



ASSESSING THE DYNAMIC INTERPLAY BETWEEN CONSUMPTION
EXPENDITURE, REAL EXCHANGE RATE AND OUTPUT IN NIGERIA: EVIDENCE
FROM SHORT RUN AND LONG RUN VECTORS

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Abstract

One of the major determinants of consumption expenditure is per capita income which hitherto depends on price level and exchange rate thereby influencing the level of demand and welfare in an economy. The aim of this study is to assess the interplay between consumption expenditure, real exchange rate and output in Nigeria. Utilizing time series data from 1988 to 2019, the result of ARDL bounds test for co-integration suggests that only when the log of consumption expenditure (LCONSEXP) is a dependent variable that co-movement exist among variables. While, the result of short run estimate shows that real exchange rate, GDP and consumption expenditure are statistically insignificant. However, in the long run, REXCH is statistically significant but negatively related to LCONSEXP whereas GDP is positively related to LCONSEXP but statistically insignificant. Hence, the paper concludes that real exchange rate is a significant determinant of consumption expenditure than the national output thereby recommending for the policies that will ensure stability in the volume of money supply, exchange rate and price level necessary for improved productivity in Nigeria.

Keywords: Consumption expenditure, Exchange rate, Output, Nigeria

1. Introduction

Most of the developing and emerging economies are battling with some macroeconomic challenges ranging from low aggregate demand, dwindling aggregate consumption expenditure, exchange rate volatility with attendant consequences on the level of investments, national output growth and per capita income. Consumption and exchange rate are critical components of economic analysis in emerging economies. The decisions as to the pattern of consumption expenditure and aggregate demand may not be unconnected with the influence of real exchange rate on per capita income and price level in an economy.

Basically, Consumption expenditure is a function of consumer income and price level. Hence, real income and interest rates serve as fundamental determinants of consumption (Bahmani-Oskooee *et al.*, 2015).

Meanwhile, exchange rate is one of the determinants of the purchasing power of a country's currency in relation to another country which also accounts for the domestic currency value and price level in a given economy. However, fluctuation in the real exchange rate affects the strength of purchase in the domestic economy which by extension determines not only consumption expenditure and consumer welfare but also increases the cost of living and the cost of productivity and as well distorts the level of investment and the level of economic growth.



Hence, exchange rates serve as a prominent determinant of consumption in relation to the openness in the economic level of countries (Iyke and Ho, 2017).

The main objective of this paper is to assess the dynamic interplay between consumption expenditure, real exchange rate and national output in Nigeria. The study is motivated by the need to bridge the gap on existing limited literature in this aspect of research. Thus, this paper will be beneficial for policy making inferences, academia, scholars, and businesses alike for both microeconomic and macroeconomic policies decisions.

2. Literature Review

Theoretical Framework

There are several debates on the determinants of consumption pattern and per capita income in an economy. Theoretically, there are many arguments put forward by economists on the determinants of consumption expenditure with respect to other macroeconomic variables. Prominent among the arguments involve the general theory of John Maynard Keynes (1936) which serve as a theoretical guide for this paper.

The Keynesian theoretical construct identify income as a key determinant of consumption and macroeconomic relationship. As stated by Keynes's macroeconomic model, aggregate consumption expenditure is determined primarily by changes in the current disposable income. Hence, real consumption is a function of real disposable income and that as income increases, consumption also tends to increase though not necessarily at proportional rate. In the same vein, the neo-classical consider consumption as the final purpose of economic activity and as well a central measure of an economy's productive success (Ezeji and Ajudua, 2015).

Similarly, Duesenberry (1949) in his relative income hypothesis, maintains that individuals level of consumption and savings is relatively determined more by their incomes rather than their standard of living and that the percentage of income consumed by an individual depends on the level of income distribution thereby suggesting that present consumption is not only influenced by present levels of absolute and relative income but also by levels of consumption attained in preceding periods. Thus, consumption and fixed investment play significant role in influencing economic growth through stimulating the aggregate expenditure as determined by the rate of exchange in an economy.

