highly influential because, at the time of writing, the world had only recently switched from the Bretton Woods system to flexible exchange rates and very little was understood of them and their volatility (Walsh, 2012). The hypothesis develops a simple macroeconomic framework for the study of exchange rate movements. The purpose is to develop a theory that is suggestive of the observed large fluctuations in exchange rates while at the same time establishing that such exchange rate movements are consistent with rational expectations formation (Dornbusch, 1976).

The model assumes a country that is small in the world capital market so that it faces a given interest rate. Perfect capital mobility will ensure the equalization of expected net yields so that the domestic interest rate, less the expected rate of depreciation, will equal the world rate. This study employs this model as a theoretical framework because Nigeria is characterized as a small open economy. The model is appropriate for this study, as it was developed to analyse the effect of exchange rates on real variables.

3.1 Computation of EMP Index

This study adopts the weighted EMP index approach constructed by Aizenman *et.al* (2015), which has the advantage of enabling us to examine the exchange market pressure in relation to the reference country's interest rate, which is one of the causes of exchange market pressure as it takes cognisance of nominal interest rate differentials between the home country and the reference country. It is ideally suited to single country analysis.

The model of EMP is based on changes in exchange rate, interest rate differentials and changes in international reserves as shown below:

$$EMP_t = \frac{\Delta e_t - \mu_e}{\sigma_e} - \frac{\nabla i_t - \mu_i}{\sigma_i} - \frac{\Delta ir_t - \mu_{ir}}{\sigma_{ir}} \qquad (3.1)$$

The exchange market pressure index is a weighted sum of exchange rate changes, relative interest rate differentials and foreign exchange reserve changes. e_t denotes exchange rate or the price of US $ in domestic currency, hence a rise in e_t is associated with the domestic currency depreciation.

Measuring EMP using only exchange rate changes will not be appropriate as the monetary authorities may alleviate, for example, upward pressure by raising interest rate and spending foreign exchange reserves. Therefore, interest rate and foreign exchange reserve are the channels that Central Bank may use for alleviating pressure. An increase in exchange rate, a rise in interest rate and a loss of foreign exchange reserves imply an increase in exchange market pressure. The parameters σ_e ,

σ_i and σ_{ir} are the weights assigned to components of exchange market pressure index. They are determined by taking the standard deviation of each component of index. This weighting scheme is adopted to assign low weight to more volatile components and therefore, avoid them dominating the index.

3.2 Model Specification

As we have already suggested, our interest is to examine the effects of EMP on financial development proxied by private credit by deposit money banks. We chose to investigate the particular case of Nigeria1970 to 2016 according to data availability for the relevant series. The empirical model to be estimated can be written as

$$PSC\_GDP_t = \alpha_t + \beta_1 EMP_t + \beta_2 Inflr_t + \beta_3 RGDP_t + \beta_4 NFDI_t + \beta_5 M2_t + \beta_6 BOT_t + \varepsilon_t \quad (3.2)$$

Where PSC_GDP represents the ratio of private credit by deposit money banks to gross domestic product, EMP represents exchange market pressure index, Inflr represents inflation rate, RGDP indicates real gross domestic product, proxied as annual growth of GDP per capita, NFDI signifies net foreign direct investment, M2 represents broad money supply, BOT stands for balance of trade, which is computed as the difference between exports and imports within the sample period. ε_t represents the error term; α_t and β represent the slope and coefficient of regression. The coefficient of regression, β_1, β_2 and β_3 indicate how a unit change in the independent variables affect the dependent variables (financial development). The error, ε_t, is incorporated in the equation to cater for other factors that may influence financial development.

Equation 3.2 shows that exchange market pressure and its drivers affect the contribution of the credit provided to private sector by deposit banks to the country's gross domestic product.

