DOLLARIZATION AND SELECTED MACROECONOMIC INDICATORS IN NIGERIA: AN EMPIRICAL ANALYSIS

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Abstract

The contagious effects of dollarization continue to ravage the Nigerian economy through fiscal and monetary transmission channels. With the debate for or against dollarization tendencies skyrocketing alongside, this paper investigates the relationship between dollarization and selected economic growth indicators in Nigeria using a fractional cointegration analysis over the period 1986-2014. It also adopted the Ordinary Least Squares (OLS) techniques to ascertain the effects of the selected variables. Our findings established that fact that the phenomenon of dollarization exists in the Nigerian economy and if not checked will result in serious economic crisis since its dominance is an indicator of misalignment in exports, external debt, foreign direct investment and economic growth. The paper thus recommends among others the adoption of prudential measures to boost confidence in the local currency as well as anti-inflationary measures.

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1. INTRODUCTION

The concept of dollarization became popular in the 1970s and 1980s when countries in Latin America experienced macroeconomic destabilization (Aslanidi, 2008). With increasing economic pressure experienced by so many countries, the trend has been creeping into Africa's shores gradually in most recent years as can be observed in the dollarization of several countries in the region (Olalekan, 2009; Kokenyne, Ley & Veryune, 2010; Kessy, 2011; Mecagni, Mauro, et al., 2015). In these economies, the use of foreign currencies to pay a large share of purchases of goods and services and wages (*real sector dollarization*), and as a means of payment (*currency substitution*) continue to increase at an exponential rate.

According to Calvo and Vegh (1996) "dollarization to refer to the unofficial process when the national currency, as means of circulation and wealth accumulation, is substituted with a more stable foreign currency or several currencies." In other words, dollarization is the use of foreign currencies as a medium of exchange, store of value, or unit of account in an economy. In recent times, symptoms of dollarization are being observed in the Nigerian economy. With a volatile Naira (Nigeria Official Currency), the financial landscape in Nigeria has been subjected to important financial risks since the economy have experienced moderate increases in residents' holding of deposits denominated in foreign currencies. Nigeria, so far has lagged behind most countries in reducing dollarization and its accompanying effects. The study is not only poised to establish the relationship between dollarization and selected macroeconomic indicators in the Nigerian economy, but it also aim to provide policy-mix

in the fight against the present prevailing explosive inflationary trend in the economy. The paper is as follows; section 2 examines the literature review and shows the trend analysis of the variables, section 3 provides the research methodology; section 4 analyses the empirical results while the last section gives the conclusion and policy recommendations.

2. REVIEW OF RELATED LITERATURE

Several empirical literatures exist on the relationship between dollarization and recession. Various countries, specifically emerging countries and Nigeria inclusive, have already embraced dollarization to some extent due to the volatility of the purchasing power of their domestic currencies. Dollarization in Nigeria is a situation which occurs where the residents use foreign currency along with their own domestic currency. The type of dollarization practiced in Nigeria is an unofficial one. However, it is still used as a means of exchange in the payment for goods and services to the extent that Nigerians want foreign transfer payment in dollars rather than in Nigerian Naira.

The rate and manner in which foreign denominated currency transactions are taking place in the Nigerian economy is unbecoming. Even multinational firms especially oil and gas companies now pay their workers in dollars. The country seems to encourage this act as the practice is seen to confer high social class and in every corner of the country, people even hail personalities that spend dollars at parties. The implication of these acts is high inflationary rate for the country (Yinusa & Akinlo, 2008, Omoragbon, 2009). It should be noted that there are numerous factors that can influence the decision to hold foreign currency. These include weak confidence in the domestic commercial banks, uncertainty about future economic developments, underdeveloped financial markets, past inflation and instability, and so on (Dvorsky, Scheiber & Stix, 2008; Stix, 2008; Ritzberger-Grünwald & Stix, 2007; Zoryan, 2005)

