EXCELLENCE
AND SERVICE

ABIA STATE UNIVERSITY

EXCHANGE RATE FLUCTUATIONS AND GOVERNMENT INFLUENCE ON THE ECONOMY: A CAUSALITY SURVEY (1970-2006).

BY

EMEKA J. OKEREKE Ph.D

*Department Of Finance And Banking, Faculty Of Management Sciences,
University Of Port Harcourt, Choba, Rivers State, Nigeria, Africa.
E-mail /GSM No: erokereke77 @Yahoo.com; +234-08033795828*

NZOTTA SAMUEL M. Ph.D

*Department of Project Management, School of Management Technology,
Federal University Of Technology, Owerri, Imo State, Nigeria*

And

ANYANWU, GODSON I. B.Sc. MBA (Fin).

*Department of Banking and Finance, Faculty of Business Administration,
Imo State University, Owerri.
E-Mail/ GSM.: amaraihuemma@yahoo.com; 2348037097582.*

ABSTRACT

The paper on "Exchange Rate Fluctuations and Government Influence on the Economy: A Causality Survey (1970-2006)" is aimed at establishing a cause and effect relationship between exchange rate (EXCR) and the ratio of government expenditure on gross domestic product (GDP) proxy by Level of Government Influence on the Economy (LGIE). In order to achieve this, the study utilized secondary and primary-secondary (internal) data which are converted data from the original data and this constitutes our operational data. The study carried out a multiple regression analysis patterned after the modified version of causality model. It was found, among others, that LGIE is not a significant factor affecting exchange rate in Nigeria. The fact that the level of government influence on the economy has dominant explanation and influence on exchange rate fluctuations in Nigeria calls for onjective manipulation of this variable and other related variables, in their most economic meaning, in order to achieve exchange rate and macroeconomic stability.

1. INTRODUCTION

Most modern economies depend significantly on the financial operations and policies of government. The regulation of the economy is founded on government activities, which culminate in public expenditure, among others. To this end, economic growth cannot be discussed in isolation from government expenditures. Understandably, and in line with public finance theories and studies, public expenditure and economic growth are positively related. Wagner's Law of Increasing State Activities is in agreement with this finding/conclusion. Empirical evidences of Ram (1987), World Bank (1988), Baro (1989), Cullison (1993), and Okonkwo (1998) support this relationship. An important issue in these studies is the sustainability of economic growth vis-à-vis government expenditure especially in the wake of persistent fluctuations in the variables that

162

determine both economic growth and public expenditure. This is where exchange rate, as a major variable comes in.

Exchange rate is a critical macroeconomic variable that can never be wished away in any economic reform agenda (Arinze and Hogan (2000). Daniels et al (1976) defined exchange rate as the number of units of currency. William and Alan. (1979:731), posit that exchange rate states the price, in terms of one currency, at which another currency can be bought. It is also defined as the price of the currency in terms of another (CBN 1997:8). These definitions can be translated to mean that exchange rate is the price one pays in one's home currency to purchase a certain quantity of the currency of another country. For instance, the rate at which naira (Nigerian currency) exchange for another country's currency – United States dollars, British pound sterling, German mark, Swiss francs, Japanese yen, etc. is the exchange rate. Given two different currencies the Nigeria naira and the British pound sterling, for example, the exchange rate between the naira and the pound sterling is equal to the unit(s) of the naira needed to purchase one (or more) units of the British pound. From these examples, two different definitions of exchange rate emerge. Thus, exchange rate can be defined as the price of a unit home currency in terms of an international currency (for example, number of units of British pound sterling per unit of Nigeria naira). In another way, exchange rate may be defined as the number of units of home currency per unit of international currency (for example, the number of units of home naira per British Pound Sterling). These two definitions give a naira to Pound Sterling exchange rate and pound Sterling to Naira exchange rate. The choice of either of the definition will affect the result of any economic analysis and more importantly the appreciation or depreciation of the currency. For instance, a higher value of naira in the first definition would indicate depreciation while a lower value would indicate an appreciation. This is the reverse of the second definition, if it is applied. Nevertheless the first definition is applied in this study as in Akan (2006). It must be noted that the two definitions are reciprocal to each other and the use of either of them is a matter of convention. In this instance consistency is required in their application.