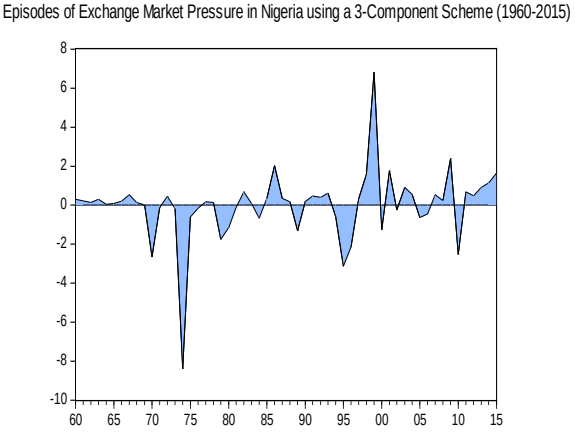
3.3 Estimation Technique

The study explores the autoregressive distributed lag (ARDL) method in analysing the model specified. This technique is a precise approach in estimating the equations either in levels or at growth rate. The method considers the long-run and short-run dynamics of the economy. The equation is estimated in a co-integration framework using Pesaran et al (2001) autoregressive distributed lag (ARDL) model. The justification for the choice of Pesaran et al (2001) bounds-testing approach hinges on the fact that it is more suited for small sample size because of its desirable finite sample properties. The ARDL framework does not require that the order of integration of the variables be of the same order. The approach is desirable in handling level and growth variables in the same regression. The ARDL Bound test technique is also important in economic modelling because it traces the time dimension of policy on macroeconomic dynamics.

4. Analysis and Interpretation of Result

4.1 Trend Analysis

Figure 4.1: Episodes of Exchange Market Pressure in Nigeria using a 3-Component (Exchange Rate, Interest Rate and Foreign Reserves) Scheme



***Source**: Authors' computation*

Figure 4.1 shows the episodes of exchange market pressure in Nigeria. During the oil boom era, between 1970 and 1978, Nigeria witnessed a downward pressure in the foreign exchange market. The forex market experienced slight pressure in 1985, which can be attributed to the country's negative balance at that time. Nigeria faced intense exchange market pressure between 1997 and 2000, which may be the consequence of the 29 percent inflation rate of 1996. During the global financial crisis of 2007 – 2009, the country also experienced pressure in the exchange market. This pressure, although of great magnitude did not last. Afterwards, the economy also faced exchange market pressure due to the recent sharp fall in oil prices in 2014 and the change

from fixed exchange rate regime to floating exchange rate in 2015.

4.2 Descriptive Statistics

A descriptive statistics is conducted on the variables used for this study in order to see the symmetrical distribution of the variables and other properties that the variables have. This discusses the statistical properties of the variables. Thus, the univariate statistics of the variables, which include the mean, median, skewness, Jarque-Bera, kurtosis, among others are reported. The results of the descriptive statistics for the variables are presented in Table 4.1.

Table 4.1: Descriptive Statistics Result

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
PSC_GDP	11.46	11.00	36.01	3.29	5.76	1.69	7.90	82.58	0.00
BOT	4.98	5.40	32.08	-7.68	9.18	0.66	3.15	4.12	0.13
EMP	-0.00	-0.07	7.80	-5.55	1.87	1.07	8.28	75.68	0.00
INFLR	15.95	11.41	72.84	-3.73	15.93	1.89	6.10	55.59	0.00
M2	20.48	20.32	43.27	9.21	7.86	0.54	2.94	2.70	0.26
NFDI	2.14	1.66	10.83	-1.15	2.21	1.73	6.97	64.68	0.00
RGDP	1570.76	0.00	6003.89	0.00	1974.45	0.90	2.49	8.23	0.02

***Source**: Authors' computation*

Table 4.1 describes the basic statistic of data used in the study. Negative mean value of Exchange Market Pressure is associated with appreciating pressure over the entire sample period, thus implying an upward pressure on naira. The median value of -0.07 separates higher half of sample from lower one. EMP values range from minimum of -5.55 to maximum of 7.80. Standard deviation measures the dispersion of EMP from its mean value and its value is 1.87. The EMP index is skewed to the right and it also exhibit a leptokurtic (slim or long-tailed) kurtosis as it is greater than 3.Thirdly, the Jarque-Bera statistic is highly significant which further confirms the non-normality of the EMP index.