Empirical Review

A number of studies have investigated the relationship between consumption expenditure and economic growth and as well as other macroeconomic variables in developing economies. Some of these studies include the work of Abdulkarim *et al.*, (2012) that examined the dynamic linkages between economic growth, fixed investment, and household consumption in Malaysia using a Structural Vector Error Correction Model (SVECM) approach. The study revealed that household consumption and fixed investment are significant in influencing the output growth in the short run. While in the long run, there is no significant effect of fixed investment and household consumption on growth with a permanent effect of economic growth on household consumption and investment. Also, Afolabi, Belford, Yemisi and Ehinomen (2016) studied the nexus between exchange rates and economic growth in Nigeria for the period covering 1978 to 2014. Using Ordinary Least Square (OLS) method, the study found that exchange rates



positively and significantly influence economic growth and vice versa, while cointegration test shows a long-run equilibrium among the series. The short-run directional relations exist between the exchange rates and economic growth in the country via Pairwise granger causality tests.

Aslam (2017) investigated how consumption expenditure induce the economic growth from empirical evidence in Sri Lank using time series data from 1975 to 2014 and found that the consumption expenditure positively impacted on the economic growth in the long run which implies that consumption expenditure in Sri Lanka induces economic growth.

Bonsu and Muzindutsi (2017) used a multivariate cointegration approach to examine the macroeconomic determinants of household consumption expenditure in Ghana covering annual time series from 1961 to 2013. Employing vector autoregressive model and Johansen cointegration approach, the study found a significant long-run relationship between real household consumption and selected macroeconomic variables with a marginal propensity to consume of 0.7971, while in the short run, household consumption was only affected by changes in price levels, with a significant effect on the real exchange rate and real economic growth. More so, Ho and Iyke (2017) assessed the effects of exchange rate uncertainty on real consumption in selected Asian countries. Using a flexible dynamic panel data technique, the result shows that exchange rate uncertainty impedes consumption and also have permanent effect than temporal in the long run with immaterial effects in the short run.

Manasseh *et al.*, (2018) employed a modified consumer spending model and data spanning from 1981–2011 to examine the effects of interest and inflation rates on consumer spending thereby investigating the causal relationship between consumer spending, interest and inflation rates. The findings suggest that all explanatory variables account for approximately 93.38% variation in consumer spending, indicating interest and inflation rates and other control variables such as per capita income, indirect tax and savings as important determinants of private consumption expenditure (PCE) in Nigeria.

Otokini *et al.* (2018) evaluated the effect of exchange rate deregulation on manufacturing output performance in Nigeria from 1980 to 2016 and the result shows that exchange rate has a non-significant positive long-run effect on manufacturing industry output while a unidirectional causality runs from exchange rate to manufacturing output using the pairwise Granger causality test.

3. Methodology

This paper used Autoregressive Distributive Lag (ARDL) approach to analyze time series data covering the period from 1988 to 2018. The data were sourced from World Bank Development Indicators (WDI, 2018) with the goal for assessing the dynamic relationship between consumption expenditure, real exchange rate and output in Nigeria,

Model Specification

Adopting the model of Dey and Tareque (2018) in Bangladesh, this paper introduced different variables to assess the relationships among consumption expenditure, real exchange rate and output in Nigeria with the targeted log- linear form specified as follows:

$$LCONSEXP = f(EXCHR, LGDP) \dots\dots\dots 1$$



Where;

LCONSEXP = log of consumption expenditure

REXCH = Real exchange rate.

LGDP = log of GDP (economic growth)

Unit Root Test

This paper used two forms of unit root tests involving the Augmented Dickey Fuller (ADF) and the Phillips-Perron (PP) approaches to identify the stationarity of the variables. The general forms of these tests are expressed as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \delta_{t-1} + \alpha_i \sum_{i=1}^p \Delta y_{t-1} + v_t \dots\dots\dots 2$$

$$y_t = \alpha_0 + \alpha_1 t + \alpha_1 y_{t-1} + \delta_t \dots\dots\dots 3$$

In this respect, the α represent the parameters of the model, v_t and δ_t are assumed to a white noise, Δy_t implies lag differences of the variable under consideration with p lag. The following hypothesis is used to test the stationarity of the variables.