From the foregoing, the studies reviewed treated government expenditure, public expenditure, government spending, or public investment and economic growth proxy by Gross National Product (GDP) separately. Exchange rate factor has not been integrated in any of the studies reviewed. Interestingly, exchange rate is a critical element in any meaningful economic management. Economic theory has proved that exchange rate affects a nation's economy through transmission mechanism, among others. Studies have also shown that internal and external imbalances are caused by the exchange rate phenomena. No wonder different governments at various times adopt a variety of exchange rate policies and economic programmes aimed at creating an economic environment devoid of severe shocks. It has been argued that government expenditure is responsible for the distortions or instability in exchange rate given that exchange rate operates as a price mechanism. On the other hand, exchange rate is said to have influenced government expenditure. It becomes imperative to always monitor and administer these two variables in an effort to ensuring their efficacy in the management of the economy.

Unfortunately, very little empirical studies have been carried out, especially within the local arena, to find out the impact of exchange rate on government expenditure and/or economic growth. Given this gap, we have tried to take a more comprehensive approach by looking at the three variables together: exchange rate, government expenditure and economic growth measured by Gross Domestic Product (GDP). Therefore, our study is focused on exchange rate fluctuations and ratio of government expenditure on Gross Domestic Product (GDP) proxy by the level of government

influence on the economy (LGIE). This is with a view to finding the cause and effect relationships using a stronger tool of a modified version of Granger's (1969) causality test.

For a proper flow, this paper is divided into six parts. Parts 1 and 2 introduce and review the study respectively. Part 3 provides the methodological treatment while part 4 looks at the estimation results and their interpretations. Economic analysis and policy implications are discussed in part 5. The paper concludes and proffers recommendations in part 6.

2. Literature Review

A number of studies have been carried out on the role of government on economic growth. Majority of these studies have positive relationship while others do not see any impact. Some of those that found a significant positive relationship were based on the framework of the growth model which utilizes the product on function of input-output analysis expressed traditionally as

$$Y = f(L,K) \dots\dots\dots\dots\dots (1)$$

Where Y = Output; L = Labour input; K = Capital input

If K is made up of Public Capital (Investment) (PK_1) and Private Capital (Investment) (PK_2)

Then, $Y = f(L, PK_1 PK_2) \dots\dots\dots\dots\dots (2)$

Agiobenebo and Cole (1998:263-67) found a significant role of capital (Input) on economic growth (Output). This means that capital is the most important factor in Nigerian production and growth. However, capital in Agiobenebo and Cole's study did not segregate between public and private capital. This finding collaborates with those of Aschauer (1989a &b, 1990) and Barro (1990). Okonkwo (1998) in his study separated the capital into two and applied ordinary regression analysis and found that public investment is a significant factor in economic growth. This result confirms the work of Arghyrou(1999). On a causal treatment of the same study by Okonkwo(1998) using Granger (1969), he found the coefficients to be insignificant. This suggests that there is no support for the causal hypothesis -meaning that public investment is not a significant factor to economic growth in Nigeria. This agrees with the Critical-Limit Hypothesis pioneered by Clark (1945) and the Crowding Out Hypothesis by Kormendi and Meguire (1986).

Most previous studies examining exchange rate and macro economic variables at one end and macroeconomic variables and exchange rate fluctuations at another end adopted either simple regression or multiple regression analysis. Generally, empirical evidences on exchange rate and public investment (spending) as a macroeconomic variable are very scanty. However, a number of researchers have done some work. William and Klaus (1993) examined public spending and real exchange rate using Rorigues hypothesis of 1989. They found that for a given trade deficit, an increase in public spending affects real exchange rate because such increase implies a corresponding decline in private spending. If the public sector has a higher propensity than the private sector to spend on imports rather than domestic goods, a shift to more public and less private spending implies increased demand for imports and a corresponding depreciation of the real exchange rate. Testing this showed mixed results for the sample countries: a higher government spending leads to appreciation of the real exchange rate for Argentina, Côte d'Ivoire, Morocco, and Zimbabwe and to depreciation for Chile, Columbia and Mexico. This result shows that the same policy may not necessarily achieve the same result for different countries.