4.3 Unit Root Test

Unit root tests of the time series properties of the data are examined to determine the order of integration of the variables used in the model. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test are used at level form and first difference of each series. The results of the unit root test are reported in Table 4.2.

Table 4.2: Unit Root Test Result

Variables	Augmented Dickey Fuller (ADF) Series		Phillips Perron (PP) Series		Order of Integration
	At Levels	At Order 1	At Levels	At Order 1	
PSC_GDP	-2.6263	-6.5436	-2.5555	-8.4476	I(1)
BOT	-4.0994	-	-3.9570	-	I(0)
EMP	-7.5830	-	-7.6384	-	I(0)
INFLR	-3.4365	-	-3.2698	-	I(0)
M2	-2.4958	-6.6102	-2.3720	-7.1536	I(1)
NFDI	-3.5889	-	-3.4755	-	I(0)
RGDP	1.5813	-6.8332	1.6170	-6.8386	I(1)

Notes:

1. Lag length for ADF tests are decided based on Akaike's information criterion (AIC).

2. Maximum Bandwidth for PP tests are decided based on Newey-West (1994).

***Source**: Authors' computation.*

The ADF t-statistics for the series shows that some of the variables are stationary at levels and some at the growth rate, first difference. The Phillips-Perron test is also conducted due to its ability to correct for any serial correlation and heteroscedasticity in the disturbance process of the test equation. The PP test also shows that EMP is the only stationary variable.

We can therefore reject the null hypothesis and conclude with a very low probability of making an error that the time series has no unit root.The fact that those series differenced at an higher order, I(1), would be used under the same modeling framework with stationary series at levels lend credence to the use of the Autoregressive Distributed Lag (ARDL) model. As posited by Pesaran et. al., (2001), the Engle-Granger Cointegration is found suitable for series of the same differenced order while the ARDL model can be used to obtain the long-run equilibrium condition of variables irrespective of the differencing order.

4.4 ARDL Bound Test

The bounds test for the model is illustrated in Table 4.3(a). The computed F-Statistic of 15.18 is greater than the upper bound critical value of 3.61 as well as the lower bound for a 5% significance level. The implication is that the null hypothesis of no cointegration between the dependent and independent variables will be rejected. The implication of these estimates is that financial institutions development (proxied as ratio of Private credit by deposit money banks to GDP) and exchange market pressure have an equilibrium condition that could keep them together in the long-run situation.

Table 4.3(a): Bounds Testing for Cointegration Analysis for Model 3

Computed F-Statistics: 15.82*	(lag Structure, k=8)
Critical Bound's value at 5%	Upper Bound: 3.61
	Lower Bound: 2.45

** denotes reject the null hypothesis of no cointegration at 5 percent level. The range of the critical values at 1 percent and 10 percent levels are 3.15; 4.43 and 2.12; 3.23 respectively.*

***Source**: Authors' Computation.*

4.5 ARDL Result

The coefficients of the short-run and long-run impact of the exchange market pressure on financial institution depth in Nigeria are outlined in Table 4.3 (b).

Table 4.3 (b): ARDL-VECM (Short-Run) Estimates

ARDL Optimal Ordering: (8, 0, 5, 5, 5, 4, 3)				
Variable	**Coefficient**	**Std. Error**	**T-statistic**	**Prob.***
D(PSC_GDP(-1))	0.424117**	0.146996	2.885235	0.0148
D(PSC_GDP(-2))	0.122895	0.128196	0.958648	0.3583
D(PSC_GDP(-3))	0.297037**	0.128012	2.320385	0.0406
D(PSC_GDP(-4))	0.170676	0.119667	1.426260	0.1816
D(PSC_GDP(-5))	0.202068	0.105334	1.918351	0.0814
D(PSC_GDP(-6))	0.180500	0.207420	0.870218	0.4028
D(PSC_GDP(-7))	0.217101	0.198780	1.092171	0.2981
D(EMP)	0.392990**	0.159935	2.457181	0.0318
D(INFLR)	0.033225	0.022645	1.467200	0.1703
D(INFLR(-1))	0.002212	0.027594	0.080163	0.9375
D(INFLR(-2))	-0.075491**	0.027802	-2.715269	0.0201
D(INFLR(-3))	0.060976**	0.023441	2.601234	0.0246

