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Money Neutrality Controversy In A Developing Economy

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Abstract
Money has always been a dominant factor in monetary policy. Money Neutrality Controversy in a developing economy is the main objective of this paper. The data were sourced from the CBN statistical bulletin, 2011. Various econometric techniques such as Phillips Perron, Johansen co integration, VAR test were used to test the stationarity of the time series variables, investigate co integration and estimation of variable on the economic growth in Nigeria. The results revealed that the GDP and money neutrality variable were stationary at I(0). There was at least two co-integrating equations and was normalized at TGE and MS. In addition, TGE has positive impact on GDP. Both MS and PRIC were found to have inverse relationship with the GDP. Finally, the MS granger caused GDP among the variables and informed short run relationship with economic growth in the developing countries.
Keywords: Unit root, PP-test, TGE, Monetary, GDP, VAR, Neutrality

1.0 Introduction

It has been a raging controversy among economic and financial analysts on whether or not money matters in economic causation. Simply stated, the neutrality of money axiom represents the economic proposition that changes in the aggregate money supply can only affect nominal variables rather than real variables, where an increase in the money supply, for instance, would increase all prices and wages proportionately, but would have no effect on real economic output (GDP), unemployment levels or real prices (prices measured against a base index (Investopededia 2009).

Whereas the classical theorists maintained that money represents a most intrinsically insignificant variable in economic causes, the neo-classical posited the contrary. The essence of the classical argument was that money (and in effect monetary policy) did not matter in exerting any significant effect on important macroeconomic magnitudes, while the neo classical (and especially, the monetarists) maintained that money mattered greatly. The Keynesians took a kind of on-the fence position of indirect significance of money only through the vehicle of interest rates. Thus money did not exert any independent influence attracted many studies which appear not to agree with many of these studies, in their inferences and conclusions but however, appear to be polarized between two schools. Is money neutral in its effect in the economy or otherwise. For instance, Tawodros (2007) showed that money is co-integrated with prices, but not with output at the zero frequency for Egypt, Jordan and Morocco. This suggests that money was neutral in these three Middle Eastern, economies. Wallace and Cabrera-Castellous (2006) also found evidence of narrow money (M_1) neutrality with respect to GDP, expenditure and consumption in the economy of Guatemala. On the other hand, the Federal Reserve Bank of St. Louis (1982) established that changes in nominal GNP were better explained by changes in the money supply than by changes in government expenditures. Invariably, money cannot be neutral and of course, does matter greatly in economic causation. The money non-neutrality works of the monetarists can also be investigated through two additional channels; investigating the relationship between the GDP per capital and financial development represented by measure of financial deepening on one part, and the relationship between the GDP per capital and the capital market window represented by total financial assets to GDP ratio or the ratio of total monetary assets to GDP**.**

The general objective of this study is to:

i. Determine the existence or otherwise of long-run equilibrium relationship between GDP, on one part, and money supply and government expenditure on the other.
ii. Determine whether monetary policy is causally superior to fiscal policy in economic causation or vice versa.

2.0 Empirical Literature

Very many authors have worked on money neutrality hypothesis using various methodologies and analytical tools. Some have extended their empirical works to the axiom of super –neutrality. For instances Coe and Noson (2002), Noriega (2004), King and Watson (2007), Olekalns (2008), Shalley and Wallace (2003), Wallace (2005) applied varieties of regression autoregressive and co integration techniques. Their main concentration was the determination of long-run monetary neutrality. Much more interesting approaches that appealed to our detailed reviews are the study of the works of Towadress (2007), Cabrera – Costellanos (2006), Koustes and Stengos (2009), Chwe (2009) and the Federal Resevoe Bank of St. Louis (1982).

Tawodros (2007) tested the hypothesis of long-run money neutrality for Egypt, Jordan and Morocco using seasonal co integration techniques. The paper used seasonal integration and co integration techniques to test the neutrality of money hypothesis for three Middle Eastern economics, using quantity data on money, prices and real income. To the author, the benefit of using this technique lies in the ability to distinguish between co integration at different frequencies. The empirical results showed that money is co integrated with prices, but not with output at the zero frequency for Egypt, Jordan and morocco. This suggests that money affects nominal but not real variables in the long run implying money is neutral in these three Middle Eastern economics. The implication of the feeding for policy analysis suggested that the anti-inflational policy prescription espoused by the monetarist school should be followed in these three Middle Eastern countries, in order to curb inflation. We must add that Tawodros' (2007) paper provided further evidence in support of money neutrality using an unconventional approach for three developing Middle Eastern economics.

Wallace and Cabrero- Costelleaos (2006) applied the fisher and Seater (1993) methodology against Guatemala data (1950-2002) is order to test for long-run neutrality of money Real GDP, consumption, investment and public expenditure, and the monetary base and M_2 are found to be 1(1). Given this order of integration, they applied the fisher –Seater neutrality test and found evidence of M_1 neutrality with respect to GDP, expenditure and consumption in the economy of Guatemala.