For ADF $H_0 : \delta_1$ (Null hypothesis), [where $\delta_1 = \rho - 1 = 0$]

$$H_a : \delta_1 < 0 \text{ (Alternative hypothesis)}$$

For PP $H_0 : \delta_2 = 0$ (Null hypothesis)

$$H_a : \delta_2 < 0 \text{ (Alternative hypothesis)}$$

ARDL Approach to Co-integration Technique

The study adopts ARDL approach for co integration developed by Pesaran *et al.* (2001) to establish the long run relationship among consumption expenditure, real exchange rate and economic growth. The investigation of the unit roots properties using the ARDL techniques is therefore paramount to ensure that none of the variables is integrated of order two. Recent empirical studies have indicated that the ARDL approach to cointegration is more preferable to other conventional cointegration approaches such as Engle and Granger (1987) and Johansen and Juselius (1990).

The ARDL methods test the long run relationship between the variables of interest by computing the F-statistics to identify the significance of the lagged levels of the variables in the error correction form of the underlying ARDL model (Pesaran and Pesaran, 1996).

ARDL Bounds Test model for Co- integration

In carrying out bounds test, the paper used three variables of interest in the model given the null hypothesis that the coefficient of the long run equation is all equal to zero which denotes no cointegration as such, the model will specify only the ARDL short run model. But if the variables are cointegrated then the model is to run or specify the error correction model (ECM) or Vector error correction model (VECM). Hence, the outcome of bounds test determines whether to specify VECM, ECM or ARDL models. Specifying the bounds test co-integration implies carrying out cointegration test on the variables specified in the model taking each as a dependent variable one after the other to determine which equation is cointegrated so as to



estimate VECM or ECM and which equation has no cointegration and then estimate only short run ARDL model.

The coefficient of the ECM is required to have a negative sign necessary to identify the speed of adjustment to the equilibrium in the long run model showing how slowly or quickly the previous disequilibrium is corrected at present. Hence, Bannerjee, Dolado and Mestre (1998) hold that a highly significant error correction term is further proof of the existence of a stable long-term relationship.

The generalized ARDL framework takes the following form:

$$\Delta Y_t = Y_0 + \sum_{i=0}^N \delta_i Y_{t-i} + \sum_{i=0}^N \beta_i X_{t-i} + \varepsilon_{it} \dots\dots\dots 4$$

Where Y_t is a vector and the variables in (X_t) are purely I (0) or I (1) or co-integrated; δ and β are coefficients, Y is the constant; $i = 0 \dots N$ are the optimal lag orders, ε_{it} is the vector of error terms – is the unobservable zero mean white noise vector process otherwise, called serially independent or uncorrelated.

In simple form, the ARDL modelling approach involves estimating the following conditional error correction models:

$$\Delta \ln Y_t = \beta_0 + \beta_1 \ln Y_{t-1} + \beta_2 \ln I_{t-1} + \beta_3 \ln O_{t-1} + \beta_4 \ln N_{t-1} + \beta_5 \ln E_{t-1} + \beta_6 \Delta \ln Y_{t-1} + \beta_7 \Delta \ln I_{t-1} + \beta_8 \Delta \ln O_{t-1} + \beta_9 \Delta \ln N_{t-1} + \beta_{10} \Delta \ln E_{t-1} + U_t \dots\dots\dots 5$$

The structural lag of the model is determined using the Schwarz Bayesian Criterion. If co-integration is found based on the bound test, the error correction model (ECM) can be estimated. The ECM is a re-parametrization of the ARDL (Asteriou & Hall, 2007). The error correction models (ECM) of co-integration can be specified as follows:

$$\Delta Y_t = \alpha_0 + \alpha_2 t + \sum \Delta Y_{t-k} + \sum \Delta X_{t-k} + \pi e_{t-1} + e_t \dots\dots\dots 6$$

Where; Δ denotes the difference operator, e_t is serially independent random error with zero mean, and π is the error correction term (also known as the adjustment coefficient) derived from the long-run co-integration model. In fact, π tells us how much of the equilibrium error is corrected each period and it is expected to be negative and statistically significant. If $\pi=0$, then there is no adjustment and therefore there is no long run relationship (Pesaran *et al.*, 2001).