Essentially what will determine the effect of fiscal deficit on exchange rate is the direction of government spending. Khan and Lizondo (1987) in Williams and Klauss(1993:234) stated that exchange rates are also affected by whether government spends more on tradable than on tradable. Sometimes spending is either diverted to individual accounts or to non essential

unproductive areas. Such spending will not positively impact on real exchange rate. A study by Onuchuku (1998) confirmed diversion of public funds by government officials in Nigeria.

The studies reviewed above looked at the relationship between the variables and sometimes the cause and effect relationships as in Okonkwo (1998). However, there is no effort to use exchange rate as an output variable and government (public) spending (expenditure) as input variable and vice versa. Again, there is no effort to integrate government expenditure, the economy and exchange rate and make each an input at one end and output at another end in the regression equation. Granger's (1969) causality model accommodates this arrangement and this is the pathway of this paper.

3. Methodology

The study utilized secondary and internal (primary-secondary) sources. The primary-secondary or internal data are converted data from the original data and this constitute our operational data applied in the study's empirical analysis and test. The original data is sourced from Central Bank of Nigeria (CBN) and Nigeria Deposit Insurance Corporation (NDIC) publications. The study carried out a multiple regression analysis of the Granger (1969) causality model. The modified version, which is adopted here, is further modified in order to meet our research objectives. Our modifications and analyses are based on the framework of a growth model, which is a straight forward production function that treats macroeconomic variable of level of government influence on the economy as similar to production input while exchange rate stability is the output, and when reversed, the opposite is the case.

Operationally, Granger's (1969) definition of causality, which provided a good foundation in causality analysis, is most preferred and is stated as 'x is a Granger cause y (denoted as x-->y), if present y can be predicted with better accuracy by using past values of x rather than by not doing so, other information being identical' This also means that Granger's (1969) causality test regresses a variable Y on lagged values of itself and another variable X plus a constant. If X is significant, it means that it explains some of the variance in Y that is not explained by lagged values of Y itself. This indicates that X is causally superior to Y and is said to dynamically cause or granger cause Y. According to Granger (1969), a variable X is said to cause another variable Y with respect to a given information set that includes X and Y, if current Y can be predicted better by using past values of X than by not doing so, given that all other past information in the information set is used. On the other hand, Y is causing X if we are better able to predict X using all available information than the information apart Y had been used. This is statistically presented as

$$Y_t = \alpha_j Y_{t-1} + \beta_j \sum_{j=1}^{m} X_t + U_t \quad ....(3.)$$

Where Y_t = Dependent Variable at time t

α_j = Coefficient of lagged Y at time j

Y_{t-1} = Lagged Y value

β_j = Coefficient of the Independent Variable X

X_t = Independent Variable at time t

U_t = Error term

m

Σ = Sum of values from year 1 to m^{th} year.

j =1

The above model was modified in the course of time as in Pierce and Haugh (1977), Ocedokun (1987), Ezirim (1999) and Okereke (2004). Thus, causality test regresses a variable Y on lagged values of itself plus X's present and past values. This is represented mathematically in the form

Y=f(Past Values of Y, Present and past Values of X)............(4)

This is same as

m

$$Y_t = \varphi_0 + \varphi_1 Y_{t-1} + \varphi_2 \Sigma (X_t + X_{t-1}) + U_t .... (5)$$

j =1

Where, the terms remain as previously defined.