Koustas and Stenges (2009), on the other hand, tested for short-run money neutrality in the economy of Canada. In their paper, they adopted an econometric methodology that was based on standard tested – hypothesis testing in order to test the policy ineffectiveness proposition is the context of some problems associated with the non-tested hypothesis framework used by other writers. The substantial openness of the Canadian, economy is taken into account through the use of a mundell-fleming aggregate demand side. The supply response of the economy was modeled, in the same context, and the familiar sergeant Wallace aggregate supply function used to derive as a special case of a more general Keynesians function by assuming instantaneous adjustment of prices to costs. Empirical tests based on a data sample spanning the period of Canada's recent experience with flexible exchange rates were unfavorable to the policy ineffectiveness proposition.

Chew (2009) worked on the needed edge and the Phillips curve: money neutrality, common knowledge, and subjective beliefs.

The paper's approach involved a simple two person action model with a seller and a buyer bidding in terms of money and where the value of the money is uncertain. The study said that: first, nominal effects will be experienced if a monetary revaluation is common knowledge. Second, making the value of money common knowledge optimizes total gains from trade if the seller and the buyer have identical beliefs.
Third, monetary revaluations have no net effect because both seller and buyer are equally well-informed and have identical beliefs.

3.0 Research Methodology

This section specifically deals with the methodology of the study. Thus, we highlight the various procedures employed is the study to gather the relevant data desired for the study as were mainly secondary data. They covered the Period (1972-2010) and obtained from CBN statistical Bulletin (2009 and 2011) and economic journals. Others were obtained from textbooks and websites.

3.1 Estimation Procedure and Data

The first step we employed was to check the stationarity status of the variables using the Phillips-Perron Test, Co integration and Estimations of relevant equations using the VAR test. Relative statistical estimates were also generated for the regressors such as the beta coefficients, standard errors, f-stat and t-ratio base on the rule of thumb in the VAR Model estimate. The various computations were done using econometrics software- **E-view 4.0**.

4 .0 Empirical Data Analysis and Discussion of Results

This section discusses the empirical analysis of the data for the study presents in tables below and discusses as follows:

Table 4.1: Unit Root Results

Variables	PP-Test	5% Critical Value	Decision	Conclusion
D(GDP) I(0)	-5.4792	-2.9446*	No Unit Root	It is Stationary
D(MS) I(0)	72.5568	-2.9399*	No Unit Root	It is Stationary
D(TGE) I(0)	7.5760	-2.9499*	No Unit Root	It is Stationary
D(PRIC) I(0)	-4.9612	-2.9399*	No Unit Root	It is Stationary

E-Views 4.0 Result Output

The table 4.2.1 shows that there is no unit among the time series when subjected to PP test at level in the time series variables. Gross Domestic Product (GDP), Money Supply (MS), Total Government Expenditure (TGE) and Price (PRIC) have no unit root at level I(0) as all the calculated PP- test values are greater than the critical value at 5% irrespective of sign difference. In addition, the results of the variable unit root tests show pattern of stationarity at level I(0). This informs co integration and possible VAR model application for model estimation.

Table 4.2 Johansen Co integration Result

Series: GDP MS TGE PRIC

Lags interval: No lags

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.920112	119.3424	47.21	54.46	None **
0.573859	38.47426	29.68	35.65	At most 1 **
0.266972	11.17872	15.41	20.04	At most 2
0.038021	1.240413	3.76	6.65	At most 3

*(**) denotes rejection of the hypothesis at 5 %(1%) significance level
L.R. test indicates 5 co integrating equation(s) at 5% significance level

E-Views 4.0 Result Output

From Table 4.2, the trace statistic and likelihood function values are greater than critical value at both 1% and 5% respectively. This reveals that there is co integration at most 4 with an implication of at least 5 co integrating equations among the variables which were rejected in favour of the alternative hypotheses at 1 per cent critical level. This is because their values exceed the critical values at the 0.01 level which implies that a long-run relationship exists among the variables (EXTR, GDP, OIMP, OEXP, NOIMP, NOEXP and POLST).

Table 4.3: Normalized Co integrating Coefficients: 3 Co integrating Equation(s)

GDP	MS	TGE	PRIC	C
1.000000	0.000000	0.000000	-28.58736 (26.1296)	-196068.1
0.000000	1.000000	0.000000	-139.3532 (62.5495)	-428707.0
0.000000	0.000000	1.000000	-133.5566 (50.9214)	-54252.31
Log likelihood	-1563.980			

*(**) denotes rejection of the hypothesis at 5 %(1%) significance level
L.R. test indicates 5 co integrating equation(s) at 5% significance level

E-Views 4.0 Result Output

It can also be seen from Table 4.3 that there are at least 3 normalized co integrating equations in the series using the diagonal matrix identify trace. Thus, we report that the normalized co integrating equation infers long run relationship between the GDP, MS and TGE. However, there is run relationship between GDP and Consumer Price Index co integrating factor. The results from the co integrating equations above suggest that all the variables in the 3 equations are significant at the 0.01 level. The Johansen co integration shows that there is no presence of full rank given that subtraction of the number of co integrating equations and the variables under study do not equal to zero therefore implying that the model is good and in functional form. More so, the value of the log likelihood is negative indicating No presence of multi co linearity.