4. Results

The modelling on this paper starts with investigation of time series properties using the unit root testing approaches of both Augmented Dickey Fuller (ADF) and Philip Peron (PP) to determine the stationarity of the data either at levels i.e. I (0) or at first difference e.g. I(1).

The result in Table 1 shows that, all the variables are found not to be stationary at levels using ADF except the real exchange rate (REXCH) for PP unit root test as all the variables became stationary in their first difference at 1% level of significance. Hence, the null hypothesis of

Table 1: Unit Root Test Results



Variables	At Level		Variables	At First Difference	
ADF Unit Root Test					
	t-Statistic	Probability		t-Statistic	Probability
LCONSEX	-1.452447	0.5434	Δ LCONSEX	-4.390117	0.0021***
LREXCH	-1.653915	0.7465	Δ REXCH	-5.136023	0.0002***
LGDP	-0.044033	0.9469	Δ LGDP	-5.937689	0.0000***
PP Unit Root Test					
LCONSEX	-1.034640	0.7277	Δ LCONSEX	-13.57265	0.0000***
LREXCH	-3.014374	0.0449	Δ REXCH	-5.135417	0.0002***
LGDP	0.124515	0.9624	Δ LGDP	-5.992070	0.0000***

Source: Researchers' estimation using e-views 9.0. Note: *** denotes rejection of null hypothesis at 1% and 5% level of significance respectively.

individual series having unit root is rejected. This gives room to further test the long run relationship among variables of interest using ARDL bounds test for cointegration.

Table 2: Results of Bounds Test for Cointegration

Dependent variable	F-Statistic	Cointegration	Model to estimate
LCONSEX	$F_{consex} = 5.0471, t_{consex} = -4.2269$	Yes	Estimate ECM
REXCH	$F_{rexch} = 3.1706, t_{rexch} = -1.6532$	No	Estimate ARDL
LGDP	$F_{gdp} = 2.3626, t_{gdp} = -1.8462$	No	Estimate ARDL

Source: Researchers' estimation using E-views 9.0

The result from bounds test for cointegration as presented in Table 2 provides that cointegration exist among variables only when LCONSEX is a dependent variable necessarily to further estimate error correction model (ECM) while REXCH and LGDP has no cointegration with their respective explanatory variables when they stand as a dependent variable each.

Table 3: The Short-run Vector Estimates

Variables	Coefficient	t- statistics	Probability
Dependent Variable: ΔREXCH			
Constant	0.100744	1.523310	0.1402
Δ REXCH(-1)	0.061070	0.299017	0.7674
Δ LGDP(-1)	-0.089491	-0.370489	0.7141
Δ LCONSEX(-1)	0.265924	0.730656	0.4718
Dependent Variable: ΔLGDP			
Constant	0.131304	2.486902	0.0199
Δ LGDP(-1)	-0.169018	-0.876476	0.3891
Δ LCONSEX(-1)	-0.364374	-1.254047	0.2214
Δ REXCH(-1)	-0.221083	-1.355907	0.1873

Source: Researchers' estimation (2019), using E-views 9.0

The result in Table 3 shows that national output as proxied by GDP is statistically insignificant and negatively related to real exchange rate (REXCH) in the short whereas consumption expenditure (LCONSEX) is positively related to REXCH. This corroborates with the findings of Ho and Iyke (2017).



Also, in Table 3, the result shows that both consumption expenditure and real exchange rate are statistically insignificant and negatively related to GDP in the short run. This implies that both LCONSEX and REXCH cannot determine GDP in the short run.

