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The Fiscal-Monetary Policy and Economic Growth in Nigeria: Further Empirical Evidence

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Abstract: The objective of this study was to re-estimate and re-examine the relative effectiveness of fiscal and monetary policy on economic growth in Nigeria using annual data from 1970-2007. The Error Correction Mechanism and Cointegration technique were employed to analyze the data and draw policy inferences. The findings were consistent with previous empirical findings. The empirical result showed that the effect of monetary policy is much more stronger than fiscal policy and the exclusion of the degree of openness did not weak this conclusion. The implication of this for the policy maker is that there should be more emphasis and reliance on monetary policy for the purpose economic stabilization in Nigeria.

Key words: Fiscal policy, monetary policy, economic growth, co-integration, Nigeria

INTRODUCTION

Sustainable economic growth and development is undoubtedly, one of the most challenging development issues in the Third World countries today. Even from the days of Father of Economics, Adams (1992), the main focus of macroeconomic thinkers and policy makers is how to attain macroeconomic stability. The two major economic policies often use to stabilize any economy of the world are monetary and fiscal policies and their cardinal tools are money supply and government expenditure, respectively (Asogu, 1998). In Nigeria, specifically before SAP, there had been an undue emphasis on the use of fiscal policy at the expense of monetary policy (Darrat, 1984) which is frequently breached. It was in 1987, after SAP that emphasis shifted on monetary policy following the wake of deregulation of money market which prevents money from becoming a major source of disturbance in the Nigerian economy. Today, fiscal and monetary policies are inextricably linked in macro economic management as developments in one sector directly affect developments in the other. Moreover, there is consensus among the economists that monetary and fiscal policies are either jointly or individually affecting the level of economic activities but the degree and relative potency of these policies has been the subject of debates and controversies between the Keynesian and the Monetarist.

Monetarist strongly believes that monetary policy exact greater impact on economic activity as unanticipated change in the stock of money affects output and growth i.e., the stock of money must increase unexpectedly for central bank to promote economic growth. In fact, they are of opinion that an increase in government spending would crowd out private sector and such can outweigh any short-term benefits of an expansionary fiscal policy. On the other hand, the concept of liquidity trap which is a situation in which real interest rates cannot be reduced by any action of the monetary authorities was introduced by Keynesian economics. Hence, at liquidity trap an increase in the money supply would not stimulate economic growth because of the downward pressure of investment owing to insensitivity of interest rate to money supply. John Maynard Keynes recommends fiscal policy by stimulating aggregate demand in order to curtail unemployment and reducing it in order to control inflation. While there are several studies on this debates between Keynesian and Monetarist in the developed countries, only fragmented evidence have been provided on this issues in the case of Nigeria. Thus, the sole objective of the study is not to resolve the fiscal monetary policy ranging debate but rather to re-estimate and re-examining relative effectiveness of both policies focusing on money supply and government expenditure in a small opened and developing economy like that of Nigeria using recent econometrics technique of estimation. Undoubtedly, findings from this study would be of immense value for suggesting which option is more ideal for application in economic stabilization programme of the Nigerian economy at any moment.

Literature review

Evidences from developed and developing countries: Many studies on the relationship between fiscal and

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monetary policy on growth in developed and developing countries had been conducted. Among which is the study of Anderson and Jordan (1968). The study carried out in United State using quarterly data tested three null hypothesis that the effect of fiscal policy relative to monetary policy on economic growth (proxied by government expenditure, money supply and Gross Domestic Product) is greater, more predictive and faster. The result of the tests is consistent with the alternative hypothesis; the effect of money supply relative to government expenditure is greater more predictable and faster on growth. The study recommends monetary policy for the purpose of economic stabilization.

The conclusion of the study of De Leeuw and Kalshbrenner (1969) however, contradicted this position. When De Leeuw and Kalshbrenner (1969) redefined the original measures adopted for some of the policy variables; the result showed that fiscal policy exerts greater impact on economic growth than monetary policy. Also, when Friedman (1977) extended the original data (1933-1968) used in the study of Anderson and Jordan to 1976, his empirical research found that government expenditure became significant.

Though, Carlson (1978) was of opinion that Friedman's (1977) was suffering from the problem of heteroscedasticity and suggested that the regression should be estimated in percentage first difference form.