According to the modified version, causation is flowing from X to Y if Y is better predicted by all the available information in X other than Y. On the other hand, X can be predicted if Y is taken as independent variable in the model and treated as such. This means that causation in equation 5 can move from Y to X. Given this, we can have a reverse of equation 5 as:

m

$$X_t = \varphi_{01} + \varphi_3 X_{t-1} + \varphi_4 \Sigma (Y_t + Y_{t-1}) + E_t ....(6)$$

j =1

This means that Y is said to Granger cause X and causation from Y to X is identified if the coefficients (φ·s) of the present and past values of Y in equation 6 are significantly different from zero as a group. On the other hand, causation from X to Y is identified if the coefficients (φ· s) of the present and past values of X in equation 5 are significantly different from zero as a group. The significance of the effect of the causality (causal variable) is tested using the traditional statistical F-test (whether it is positive or negative). That is whether the change in the independent variable significantly increases or decreases the dependent variable and vice versa.

Applying the model to our operational variables we have

$$EXCR_t = a_{01} + a_1 EXCR_{t-1} + a_2 \Sigma(LGIE_t + LGIE_{t-1}) + P_t \ldots\ldots 7$$
$$LGIE_t = b_{01} + b_1 LGIE_{t-1} + b_2 \Sigma(EXCR_t + EXCR_{t-1}) + p\hat{}_t \ldots\ldots 8$$

From equations 7 and 8 causality flows from Level of Government Influence on the Economy to exchange rate if the coefficient of the joint values of $LGIE_t + LGIE_{t-1}$ is found to be significant. Otherwise there is no causality flowing from Level of Government Influence on the Economy to Exchange Rate, which implies that Level of Government Influence on the Economy is not a significant factor affecting exchange rate in Nigeria.

Equation 8 would determine whether causality flows from exchange rate to Level of Government Influence on the Economy only when the coefficient of the combined values of $EXCR_t$ and $EXCR_{t-1}$ is significant at conventional level (5%).

The letters/numbers in the models are defined as follows:

$a_{01 \text{ and } b01}$ = Intercept of the regressand or dependent variable at any given direction

a_1 and a_2, b_1 and b_2 = Coefficients (measurement parameters) of lagged variables and combined values of both present and past variables (regressors).

P_t, $P\hat{}_t$, etc = Error Terms.

4. Model Estimation Results and Interpretations

Average Real Exchange Rate on level of Government Influence on the Economy (Present and Past Values)

$$EXCR_t = .396 + 1.080 EXRC_{t-1} - .137 LGIE_{t+t-1} \ldots\ldots\ldots 9$$

t
(1.264) +   (4.440);   (-.568)
Prob
(.220)   (.000)
(.578)
R =   .949; R^2 = .900;

AR^2 = .891;   F = 94.897;   F- sig. = (.000);

DW = 1.079

Level of Government Influence on Economy on Average Real Exchange Rate (Present and Past Values)

$$LGIE_t = -5.1160 + .676 LGIE_{t-1} + .312 EXCR_{t+t-1} \ldots\ldots 10$$

t   (-1.369)
(5.604)   (2.586)
Prob   (.185)
(.000)   (.017)
R =   .949; R^2 = .900;

AR^2 = .891
F =   126.996;   F- sig. = (.000);

DW = 1.626

Table 1:

Summarised Result of Model Estimation Variables*

S/N	Variable	R (%)	R² (%)	Regression sign	A Priori Expectation	At 5% level of significance		
						Correlation	Causality	
							From MECV to EXCR	From EXCR to MECV
1	Exchange Rate in	95	90	-	E	Ns	Ns	
2	LGIE	95	90	+	E	S		s

Source: Estimation Results from Equations 9 and 10, as generated from SPSS

Where e = expected (as shown in the directional sign of the independent variable)

+ = directional sign of the independent variable

s = significant

ns = not significant

MECV = Macroeconomic Variable

*Fully explained under section 5 below

5. Economic Analysis and Policy Implications

Equation 9 results give correlation coefficient (R) as .949. This shows that the degree of association (correlation) between exchange rate and exchange rate lagged, Level of Government Influence-on the Economy (LGIE), present and past values is about 95 percent. Accordingly, this is a highly significant positive relationship in the model as in the descriptive analysis. The explanatory power of the model (R²) is about 90 percent. This means that the ability of the independent variables to explain fluctuations in exchange rate (EXCR) is about 90 percent. The coefficient of the combined values of LGIE (present and past) is not statistically significant at 5% probability level. This suggests that causality is not flowing from level of government influence on economy (LGIE) to exchange rate. It also means that LGIE is not a significant factor affecting exchange rate in Nigeria.