Dollarization can pose important challenges to policymakers. It constrains the capacity of monetary authorities to act as a lender of last resort; hampers banks' liquidity management; and weakens the stability of the financial sector, as it may amplify the impact of exchange rate movements on banks' balance sheets, thereby increasing the risk of contractionary effects and bank failures (Omoragbon, 2009). Dollarization can complicate the implementation of economic policies through various channels, by:

- Exposing the balance sheets of the public sector, private enterprises, and households to exchange rate risks, when assets and liabilities in foreign currency are mismatched;
- Reducing the authorities' capacity to use monetary policy and making it harder to use the central bank's lender-of-last resort function to stabilize the domestic banking system;
- Weakening the structural fiscal balance and fiscal flexibility
- Reducing the abilities of governments to issue medium- and long-term debt in domestic currency further exacerbating vulnerabilities to shocks and thereby amplifying macroeconomic and output fluctuations. (Eichengreen, Hausmann, & Panizza (2002)

For instance, in their study, Edwards and Magendzo (2001) examined the relationship among dollarization, inflation and growth. The study concluded that that there is a significant reduction in inflation in nations with dollarization. Noko (2011) argues that dollarization has led to reduced inflation in Zimbabwe. In the same view, Berg and Borensztein (2000) opined that dollarization reduces the risk of a currency crisis in an economy.

On the other hand, the study of Patricia and Alicia (2007) argues that dollarization has not significantly reduced inflation and has in fact even worsened financial crisis. This view was also supported by Antinolfi, Landeo and Nikitin (2007).

3. METHODOLOGY & DATA

This section deals with the theoretical framework, method of data analysis as well as data to be used in the study.

3.1 Theoretical Framework

Monetary policy will be ineffective in a country where foreign currencies are seen as substitutes for domestic currency. The implication is also that the elasticity of substitution between domestic and foreign currency is likely to increase when the perceived risk of sharp changes in the value of domestic currency are greater, most likely in situations of floating or adjustable predetermined exchange rates. Among all the theoretical foundations existing in the literature, this study adopts the Money-in-the-Utility function specification found in the works of Imrohoroglu (1994), Bufman and Leiderman (1993), Friedman and Verbetsky (2001), Selçuk (2003).

The Money-in-Utility Model

The Money-in-Utility Model (MIU) model seeks to establish the substitutability between real domestic balances and foreign balances with the objective of examining the main reason behind the propensity of the holding of foreign currencies by economic agents. In the MIU model money is included in the utility function and treated as a good.

Assumptions

- an infinitely lived identical agents (households and firms) in the economy represented by N
- each agent takes decisions at the beginning of every period of how much to consume and how much of domestic and foreign currency to hold optimally
- money (local or foreign) is a public good

The model represents a situation in which residents hold foreign currency as a simple and natural hedge against contingencies. The foreign currency is thus assumed to be stable and trustworthy. Local and foreign currencies can be easily exchanged in the market at the market exchange rate. The economy consists of a continuum of infinitely lived identical individuals with total measure one. A representative agent is assumed to derive utility from the consumption of a single good and from the liquidity services provided by holdings of domestic and foreign money. Thus, an agent maximizes the expected value of the discounted utility:

$$E_0 \sum_{t=0}^{\infty} \beta^t (c_t, x_t) \qquad (1)$$

where β is the discount factor and c is consumption, and x denotes liquidity holdings.

In the model, money services are produced by using a combination of domestic and foreign real balances in a CES production function specified below:

$$x = [(1-\alpha)^{-\rho} + \alpha m^{*-\rho}]^{-1/\rho} \qquad (2)$$

where m denotes domestic real money balances and m^* denotes foreign money balances. Coefficient α is a share of

foreign money balances in producing money services. Parameter ρ is used to compute the elasticity of substitution between domestic and foreign currency, and represents the substitutability between the two currencies.