In an attempt to resolve the controversy, Batten and Hafer (1983) carried out his empirical study outside United State on 5 developed countries namely Japan, Canada, United Kingdom, France and Germany using St. Louis equation and found that monetary policy exact greater impact on economic growth in these countries than the fiscal policy and equally that the St. Louis can be applied to a variety of other countries. Chowdhury (1986) using Ordinary Least Square technique (St. Louis equation) on data collected from Bangladesh found that fiscal rather than monetary action had greater influence on growth. Cardia (1991) however, found that fiscal policy and monetary policy are playing only a small role in influencing economic growth.

Evidences from Nigeria: Specific studies examining the relative effectiveness of both monetary and fiscal policy are not many in Nigeria. For example, Ajayi (1974) and Aigbokhan (1985) employed original version of the St. Louis equation were the first among the earliest studies to extend the debate to less developed countries with particular reference to Nigeria. Ajayi (1974) maintained that much reliance have been placed on the use of fiscal policy rather than monetary policy. He then set out to investigate the usual hypothesis for the period 1960-1970 in Nigeria. In his study, he estimated the variables of fiscal and monetary policies using Ordinary Least Square technique. His result was line with that of Anderson and Jordan (1968) revealed that monetary actions are much larger and more predictable than fiscal action while empirical result of Aigbokhan (1985) favoured fiscal policy. Aigbokhan (1985) employed the elasticity version of the St. Louis equation and found that monetary policy exacts greater impact on economic growth in Nigeria.

Familoni (1989) argued that before monetary policy can produce desired result as maintained by the classical economist, highly integrated and monetized economy and regular information network system are indispensable. He, however, lamented that the Nigerian economy lacks the fundamental, flexibilities (in respect to interest rate, treasury certificates, etc.) which could have aided a much more effective use of monetary policy. He therefore, denounced the classical preference of monetary policy over fiscal policy on the basis of their empirical evidence and predicted that it would only work for a developed economy and suggest where necessary the mixture of both policies for better performance in a developing economy like Nigeria. Olaloye and Ikhide (1995) used monthly data for the period 1986-1991 to estimate a slightly modified form of the basic St. Louis equation and found that fiscal policy have been more effective.

Asogu (1998) adopted modified version of the St. Louis equation as in Batten and Hafer (1983) and provide estimates, based on first differences and percentages changes of the data. The results also include the respective t-ratios, beta and elasticity coefficients to facilitate direct comparisms.

The result of the estimate showed that coefficients of money supply were statistically significant while those of government expenditure were not significant. This agrees with the hypothesis that monetary actions are more potent than fiscal policy. However, coefficient of Export is not significant and this confirms earlier results by Ubogu (1985) such that the exclusion of export variable in the earlier studies on Nigeria appear not to weaken the conclusions of relatively greater and more stable potency of monetary actions compared with fiscal operations, rather sharp fluctuations of such fiscal actions indicate that they are more distortionary than achieving the desired impact or direction on the target variables.

Ajisafe and Folorunso (2002) report after using annual series data for the period of 1970-1998 that monetary rather than fiscal policy exerts a great impact on economic activity in Nigeria and that the emphasis on fiscal action of the government has led to greater distortion in the economy. However, the study recommends that both policies should be complementary.

MATERIALS AND METHODS

Model specification: Following the previous empirical studies, the appropriate model is specified thus:

$$Y_t = f(DOPNESS_t, M_{2t}, GEXP_t) \quad (1)$$

Where:

Y = The GDP
M_2 = Broad money specification
GEXP and DOP = The degree of openness and government expenditure, respectively

Log Linear form for Eq. 1 is derived as follows:

$$\ln Y_t = b_0 + b_1 \ln M_{2t} + b_3 \ln GEXP_t + b_4 \ln DOPNESS_t + e_t \quad (2)$$

In is the natural logarithm, e_t is a normally distributed error term with zero mean and variance equal to 0. It is expected that b_1, b_2, b_3 and $b_4>0$.

Estimation techniques: Since data employed are time series, we therefore used an Ordinary Least Square (OLS) method of estimation. In other to avoid spurious result, we first test for the order of integration of the individual series by conducting unit root test for stationarity.