D(INFLR(-4))	-0.033157	0.019263	-1.721293	0.1132
D(RGDP)	0.001937**	0.000759	2.553489	0.0268
D(RGDP(-1))	-0.000120	0.001246	-0.096618	0.9248
D(RGDP(-2))	0.000656	0.001450	0.452535	0.6597
D(RGDP(-3))	0.002372	0.001274	1.861435	0.0896
D(RGDP(-4))	-0.005761*	0.001069	-5.387912	0.0002
D(NFDI)	1.299964*	0.167272	7.771549	0.0000
D(NFDI(-1))	0.130512	0.228418	0.571372	0.5792
D(NFDI(-2))	-0.338703**	0.150201	-2.255004	0.0455
D(NFDI(-3))	0.450699	0.220594	2.043111	0.0658
D(NFDI(-4))	0.548175**	0.188993	2.900503	0.0144
D(M2)	0.846512*	0.047274	17.906602	0.0000
D(M2(-1))	-0.308574	0.149875	-2.058876	0.0640
D(M2(-2))	0.228687	0.125255	1.825775	0.0951
D(M2(-3))	-0.088005	0.100726	-0.873700	0.4010
D(BOT)	-0.088534**	0.035721	-2.478487	0.0307
D(BOT(-1))	-0.035275	0.027895	-1.264583	0.2322
D(BOT(-2))	0.042161	0.028730	1.467476	0.1702
ECM(-1)	-0.773643*	0.132564	-5.835998	0.0001
R-squared	0.996087			
Adjusted R-squared	0.983280			
Durbin-Watson stat	2.927196			
F-statistic	77.777031			
Prob(F-statistic)	0.000000			

Note: *PSC_GDP is the Dependent Variable. The optimal ARDL ordering is conditioned on the empirical result that does not violate any decision criteria threshold and relatively produce improved empirical outcomes.*

** Significant at 1%; ** significant at 5%*

Source: *Authors' Computation*

From table 4.3(b), exchange market pressure significantly influences financial market development positively in Nigeria with a coefficient of 0.39 and a probability value of 0.0318. This means that one percent increase in the pressure experienced in the forex market in Nigeria will upshot the credit given to the private sectors by deposit money banks by 39 percent. The economic intuition of this is that, as the foreign exchange market experiences disequilibrium as a result of excess demand of foreign exchange, the credit provided to private sectors by DMB increases. This is so because the naira given in exchange for foreign currency will increase, due to the increased demand.

The effect of price stability fluctuates between different time periods. In the present and immediate past period, insignificant positive impacts on the depth of the financial institutions in Nigeria are recorded but a significantly negative impact is witnessed in the two-lagged period, where the coefficient and probability values are -0.075 and 0.0201 correspondingly. Immediately after the two-lagged period, a positive impact is also recorded, which is significant at 5 percent significance level.

Likewise, average standard of living impacted the development of financial institutions differently, with respect to time dimension. A significant effect occurred in the present and fourth period. However, while the former had a positive effect, the latter impacted the financial institution depth negatively. The current situation indicates that an increase in the standard of living of an average citizen in the country will cause the credit provided by deposit banks to private sectors to rise to the tune of 0.2 percent. In contrast, the fourth period estimates imply that a one percent increase in the average standard of living of the citizens will result into about 0.5 percent decrease in the credits provided. This can be attributed to change of taste, prices of goods and other factors. If prices of goods increase, the citizens may decide to

invest, thereby providing money for the financial institutions to loan out to people.