The money services part of the utility function reflects the willingness of residents to diversify their money holdings portfolio to lower the risk of losing their monetary assets due to economic instability and inflation in the home country. The utility function has a budget constraint as follows:

$$c_t + m_t + {m^*}_t + b_t = y_t + \tau_t + \frac{m_{t-1}}{(1+\pi_t)} + \frac{{m^*}_{t-1}(1+\varepsilon_t)}{(1+\pi_t)} + \frac{b_{t-1}(1+r_t-1)}{(1+\pi_t)} \qquad (3)$$

where r_t is a nominal interest rate. The nominal exchange rate is the ratio between the domestic price level and foreign price level. Variables π_t and ε_t represent the inflation rate and rate of depreciation of the national currency, respectively. Each period every individual receives an endowment y; and a lump-sum transfer from the government τ. Agents hold financial assets b in the economy.

The final Money-in-the-utility function specification arrived at after much interpolation is given thus; is used:

$$U(c_t, x_t) = \frac{\left({c_t}^{1-\theta} x^{\theta}\right)^{1-\sigma} - 1}{1-\sigma} \qquad (4)$$

where x_t is represented by equation (2).

It is assumed that the coefficient θ lies in the interval between 0 and 1, and reflects the transaction requirement of money, and parameter σ represents the coefficient of relative risk aversion (RRA) and should be positive. The parameter ρ measures the degree of currency substitution and should be more than -1. Then the elasticity of substitution between domestic and foreign money is computed as 1/(1 + ρ).

3.2 Empirical Model

In estimating an empirical model, we specified a modified model of Levy-Yeyati (2006). This is shown below;

$$DD_t = \alpha_1 + \alpha_2 PortFo_t + \alpha_3 MktF_t + \alpha_4 Access_t + e_t \qquad (3)$$

Where;
DD = dollarization variable
PortFo = portfolio variable
MktF = market failure variables
Access = access to foreign exchange finance e_t = error term

3.3. Techniques of Estimation

3.3.1. Fractional integration and Ordinary Least Squares (OLS)

In testing for persistence in data series, fractional integration is part of a larger classification of time series, commonly referred to as "long memory" models. According to Granger and Ding (1996), a series has a long memory series based on a slowly declining autocorrelation structure. In other words, long memory models address the degree of persistence in data.

Fractional integration thus addresses a shortcoming of that traditionally used integration has with modeling the degree and type of persistence in a time series. In other words, instead of being forced into modeling data as either stationary [I(0)] or as integrated [I(1)], we can more accurately model the

dynamics of the series with fractional integration, I(d), where d can still be 0 or 1, but any fraction as well. In this type of modeling, in the case of stationary date, external shocks can have a short-term impact, but little long-term effects, as the data revert to the mean of the series at an exponential rate. In this modeling type, integrated data do not decay. In other words, they do not return to the previous mean after an external shock has been felt. By allowing d to take fractional values, we allow data to be mean-reverting and to still have long memory in the process.

Modeling data with fractional integration reduces spuriousness. Fractionally differenced data will produce more precise regression results and predictions (Lanier, Lebo, & Walker, 1998; Lebo, Walker, & Clarke 1998). Modeling time series data as stationary or integrated without testing for fractional integration would lead one to draw incorrect conclusions about the nature dollarization in Nigeria.

Equation (3) will also be estimated using the ordinary Least Squares (OLS) econometric methods. Before the estimation preliminary tests will be carried out.