According to Engle and Granger (1987), a non-stationary series is said to be integrated of order d if it can be made stationary by differencing it d times; expressed as $X_t \sim I(d)$. After confirming firstly that the series are generated by first order autoregressive process, i.e., AR(1) of the form:

$$y_t = y_{t-1} + \varepsilon_t \quad (3)$$

Because of the possible autocorrelation, the above equation is extended to allow for AR (n) process yielding Augmented Dickey Fuller (ADF) test of the term:

$$\Delta y_t = \beta y_{t-1} + \sum_{i-1}^{n} \beta_i \Delta y_{t-i} + \varepsilon_t \quad (4)$$

Where:

y_t = A particular variable
β = Parameter
ε_t = Error terms assumed to be white noise i.e., $\varepsilon_t \sim IID(0,\sigma^2)$

Philip perron z test will be employed along with ADF test as Pesaran and Pesaran (1997) argued that the ADF unit root testing procedure is not very powerful in finite samples hence, the Philips-Perron (PP) (Philips and Perron, 1988) unit root test is used as one alternative. If the variables of concern are all stationary at level, we then run an OLS regression of the variables on levels and test for cointegration using Johansen test.

The existence of cointegration allows for analysis of the short run dynamic model that identifies adjustment to the long run equilibrium relationship through the error correction model representation. It follows that cointegration is a necessary condition for error correction model to hold (Engle and Granger, 1991). Hylleberg and Mizon (1989) have given a detailed analysis of cointegration and error correction mechanism. Also, Philips and Loretan (1991) have considered a variety of ways of representing cointegrated systems with particular emphasis on error correction model representation. Indeed, such models incorporate both the economic theory relating to the long run relationship between variables and short run disequilibrium behaviour. The next step is the adoption of the short run model with an error correction mechanism. Adopting the Engle and Granger representation, we employ an error correction dynamic specification of the form:

$$\Delta Y_t = \alpha_o \Delta Z_t + \alpha_2 (Y-Z)_{t-1} + e_t \quad (5)$$

For real Y_t where Z is the vector of variables that cointegrate with each growth equation. Alternatively, Eq. 5 can be written as:

$$\Delta Y_t = \alpha_o L \Delta Z_t + \alpha_2 ECM_{t-1} + e_t \quad (6)$$

where, L is lag operator and ECM is the time series of residuals from the cointegrating vector. Equation 6 incorporates a corrective mechanism by which previous disequilibria in the relationship between the level of growth rate of output and the level of one or more of its determinants are permitted to affect the current change in growth. In this way, an allowance is made for any short run divergence in output growth rate from the long run target holding. Equation 6 can then be reduced to a parsimonious equation through the elimination of insignificant terms and the imposition of constraints that hold a reasonable approximation (Adams, 1992; Buoghton, 1991). The result of re-parameterization of this equation is then used in further analysis.

Unit root tests: Taking into consideration the steps suggested in the previous section, we start by testing for the order of integration of the variables which appear in the models. In other to characterize the time series property of the variables of our interest, both Augmented Dickey Fuller and Phillip-perron z tests were employed. All variables are regarded as non-stationary at their levels

Table 1: ADF and PP test

	ADF-test		PP-test	
Unit root test	No trend	Trend	No trend	Trend
InY	0.38487	-1.4477	0.3849	-1.5945
InDOPNESS	-2.68997	-3.4300	-2.6795	-3.5055
InM_2	0.31777	-1.5044	0.3178	-1.8086
InGEXP	-2.03113	-1.8320	-2.1418	-1.8320
ΔInY	-5.0984*	-5.0752*	-5.1046*	-5.0510*
ΔInDOP	-8.0324*	-8.0150*	-8.0324*	-8.0150*
ΔInM_2	-4.1415*	-4.0793*	-4.1586*	-4.0974*
ΔInGEXP	-6.4931*	-6.6162*	-6.4930*	-6.6550*

*Denotes significance at the 5% level and data from 1970-2007

since each reported absolute t-value is not >5% critical values of both ADF and PP test, which are 2.94 and 3.53, respectively with a sample size of 37. The null hypothesis of non-stationary is not rejected for all the series investigated in level. Summarily, the results of these tests are shown in Table 1, these suggest that there is the presence of a unit root in each of the variable investigated.

Tests of cointegration: The result of the unit root test shows that all the variables are random walk processes. It does not however imply that in the long run the variables could express long run convergence, i.e., long run equilibrium. Because of the problems of choosing the right lag length and the assumption of cointegrating vector captured by the cointegrating regression (i.e., stationary residual) assumed in Engle and Granger 2-step procedure, this study therefore employed Johansen Cointegration test, which is a superior test that lies on asymptotic property (like this study) and therefore sensitive to error in small sample. It is also robust to many departures from normality as it gives room for the normalization with respect to any variable in the mode that automatically becomes a dependent variable. It also allows cointegration test to be carried out when the variables are of different orders of integration and gives room for the application of Error Correction Mechanism.