Net foreign direct investment inflows positively affects ratio of private credit provided by deposit money banks to GDP with a coefficient value of 1.30, which is highly significant at even 1 percent significance level, with the probability of 0.0000 in the present state. Intuitively, this denotes that an increase in net FDI inflows today will generate up to 130 percent boost in the contribution of private credit by deposit banks to GDP in the present time. Even though a significant impact which is negative is recorded in two periods before the present, a positive impact of significance is also recorded in four periods behind from today. These fluctuations can be linked to the macroeconomic instability experienced in the country, poor institutional quality, among other factors.

From the table above, it is evident that the supply of money in the present moment significantly increases the credit provided by deposit banks in Nigeria by at least 84.7 percent. Balance of trade negatively affects the development of financial institutions in Nigeria, with a coefficient value of 0.09 and a probability value of 0.0307 which is less than the significance level of 5 percent.

The adjusted R^2 obtained for is 0.98, which implies that the variables included in the model (i.e Model 1) accounts for 98 percent movement in financial market depth. This means that the model does not suffer from any misspecification error. The F-statistics of 77.77, which is highly significant, indicates that the model has a goodness of fit. The Durbin Watson (DW) statistic of 2.93 signifies that the model is without autocorrelation.

The error correction term of the coefficient value of -0.774, which is highly significant with probability value of 0.0001, shows the evidence of long-run equilibrium conditions among the variables in the model. Thus, the whole system can get back to long run equilibrium at the speed of 77.4 percent.

Table 4.3 (c): ARDL Bound Test Long-run Estimates

Dependent Variable: PSC_GDP				
Variable	**Coefficient**	**Std. Error**	**T-statistic**	**Prob.***
EMP	0.507974**	0.205016	2.477724	0.0307
INFLR	0.023955	0.064343	0.372306	0.7167
RGDP	0.002367*	0.000615	3.849287	0.0027
NFDI	0.803735	0.552387	1.455022	0.1736
M2	0.561669*	0.109836	5.113725	0.0003
BOT	-0.157492	0.089535	-1.758998	0.1063
C	-4.428736**	1.881823	-2.353429	0.0383

** Significant at 1%; ** significant at 5%*
Source: *Author's Computation*

From the table above, it can be observed that the positive relationship exchange market pressure has with financial institution depth in the short run is still sustainable in the foreseeable future. The relationship is not only positive but also significant, with a coefficient and probability values of 0.51 and 0.0307 in that order.

In the long run situation, inflation and net foreign direct investment inflows are positively related to private credit by deposit banks but these impacts are insignificant. In the same vein, average standard of living and money supply are significantly positively related to financial institutions depth. An insignificant negative relationship was conversely recorded between balance of trade and financial institution depth in the long run.

4.6 Diagnostic Tests

In order to ascertain the robustness of results and the reliability of the estimates obtained, it is important to conduct some tests on the estimates previously obtained. Specifically, three of these tests are presented. These are the Ramsey RESET test (x^2_{RESET}); Breusch-Godfrey LM test (x^2_{SERIAL}) and the ARCH (x^2_{ARCH}) tests.

Table 4.4: Diagnostic Test Results

S/N	**Test Statistics**	**The model**

1	x^2_{RESET}	2.4154 (0.157)
2	x^2_{SERIAL}	2.3751 (0.257)
3	x^2_{ARCH}	1.1571 (0.355)

***Note**:Values in parentheses are the probabilities of significance. It should be noted that, the null hypotheses for these tests are that: (i) the model does not suffer from functional specification bias for the Ramsey RESET test; (ii) the residuals are serially uncorrelated for the Breusch-Godfrey test; (iii) there is absence of autoregressive conditional heteroscedasticity for the ARCH test. Based on these results obtained, these estimates indicate that these null hypotheses should all be accepted at the 5 percent of significance since the probability values for these tests are all above 0.05 (5 % level of significance).*