3.3 Operationalization of Variables

Emerging from the foregoing analysis, several variables are considered relevant in the specification of the model to be tested empirically. These are explained below;

- ***Dollarization (DD):*** is measured as the ratio of foreign currency deposits that is domiciliary accounts (FCD) to broad money (M2) (Yinusa, 2007).
- ***Market Failure*****:** this variable is measured by both External Debt/GDP ratio and M2/GDP ratio. Higher external debt tends to be associated with a higher share of foreign currency deposits (Levy-Yeyati 2006). Market failure will ceteris paribus lower levels of deposit dollarization. As the financial sector develops, and more financial products are offered in which domestic currency savings can be invested, dollarization naturally declines.
- ***Portfolio Variable:*** Proxied by Real lending rate
- ***Access to foreign exchange Finance (ACCESS)***: A priori, de facto access to foreign exchange has an ambiguous impact on deposit dollarization. The ability to keep money overseas is expected to reduce domestic deposit dollarization. This can be captured by financial openness (FDI/GDP), Export/GDP ratio and Oil export/GDP ratio

3.4 Data Sources

In this paper, annual data was used in the analysis. All the data employed in the study were sourced from Central Bank of Nigeria Statistical Bulletin (2015) from the period of 1986 to 2014. The choice of the sample period is due to the significance of dollarization in Nigeria brought about by the introduction of Structural Adjustment Programme (SAP) in 1986**.** All the variables are expressed in log form.

4. RESULTS & DISCUSSION OF FINDINGS

4.1. Fractional Integration

In economic principle, the *d* parameter is used to determine the extent or degree of persistence in the series. Table 1 below shows the interpretations for the values of *d* and the parameter value for fractional integration. In estimating the fractional order of integration of the series involved, a semi parametric method was employed. The spectral regression estimation (GPH) is used to determine the value of the differencing parameter *d* for the series involved (Gweke & Porter-Hudak, 1983)

The GPH estimation results can be seen in Table 2 in the Appendix. Since the differencing parameter *d* for Ldd is 0.05231, the log of DD appears to be stationary, mean-reverting and possesses a finite

variance- effect of shocks in the system die away very rapidly. We can thus, accept the null hypothesis that *d*=0. The *d* values for EXD/GDP and FDI/GDP are non-stationary, non-mean reverting and possesses an infinite variance. In other words, its autocorrelation failed to vanish with time; while the log of EXP/GDP is mean-reverting but non-stationary, as shocks to the series tends to disappear only in a very long-run. The values of the differencing parameters for M2/GDP, OILEXP/GDP and RLR exhibit a long-lived shock duration (it takes a long time for their means to revert) and non-stationary.

4.2. Ordinary Least Squares (OLS) Analysis

The estimation results in Table 3 in the Appendix were satisfactory. We note that over 93% of the variations in dollarization could be attributed to variations in the explanatory variables in the specification. Besides, the hypothesis of a joint significance of the parameter estimates cannot be rejected as can be seen in the F-statistic. The estimated coefficients represent the elasticities of the dependent variable with respect to the explanatory variables since the model was estimated with data in log linear form. Of the six explanatory variables, four were found to be statistically significant. Only EXD/GDP and EXP/GDP ratios were insignificant.

The results of the Dollarization Equation shown in Appendix 3 have several policy implications. In view of the fact that the equation of the model was estimated using date in logarithms, the parameter estimates represent static short run elasticities of the dependent variable with respect to the explanatory variables. Under the market failure variable, Dollarization is EXD/GDP and M2/GDP inelastic. It is also positively related to market failure. This is in line with the findings of Yinusa (2007). In the same vein, portfolio variable positively impacts on dollarization level in Nigeria. This finding confirms Yinusa and Akinlo (2008), Viseth (2001) and Antinolfi et al (2007). Generally, on the variable of access to foreign exchange, it can be deduced that dollarization depends significantly on access to foreign currency. That accounts for the significant FDI/GDP and OILEXP/GDP ratios.

5. CONCLUSION AND RECOMMENDATIONS

Dollarization continues to permeate the local economy. With the recent recession scare, it has become more imperative to address the issue. There is nothing we are buying in Nigeria today that we were not purchasing 3 years ago. Thus, contrary to what most policymakers and economists will argue, it is not our purchase that put pressure on the Naira but on dollarization on the part of prominent *dramatis personae* of the society. Such individuals were to buy dollars at any price, which led to high exchange dollar rate. The phenomenon is usually termed "dollar rush".