RESULTS AND DISCUSSION

The results of the cointegration tests are shown in Table 2. The results reported for the trace statistics shows that the null-hypothesis of no-cointegrating vector linking Fiscal-Monetary Policy and Growth relation is rejected at the 5% level of significance while maximum eigenvalue statistics shows contrary. The trace test statistics reveal that there are 4 cointegrating relationship at both 5 and 1% level of significant, while the maximal eigenvalue statistics suggests no cointegration. However, the trace statistics possesses more power than the maximal eigenvalue statistics since it takes into account all of the smallest eigenvalues (Serletis and King, 1997; Kasa, 1992; Johansen and Juselius, 1990). Furthermore, trace statistics was recommended whenever there is a conflict between the two statistics (Johansen and Juselius, 1990). The conclusion drawn from this result is that there exists a unique long-run relationship between gdp, dopness, gexp and M_2.

Since there exist cointegrating vectors, an economic interpretation of the long-run Fiscal-Monetary Policy and Growth equation can be obtained by normalizing the estimates of the unconstrained cointegrating vector on growth.

The long-run elasticities of the cointegrating vector for the long-run Fiscal-Monetary Policy and growth equation are shown in Table 2. From this Panel B, the results reveal a positive and statistically significant relationship between economic growth proxied by gross domestic product (gdp) and money supply proxied by broader specification of money (M_2) during this period. The result is in line with previous studies as the coefficient on the broader specification of money (M_2) indicates that the long-run elasticity of money supply for gross domestic product (gdp_t) is 2.316 and this is higher and statistically more significant than that of government expenditure. The long-run elasticities of the cointegration equally showed negative relationship between the degree of openness ($dopness_t$) and economic growth but not significant.

Error correction representation: The essence of this is to capture the effect of short run movement in the empirical models. It involves moving from over parameterization modelling to parsimonious. In general, the equation estimates an over-parameterized error correction model by setting the lag length long enough in order to ensure that the dynamics of the models have not been constrained by too short lag length, 4 years lag was considered adequate in this study.

In this initial over-parameterized model, all the variables were lagged equally but these models seem difficult to interpret. We therefore derived parsimonious model for analysis from the over-parametised error correction model by adopting the General To Specific (GTS) methodology.

This reduction is carried out by eliminating the variables with insignificant coefficients successively based on the imposition on these variables zero coefficients as they bear low t-statistics of <2.0 approach or >0.05 probability values (Table 3). The resulting Schwarz Information Criterion and Standard Error were employed as a guide to parsimonious reduction. A fall in both values is indication of model parsimony.

Table 2: Johanson maximum likelihood cointegration test results (Ingdp, Ingexp, Indopness, InM_2)

Hypothesized	Panel A, B				
no. of CE (s)	Eigen value	Max-eigen statistics	5% critical value	Trace statistics	5% critical value
None	0.5048	24.60	27.07	67.99*	47.21
At most 1	0.4766	22.66*	20.97	43.40*	29.68
At most 2	0.2865	11.81	14.07	20.74*	15.41
At most 3	0.2250	8.92	3.76	8.92*	3.76

Panel A: Maximum Eigenvalue and Trace Tests for the Fiscal-Monetary Policy and Growth Equation. Panel B: Normalized Cointegrating coefficients of the Fiscal-Monetary Policy and Growth Equation; $Ingdp_t$ = -43.416 + 0.065 $Ingexp_t$ (4.867)* + 2.316 InM_{2t} (5.531)* - 0.201 $Indopness_t$ (1.216); *Indicates rejection of the null hypothesis at 5% level of significance