From the result in equation 10, the value of R is .949, which suggests that the degree of relationship between LGIE and its lagged value, exchange rate present and past values is approximately 95 percent. This means a very strong association. In other words, the dependent and explanatory variables exhibit a highly significant positive relationship. The explanatory power of the model, represented by R², is .900 or 90 percent. This means that 90 percent of the variations in LGIE is explained by the variations in LGIE lagged, exchange rate, present and past values.

On cause and effect relationship, the coefficient of the combined values of exchange rate is statistically significant at 5% level of significance. This indicates that causality is flowing from

exchange rate to LGIE. This also means that exchange rate is a significant factor influencing level of government influence on the economy (LGIE) in Nigeria.

Exchange rate, as a dependent and independent variable in equation 9 and 10 respectively exhibits a very strong association between the variables. The causality tests indicate a one-way causation. Thus, causality is only running from exchange rate (EXCR) to level of government influence on the economy (LGIE) but non is running from LGIE to EXCR. This means that LGIE is a significant factor influencing exchange rate. This indicates that government policy changes and implementation is very significant in either enhancing or deteriorating the value of domestic currency. Reversing the direction of causation, exchange rate is not a significant factor affecting LGIE in Nigeria. Exchange rate is essentially a monotonic decreasing function of government expenditure. When such expenditures are properly channeled, it enhances the productive base and brings about a strong exchange rate. Unfortunately, the Nigerian economy has been experiencing weak exchange rate, which confirms that government expenditure is a source of leakage to the limited foreign exchange resources of the country. The exchange rate spread (premium) can also be identified as a significant factor apart from the issue of 'rumours'. It has also been observed that corruption at different levels of government is a deadly disease killing the various sectors of the economy and decisive steps must be taken to check this canker worms eating deep into the fabrics of the Nigerian economic, political, social and spiritual systems. According to Onuchuku (1998:117) in his study concluded that 'public investment spending in Nigeria is characterized by corruption and inefficiency. Funds were either embezzled or diverted'.

The study found multiple exchange rates, which is economically contradictory and requires a policy shift. Exchange rate policy should be comprehensively articulated. This involves the public and private sectors of the economy having a fair deal in *access and utilization* of foreign exchange resource. The price gap (if any) between the public and private sectors of the economy (arising from different rates) should be made to be very insignificant to avoid diversion and abuse. It calls for the pursuit of a more *Liberalized Exchange Rate Policy*.

6. Conclusion and Recommendations

Exchange rate factor has proved, from existing literature, to be a significant and critical instrument in any economic management. Its stability in relation to realities of our immediate environment determines significantly the progress of other production output and, by extension, the prosperity of economic indicators. Therefore whatever economic variable (s) that affects its stability negatively should be seriously and objectively addressed and managed. The duality treatment of the dependent and independent variables in the study using Granger causality test, as modified, showed that level of government influence on the economy is not a significant factor affecting exchange rate stability. On the other hand, exchange rate is a significant factor affecting the level of government influence on the economy. These conclusions call for a concerted attention on the realities of our immediate economic structure and environment and the need for a more indigenous policy framework that is in line with Nigerian peculiar economic, social and political circumstance/environment.

Based on the findings, discussions and conclusions therefrom, the following recommendations are proffered:

The fact that the level of government influence on the economy has dominant explanation and influence on exchange rate fluctuations in Nigeria calls for objective manipulation of this variable and other related variables, in their most economic meaning, in order to achieve exchange rate and macroeconomic stability.

Sources of pressure on the exchange rate must be identified and checked. Multiplicity of exchange rates must be avoided. The dichotomy between government purchase of foreign exchange and others should be abolished. Government should buy in the same market at the same rate, as pointed out earlier.

Government must show some fiscal discipline and also should vigorously pursue economic independence with some sub-regional integrative characteristics, which must be realistic and consistent.