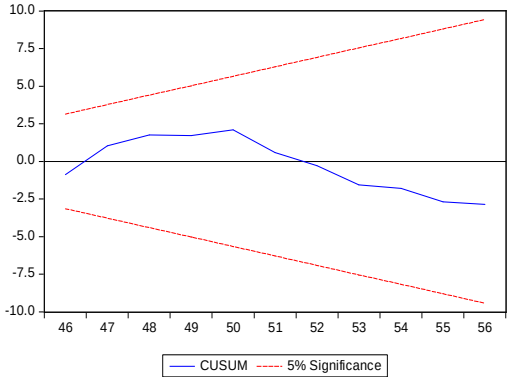
Source: *Authors' Computation*

It can be seen from Table 4.4 above that the estimates obtained for this empirical enquiry are robust since the diagnostic tests suggest that the model is free of specification bias and that serial correlation is absent for all the models. There is also no evidence of autoregressive conditional heteroscedasticity.

4.7 Stability Test

In order to completely ascertain the reliability level of our estimates, stability tests of CUSUM and the CUSUM sum of squared were conducted on the error correction estimates obtained. These tests depict how the estimates depart or converge to their consistent level. As depicted in the figures below, the estimates lie within the confidence interval at the 5 percent.

Figure 4.2: Stability Test



5 Conclusion and Policy Implications

This study examines the episodes of the pressure in the foreign exchange market and provides empirical evidence on its impact on financial development using credit to private individual by deposit money bank in Nigeria. The study is based on Dornbusch's (1976) overshooting model which establishes that, large foreign exchange rate fluctuations may be detrimental to economic performance. The study employs annual time series dataset from 1960 to 2015. Empirical findings from autoregressive distributed lag (ARDL) and vector error correction models suggest that, exchange market pressure has resulted into financial sector disequilibrium overtime in Nigeria. To bridge this demand and supply of foreign exchange gap, government may need to adopt measures such as economic diversification anchored on comparative advantage. This policy may naturally lead to boosting of domestic investment, export oriented strategy and reduces the pressure in the financial sector of Nigeria economy. The implication of this finding is that most banking credit is directed towards working capital and the provision of import credit rather than investment financing. Therefore, the expansion of credit in the face of upward pressure might well imply that, although a majority of firms borrowing for investment purposes experienced a negative balance sheet effect, a majority of those seeking credit for import financing and working capital experienced the positive effect. Thus, private credit does not have discernible effect on private investment.

The results from the study indicate that exchange market pressure negatively affects financial markets in Nigeria. Consequently, it is imperative to consider the following recommendations directed at controlling this pressure in order to spur development in the financial sector.

i. An intense pressure in the market, reflecting persistent depreciation of the domestic currency requires government intervention whereby actions are taken to reduce the exchange rate. Through the intervention, the government intends to avert the negative impact of intense depreciation of the domestic currency on the overall economy. In a bid to achieve this, attention to the

development of appropriate early warning signals to effectively manage the EMP and ensure overall macro-economic stability will be required.

ii. In view of the fact that EMP arises as a result of either excess demand or excess supply of foreign exchange, it is disequilibrium. Thus, there is need for appropriate action by the authority to restore equilibrium. In this regard, the central bank should manage exchange market pressure through interventions that impact supply or demand in the market and ultimately influence the exchange rate. Interventions by central banks to influence the exchange rate could be through the direct method; direct purchases and sales of foreign currency by the monetary authority, or indirect method; raising or lowering the exchange rate through changes in domestic money supply or interest rate.

iii. The Nigerian government can also formulate and implement appropriate policies to prevent or moderate EMP. When the domestic currency depreciates due to demand pressure or supply shortage, the central government may opt for external borrowing or disposal of its foreign assets to increase the supply of foreign exchange. The inflow from such borrowing or sale of foreign assets is added to the foreign reserves which can ultimately be released through direct intervention to increase supply of foreign currency and moderate EMP. To restrict excess demand, the government may adopt measures such as importation ban or curb access to supply of foreign exchange for certain items to reduce the demand for foreign exchange. The government may also introduce policies to facilitate investment in domestic assets by foreign investors. On the contrary, in times of currency appreciation and where the objective is to reduce excess supply of foreign exchange, the government may introduce policies to reduce bottlenecks and facilitate access to foreign investment channels by domestic investors.

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