Table 3: Modeling DGDP by OLS

Variables	Coefficient	Std.error	t-statistic	Prob.
$DGDP_{t-1}$	0.613825	0.741878	0.827394	0.4229
$DGDP_{t-2}$	-0.033237	0.200191	-0.166027	0.8707
$DGDP_{t-3}$	-0.060738	0.194819	-0.311768	0.7602
$DGDP_{t-4}$	0.125717	0.233277	0.538917	0.5991
DDOPNESS	4.097691	1.305271	3.139342	0.0078
$DDOPNESS_{t-1}$	-0.704972	1.942095	-0.362996	0.7224
$DDOPNESS_{t-2}$	-0.763299	1.515244	-0.503746	0.6229
$DDOPNESS_{t-3}$	-1.232137	1.793910	-0.686845	0.5042
$DDOPNESS_{t-4}$	0.565918	1.726248	0.327831	0.7483
DGEXP	-0.015118	0.025925	-0.583156	0.5698
$DGEXP_{t-1}$	0.025757	0.025601	1.006090	0.3327
$DGEXP_{t-2}$	0.007472	0.024784	0.301487	0.7678
$DGEXP_{t-3}$	0.037895	0.023353	1.622686	0.1286
$DGEXP_{t-4}$	-0.080772	0.024934	-3.239374	0.0065
DM2	-0.000907	0.354229	-0.002560	0.9980
$DM2_{t-1}$	0.117020	0.467286	0.250426	0.8062
$DM2_{t-2}$	0.449787	0.349041	1.288635	0.2200
$DM2_{t-3}$	-0.250779	0.350650	-0.715182	0.4871
$DM2_{t-4}$	-0.000869	0.268931	-0.003232	0.9975
ECM_{t-1}	-1.231529	0.318051	-3.461706	0.0019
Statistical analysis				
R^2		0.6993620		
Adjusted R^2		0.2599670		
SE of regression		0.1566920		
Sum squared resid		0.3191810		
Log likelihood		29.7103600		
Mean dependent var.		0.2166230		
SD dependent var.		0.1821470		
Akaike info criterion		-0.5885070		
Schwarz criterion		0.3184680		
Durbin-Watson stat		1.8620860		

Table 4: Modeling DGDP by OLS

Variables	Coefficient	SE	t-statistic	Prob.
$DGDP_{t-1}$	0.583150	0.124167	2.798918	0.0058
$DGDP_{t-4}$	0.120157	0.136958	0.877331	0.3898
$DDOPNESS_{t-1}$	-0.904909	1.067744	-0.847497	0.4058
$DDOPNESS_{t-3}$	-0.709865	0.786967	-0.902027	0.3768
DGEXP	-0.018742	0.017918	-1.045990	0.3069
$DGEXP_{t-1}$	0.018592	0.018733	0.992499	0.3317
$DGEXP_{t-4}$	-0.082451	0.019814	-4.161214	0.0004
$DM2_{t-1}$	0.253496	0.031968	3.092803	0.0073
ECM_{t-1}	-1.395304	0.261916	-4.815946	0.0005
Statistical analysis				
R^2		0.643641		
Adjusted R^2		0.481659		
SE of regression		0.131138		
Mean dependent var.		0.216623		
Sum squared resid		0.378338		
Log likelihood		26.904850		
SD dependent var.		0.182147		
Akaike info criterion		-0.963930		
Schwarz criterion		-0.465094		
Durbin-Watson stat		1.921203		

Results from error correction model: The coefficient of multiple determination gave 0.64 suggesting that about 64% of variations in GDP could be explained by the explanatory variables (Table 4).

The result also reveals that error correction term, ECM, which is used to switch to short run model indicates an approximately a feedback of 140% of the previous year's disequilibrium from the long-run elasticity of the Fiscal-Monetary Policy and Growth.

This means that the explanatory variables maintain the GDP equilibrium through time. The coefficient of ECM_{t-1} is statistically significant and negative which provide further evidence for the earlier decision that GDP cointegrates with the explanatory variables. The Durbin Watson values is approximately 2, hence there is absence of serial correlation among the residuals in the model. Therefore, the model is adequate and sufficient to explain variation in the GDP.

CONCLUSION

This study examined the relative effectiveness of fiscal and monetary policy in an opened economy, Nigeria. The study made used of secondary data which were obtained from Statistical Bulletin published by Central Bank of Nigeria form 1970-2007. In the empirical analysis, we employed Johansen maximum likelihood cointegration procedure to show that there is a long-run relationship between economic growth, degree of openness, government expenditure and M_2. The statistical insignificant of the coefficient degree of openness confirmed earlier results by Asogu (1998) and Ubogu (1985) as the exclusion of export variable in the earlier studies on Nigeria appear not to weaken the conclusions of relatively greater and more reliable, stable, strong and effective monetary actions compared with fiscal operations, rather sharp fluctuations of such fiscal actions indicate that they are more distortionary than achieving the desired impact or direction on the target variables. The estimates used in this study revealed that the effect of

monetary policy on economic growth in Nigeria is much stronger than that of fiscal policy. This study therefore, recommends monetary policy for the purpose of economic stabilization.

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