REFERENCES

Agiobenebo T.J. and Cole I.M (1988) "Real Money Balances and Imports in   Aggregate Nigerian Production" *Journal of Industrial, Business and Economic Research (The JIBER)* Vol. 2 No. 1. Jan-June.

Akpan P.L. (2006) Exchange Rate Volatility and Macroeconomic Performance in Nigeria (1970-2003). An Unpublished Ph.D Dissertation presented to the Department of Economics, School of Graduate Studies, University of Calabar, Nigeria.

Arghrou M. G (1999) "Public Expenditure and National Income: Time Series Evidence from Greece", Paper Presented at the International Economics and Finance Society Conference, City University, London, April.

Arinze A.C and Hogan, J. (2000) "Exchange Rate Volatility and Foreign Trade: Evidence from LDCs", *Journal of Business and Economic Statistics,* 18(13).

Aschaner D.A. (1989 (a)) "Is Public Expenditure Productive? *Journal of Monetary Economics* 23 No. 2.

_____. (1989 (b)) "Does Public Capital Crowd out Private Capital." *Journal of Monetary Economics* 24, No. 2.

_____(1990) "Why is Infrastructure Important?" In Munnel A.H. ed. (1990) *Is there a shortfall in Public Capital Investment?* Federal Reserve Bank of Boston Conference Series No 34.

Barro R.J. (1989) "A cross-country study of Growth, Saving and Government" NBER Working Paper No. 2855, Cambridge MA

Clark (1945) "Public Finance and Changes in the value of Money" *Economic Journal* December in Bhatia H.I. *Public Finance*, Delhi: Vikas Publishing House PVT Ltd.

Collins W.E. (1993) "Public Investment and Economic Growth" *Federal Reserve Bank of Richard Economic Quarterly*, Vol. 79, No. 4.

Daniels J. D et al. (1976) *International Business: Environment and Operations,* Meulo Park; Addison-Wesley Publishing Company.

Ezirim, B. C (1999) "Intermediation Functions of the Financial Superstructure and Economic Growth: Evidence from Nigeria" Unpublished Ph. D. Dissertation, University of Port Harcourt, Port Harcourt.

Granger C.W.J. (1969) "Investigating Causal Relationships by Econometric Models and Cross-Spectral Methods" *Econometrica.* Vol. 35.

Kormeudi R.C. and Meguire P. (1986) "Government Debt, Government Spending and Private Sector Behaviour: Reply" *America EconomicReview,* Dec.

Odedokun, M.O. (1987) " Causalities Between Financial and Real Sector Variables in Nigeria: A comparission of Results from Granger's and Sim's Tests" *The Nigerian Journal of Economic and Social Studies.* Vol. 29 No.3.

Onuchuku O. (1998), "An Econometric Study of Public Investment Behaviour in Nigeria (1970 – 1994)" Ph.D. Dissertation, University of Port Harcourt

Okereke E.J (2004) "Exchange Rate Fluctuations and Macroeconomic Stability in Nigeria (1970-2001)", Unpublished Ph.D Dissertation, SMAT, Federal University of Technology, Owerri (FUTO).

Okonkwo (1998) "Public Investment and Economic Growth in Nigeria. A Casual Analysis" *JIBER*, Vol. 2, No. 1, Jan – June.

Pierce D.A and Haugh L.D (1977) "Causality in Temporary Systems: Characterizations and a Survey", *Journal of Econometrics,* Vol.5, July.

Ram R. (1987) "Wagner's Hypothesis in Time Series and Cross Section Perceptive: Evidence from 'Real' Data for 115 Countries", *The Review of Economics and Statistics* 69, 2 May.

Williams E. and Klaus S. (1993) "Fiscal Deficit and Macroeconomic Performance in Developing Countries" *The World Bank Research Observer,* Vol. 8. No. 2.

William J. B. & Alien S. B. (1979) *Economics: Principles and Policy,* New York. Harcourt Brace Jovanovich, Inc.

World Bank (1988) *World Development Report,* Oxford University Press.