Table 4: The Long-run Vector Estimates: Results of Error Correction Model (ECM)

Dependent Variable: LCONSEX				
Variable	Coefficient	Std. Error	t-Statistic	Probability
ECM(-1)	-0.686405	0.398106	-1.724177	0.0981
D(LCONSEX(-1))	-0.015971	0.005887	-2.712763	0.0124
D(LREXCH(-1))	-0.169948	0.077441	-2.194539	0.0386
D(LGDP(-1))	0.027230	0.097583	0.279050	0.7827
Constant	0.076439	0.026284	2.908143	0.0079

R-squared = 0.545439
 Adjusted R-squared = 0.531602
 S.E. of regression = 0.111674
 Sum squared resid = 0.286835
 Log likelihood = -124.4044
 F-statistic = 3.034508
 Prob (F-statistic) = 0.000200

Source: Researchers' Estimation (2019), using E-views 9.0

The results in Table 4 indicated that in the short run, the coefficient of LCONSEX is negative and statistically significant. Meaning that, consumption expenditure of the immediate past year has a negative and significant influence of about 0.02% on current consumption expenditure. While, the real exchange rate is also statistically significant but negatively related to consumption expenditure. This implies that effect of exchange rate volatility may distort consumption pattern and this corroborates with the work of Ho & Iyke (2017). But the coefficient of LGDP is positively related to consumption expenditure as in line with the findings of Aslam, (2017)

However, the result also shows that error correction term (ECM) is found to have a negative sign with a coefficient of -0.68 suggesting that a disequilibrium from the previous years is adjusted and corrected at the speed of about 68% in the following year, meaning that the adjustment takes place rapidly.

Diagnostic Tests

The paper employed diagnostic test in order to test for the serial correlation effect of the estimated ECM model with the aid of the Breusch – Godfrey Serial correlation LM test as shown in the table below:

Table 5. Breusch – Godfrey Serial Correlation LM test

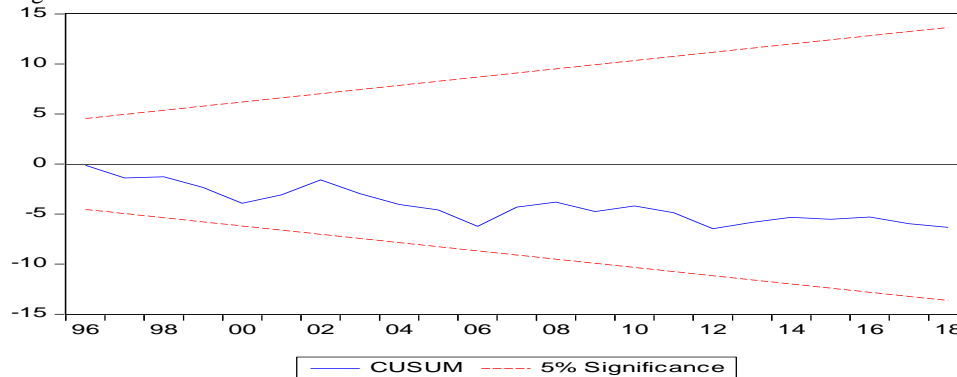
F-statistic	0.523431	Prob. F(1,22)	0.8797
Obs*R-squared	0.29790	Prob. Chi-Square(1)	0.8630

Source: Researchers' estimation (2019), Using E-views 9.0



In Table 5, the serial correlation LM test statistic observed R- squared probability value is 0.2979 which is greater than 0.05 critical values. This suggests that the model is free from the effect of serial correlation.

Figure 1: Cusum Plot of Recursive residuals of ARDL Model



The CUSUM is used for the stability tests of the model. The finding indicates that the parameters of the model used are relatively stable, consistent and reliable. Hence, it lies within the boundary of 5% significance. This implies that the empirical result of this study can be suited for policy inference.

5. Conclusion and Recommendations

The study assessed the dynamic interplay between consumption expenditure, real exchange rate and output in Nigeria. Utilizing the time series data from 1988 to 2019, the result of ARDL bounds test for co-integration suggests that only when the log of consumption expenditure (LCONSEXP) is a dependent variable that co-movement exist among variables. While, the result of short run estimate shows that real exchange rate, GDP and consumption expenditure are statistically insignificant. But in the long run, REXCH is statistically significant but negatively related to LCONSEXP whereas GDP is positively related LCONSEXP but statistically insignificant. Hence, the paper concludes that real exchange rate is a significant determinant of consumption expenditure than the national output thereby recommending for the policies that will ensure stability in the volume of money supply, exchange rate and price level necessary for improved productivity in Nigeria.

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