From the foregoing, it can be deduced that the phenomenon of dollarization exists in the Nigerian economy and if not checked result in serious economic crisis since its dominance is an indicator of misalignment in exports, external debt, foreign direct investment and economic growth. There is thus need to improve on the value of the Naira by reducing the rate of dollarization in Nigeria. The following recommendations are thus proffered to achieve this objective:

- Nigeria should continue to pursue macroeconomic stability by keeping inflation low and stable, and by reducing nominal exchange rate volatility, dollarization in the region could gradually diminish. Policy-makers should adopt a comprehensive strategy based on macroeconomic stabilization and prudential measures (fiscal consolidation should be adopted to cut the fiscal deficit)
- Regulations should be issued to ensure that banks adequately incorporated the risks arising from foreign currency deposits. These include imposing stronger requirements for borrowers that did not have foreign exchange income, higher reserve requirements on foreign currency deposits and higher provisioning requirements on foreign currency loans. Nigeria's

investment environment should be improved on to boost confidence on the local currency. This naturally will phase out dollarization.

- Appropriate supervisory framework should be adopted to accommodate cross-country activities to ensure stability.
- The securities market in domestic currency should be deepened as the public sector so as to finance its deficit with bonds in local currency.

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Appendix

Table 1: Parameter Value for Fractional Integration

d Value	Interpretation	Variance	Shock Duration	Stationarity
d = 0	Deviations follow a stationary and possess short memory since its autocorrelation die away very rapidly	Finite	Short-lived	Stationary
0 < d < 0.5	Deviation follows a stationary and meanreverting process; though its correlation takes more time to vanish	Finite	Long-lived	Stationary
0.5 ≤ d <1	Non-stationary but still mean reverting. Shocks tend to disappear in the long run	Infinite	Long-lived	Non-Stationary
d ≥ 1	Non-stationary and non-mean reverting	infinite	Infinite	Non-Stationary

Source: Galeotti et al (2006); Lee et al (2010)

Table 2: GPH Estimates for d-differencing Para meter

Variable	Power	Ords	Est. d	T (H0: d = 0)	Prob
Ldd	0.5	7	0.05231	0.0728	0.824
LEXD/DGP	0.5	7	1.01362	2.3815	0.019
LEXP/GDP	0.5	7	0.70148	2.7927	0.022
LFDI/GDP	0.5	7	1.00686	2.2772	0.076
LM2/GDP	0.5	7	0.76312	1.5422	0.261
LOILEXP/GDP	0.5	7	0.92183	0.6886	0.523
LRLR	0.5	7	0.98912	35.635	0.000

Source: Authors' Compilation

Table 3: OLS Estimation

Dependent Variable: LDD
Method: Least Squares
Date: 10/28/16 Time: 23:33
Sample (adjusted): 1986 2014
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.334651	1.898674	-1.756305	0.0918
LEXD/GDP	0.136157	0.261549	0.520581	0.6074
LEXP/GDP	-0.152882	0.110057	1.389120	0.1776
LFDI/GDP	1.362476	0.437158	3.116668	0.0007
LM2/GDP	0.236162	0.120651	1.957396	0.0067
LOILEXP/GDP	0.828516	0.472368	1.753963	0.0142
LRLR	0.103729	0.050284	2.062852	0.0022

R-squared	0.938547	Mean dependent var	11.93026
Adjusted R-squared	0.925744	S.D. dependent var	2.576872
S.E. of regression	0.702195	Akaike info criterion	2.307647
Sum squared resid	11.83388	Schwarz criterion	2.587886
Log likelihood	-28.61470	Hannan-Quinn criter.	2.397298
F-statistic	73.30840	Durbin-Watson stat	1.968390
Prob(F-statistic)	0.000000		

Source: Authors' Compilation