Table 4.4: VAR Model
VAR Model Empirical Result

Sample(adjusted): 1974 2010
Included observations: 32
Excluded observations: 5 after adjusting endpoints
Standard errors & t-statistics in parentheses

	GDP
GDP(-1)	-0.588037 (0.54280) (-1.08333)
GDP(-2)	-0.228380 (0.18796) (-1.21504)
C	353174.5 (116705.) (3.02622)
MS	-0.052946 (0.08991) (-0.58888)
TGE	0.648788 (0.38481) (1.68601)
PRIC	-15.64617 (15.7637) (-0.99255)
R-squared	0.288499
Adj. R-squared	0.151672
Sum sq. resids	1.99E+12
S.E. equation	276319.8
F-statistic	2.108491
Log likelihood	-443.0219
Akaike AIC	28.06387
Schwarz SC	28.33869
Mean dependent	314147.1
S.D. dependent	300006.1

VAR Model - Substituted Coefficients:
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GDP=-0.588037431*GDP(-1)-0.2283800896*GDP(-2)+353174.466-0.0529462772*MS+ 0.6487881475*TGE - 15.64616607*PRIC

E-Views 4.0 Result Output

The econometric result of the VAR model adopted in the table 4.5 for the data analysis is presented by the estimated model:

GDP=-0.588037431*GDP(-1)-0.2283800896*GDP(-2)+353174.466-0.0529462772*MS+0.6487881475*TGE -15.64616607*PRIC

The Vector Autoregressive Model is not statistically significant at both current year (-1) and previous years as the probability of their t-ratios (-1.0833) and (-1.2150) are less than rule of thumbs (2.0 and above) at 5% critical value. Estimate of β_1 is -0.0529. This implies an inverse relationship between GDP and MS. A unit change in MS will result in about 5.3% decrease in GDP. The estimate of β_2 is 0.6487. This implies that there is a direct relationship between the independent variable, Total Government Expenditure (TGE), and the dependent variable, GDP. This means that unit change in TGE will bring about 64.8% percent increase in GDP

The estimated value of β_3 is -15.646. This shows an inverse relationship between Consumer Price Index (PRIC) and Gross Domestic Product (GDP). That is, a relative change in PRIC results in about 15.6% percent decrease in Gross Domestic Product (GDP).

The results of the empirical study for the test of significance are discussed as follows: F-statistics and t-statistics are adopted to accept or reject the above hypotheses to be tested using the decision rule criteria based on the rule of thumb (2.0). If the t-ratio is greater than 2.0, we accept H1 that there is significant relationship. Otherwise, there is not statistically significant.

Investigating the overall significance of the model, the value of F-statistics is 2.1085>2.0 by the rule of thumb. This means that there exists statistical significance between the GDP and the exogenous variables (MS, TGE and PRIC). R-squares is 0.288 implying that the coefficient of determination (R^2) indicates 28.8% which adjudges the model to be poorly fitted. About 15.1% of variance in the GDP can be explained by monetary neutrality controversy parameters under study.

To test for the significance of the individual parameter, we apply based on the argument of the rule of thumb; MS and PRIC are not statistically significant to the GDP as the t-ratio are less than 2.0. However, the Total Government Expenditure (TGE) is statistically significant to GDP because the t-ratio (1.6) is approximately equals to 2.0 by concept of whole number.

5.0 Conclusion and Recommendation

The empirical results demonstrated an inverse relationship between some explanatory variables (MS and PRIC) and GDP. Direct relationship is established between Total Government Expenditure (TGE) and GDP. It is found that the measures of money neutrality were co integrated with the GDP at most 1. Hence, there is long run relationship between money neutrality controversy and economic growth in the developing countries. Therefore, government should strive hard to sustain our policy that is viable and expected to contribute positively to healthy environment foreign direct investment which in turn creates employment for the teeming youth in Nigeria.

Since Total government expenditure has direct relationship with GDP. It is therefore important for appropriate policy formulation and implementation for rapid government expenditures that are capable enough to encourage and boost the GDP in turns ensure sustainable economic growth in Nigeria through diversification of developing country's economy base to enhance productive activities in Nigeria.

Finally, in favour of our apriori expectation, money supply was inversely related to GDP. It is therefore the opinion of the researcher that government should try to sustain inflation control measures should adopted to check excesses of money supply.

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