LONG-RUN NEUTRALITY CONTROVERSY IN A DEVELOPING ECONOMY: THE NIGERIAN EXAMPLE.

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Abstract

This paper uses post independence quarterly data to examine the validity of two long-run neutrality Propositions in Nigeria. over all, there is qualified evidence that suggests the existence of long-run monetary neutrality and evidence that refutes the existence of the long-run fisher relation between prices and interest rates. The evidence on long-run monetary neutrality is qualified because it holds under the assumptions of contemporaneous money exogniety and contemporaneous monetary neutrality. As a consequence, our results inform our deductions about the ineffectiveness of the monetarist anti-inflationary, prescriptions for managing the macroeconomy of a developing country like Nigeria. Pursuing a synchronized and coordinated fiscal monetary policies framework is likely to yield the desired results on real economic variables.

Keywords*; Developing Economy, Long-run neutrality, Fisher relation, money exogeneity.*

Overview of the Study

The underlying concept behind long-run neutrality propositions is the hypothesis that permanent and sustained changes in nominal variables have no long-run effects on real macro-economic variables. This proposition has served as a very important anchor for key classical macroeconomic models and policy recommendations, and its validity or invalidity has far reaching implications for successful conduct of macroeconomic policy.

Interestingly, empirical tests on long-run neutrality propositions have been is a state of flux (Bullard, 1999, Karanassou and Sola, 2010). The instability to long-run neutrality test results is

partly because of the difficulty is specifying the relationships between nominal and real macroeconomic variables and arriving at firm conclusions about their long-run relationships. Also, many of the empirical tests that were previously applied ran into several criticisms especially, with respect to the handling of the time series properties of the data. However, in recent times, economist have now devised new methodologies for testing long-run neutrality propositions that now take cognizance of hilberto questionable issues of model specifications, data integration and cointegration properties and econometric identification problems.

The objective of this paper is to apply the King and Watson (1997) methodology to test two long-run propositions in Nigeria using post independence (1960) quarterly data. Three important features distinguish the present paper from most other papers addressing the same issue. First, the issue is examined for the case of a developing economy. Secondly, unlike other works that employ only the traditional Dickey and Fuller (1979) unit root test (Ozotay 1997, King and Watson 1997, Koustas, 1998, and Chen, 2007), we carry out a series of unit not and stationarity tests to ascertain the integration and cointegration properties of the time service data. Thirdly, we test for long-run monetary neutrality using three different identification schemes, i.e we test with assumptions of contemporaneous money exogeniety, contmporanous money neutrality, and long-run money neutrality.

Preparing the results, there is qualified empirical evidence supporting the existence of long-run monetary neutrality in Nigeria. This conclusion is robust over different subsamples and lag specifications. It is also theoretically plausible, given the observation that developing economics one characterized with the absence of sources of non neutrality. For instance, Humphrey (2001) survey of the sources of non- neutrality reveals that sticky prices, sticky nominal wages and fixed nomine costs are influential sources of non- neutrality and these conditions, hardly pertain to the norm in a developing economy, including Nigeria. conversely, the test for the long-run fisher relation is completely rejected in the case of Nigeria, this is informed by the observation of a cointegrating relation between inflation and real interest rate.

The rest of the paper is organized as follows: Section 2 looks at the salient theoretical and empirical issues on long-run neutrality propositions. Section 3 describes the procedure of the King

and Watson methodology, applied in the study and the results from the estimations are discussed in section 4. Section 5 present the policy implications of the findings and the conclusions.

2.0 Review of Related Literature

2.1 Theoretical Issues

The long-run neutrality proposition derives its theoretical foundation from the quantity theory of money. The underlying proposal of the quantity theory of money is that, if innovations in the quantity of money were exogenously engineered by monetary authorities, then, the long-run effect will be a proportionate change in the price level (including other nominal variables), such that there is eventually no change in any real variable. Over the years, the quantity theory of money proposal has metamorphosed into what may be described as the "long-run neutrality triplex". First is the long-run monetary neutrality proposition which postulates that permanent changes in the money supply have no permanent long-run effects on real out put. Next, is the long-run fisher relation, which hypothesizes that permanent changes in inflation have no long-run effects on the real interest rate, while the third proposition is that of the vertical long-run Philips curve which postulates that permanent changes in rate of inflation cannot change the rate of unemployment in the long-run. The emphasis of these three neutrality proposition is on the nature of the long-run relationships. That is, effects that will occur hypothetically after all adjustment have taken place (MC Callum, 2004). This condition requires that changes in the money stock be permanent and sustain for some time to allow the transition (short-run) effects to vanish (Bullard,1999). The importance of the quantity theory of money in neutrality propositions can be illustrated using a monetarist model of inflation with a neoclassical supply function and a stable demand functions of money. Let us assume a simple functional form for the demand for money, thus:

$$M^D = P_Y{}^B \qquad \ldots\ldots\ldots\ldots (1)$$

Where MP is the demand for money in nominal terms, P is the price level, Y is real output and B is the output elasticity to demand for money. If the money market is to be in equilibrium, then we must have the stock of money in the economy MS, being equal to the demand for money. Hence:

$$M^s = MD = P_y{}^B \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

We can derive the relationship between growth in the stock of money and the price level by differentiating equation 2 with respect to time, thus:

$$\frac{dM^S}{dt} = Y\beta \frac{dP}{dt} + P\beta y\beta - 1 \frac{dy}{dy} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Dividing both sides of P Equation (3) by M^S, we obtain

$$\frac{1}{MS} \frac{dM^S}{dt} = \frac{1}{P} \frac{dP}{dt} + \beta \frac{1}{y} \frac{dy}{dt} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Using the dt notation to represent continuous time, Equation (4) can be presented with inflation as the subject thus:

$$\frac{P}{P} = \frac{M}{M} - \beta \frac{y}{y} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where P/p is the inflation rate, M/m is the rate of growth of money supply and y/y is the growth rate of real output, all in continuous time. Equation 5 implies that the rate of inflation is equal to the rate of growth of the money supply minus the rate of growth of the demand for money balances that is due to growth in real output.

To describe the mechanism of long-run neutrality of money, assume the growth rate of real output is zero. Then, the rate of inflation will be identical to the rate of money growth. However, if money is assumed not to be neutral, then a positive innovation in the money supply may lead to a rise in the demand for money. The increased demand for money will then mop-up some of the excess supply generated by the positive innovation in the monetary aggregate and hence, lead to a smaller rise in the price level than that implied by equation 5. In the short-run, there will be an increase in real output via the short-run Philips relation which postulates that the difference between the long-run and actual growth rates of real output depends positively on the inflation expectations error Symbolically;

$$(y/y)^N - \overline{y}/y = \varnothing \{ \{p/p)^e - (p/p) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where $(y/y)^N$ is the natural growth rate of output and $(p/p)^e$ is the expected inflation rate. Merging equation 5 with Equation 6, we obtain.

$$-\frac{1}{\beta}\left[\frac{\dot{M}}{M}\right] - \left[\frac{\dot{P}}{P}\right] = -\left[\frac{\dot{Y}}{Y}\right] + \varnothing\left[\frac{\hat{P}}{P}\right] - \left[\frac{\dot{P}}{P}\right] \quad \ldots\ldots\ldots\ldots (7)$$

$$\text{Hence:} \quad \frac{\dot{P}}{P} = \frac{1}{1+\varnothing\beta}\frac{\dot{M}}{M} - \beta\left[\frac{\dot{Y}}{Y}\right]_N + \frac{\varnothing\beta}{1+\varnothing\beta}\left[\frac{\dot{P}}{P}\right]^Q \ldots\ldots(8)$$

In the long run, after full adjustment have taken place, $p/p \hat{=} (p/p)^e$ and equation 8 collapses to equation 5.

This simplified illustration concisely demonstrates the premises underpinning the propositions of long-run neutrality.

2.2 Empirical framework

Empirical studies on long-run neutrality have generally followed three testing methodologies (Karanassou and Sala, 2010, Chuku, 2011). The first form of methodology simply regresses the level of real output on a distributed lag of observation on money stock (Belke and Polkit, 2006; Friedman and Schwartz, 1963). The second is based on frequency domain time series techniques (Lucas, 1980, Geweke, 1986, Stein, 1982 and Dwyer and Hafer, 1988). The frequency – domain time series technique emerged as a response to the Lucas – Sargent critique. Lucas (2002) and Sargent (2001) demonstrated that in the context of short – run non-neutrality and rational expectations, long-run neutrality tests should be based on the estimation of structural econometric models and not reduced form estimates.

The third, which has been popularized by stock and Waton (1988), King and Watson (1997) and fisher and Scater (1993) is based on explicit tests of coefficient restrictions in bivoriate vector auto-regressions (VARs). In this case, long-run neutrality will imply the imposition of a zero restriction on the sum of coefficients of the contemporaneous and lagged monetary variables in a regression on real economic activities. The application of this procedure is conditional on the

orders of integration of the time series variables. Both money and the real variable must be integrated of at least order one to carry out long-run neutrality tests. If money is integrated of order zero, i.e money is (0), then, it implies that there have been only temporary changes in the money stock and it will not be reasonable to test for long-run neutrality in the obsence of permanent (sustained) changes in the money stock (Wallace, 2004, and Koustas, 1998).

Recently, researchers investigating long-run neutrality propositions have built on the foundations of coefficient restriction tests in bioariate VARs put forward by king and Watson (1997) and fisher and scater (1993) in separate works. Typical examples include the test of long-run neutrality in Mexico by Wallace and shelly (2006), using the FS methodology with corrections for size distortion and low power using the Coc-Noson bootstrapping procedure. Chen (2007) use the king and Watson methodology to investigate long-run neutrality in South Korea and Taiwan, and Koustes (1998) also used the king and Watson methodology to carry out similar tests in Canada, among others. Despite the theoretical appeal of the king and Watson methodology, empirical works carried out using these methodologies have returned mixed evidence both in developed and developing economies. Some examples include the constracting results between king and Watson (1992) and Bosches and Otroks (1994) tests for the US, Hang and Lucas (1997) and Koustas (1998) tests for Canada, and Noreigas (2001) tests for Mexico, and Chess (2007) tests for South Korea and Taiwan. Three major factors can explain the non conformity of the results from these studies. First, the choice of the monetary aggregate used has proven to be a major determining factor. Also, the nature of the long and short – run restrictions placed on the model can be a major cause of differing results and finally, the lag specifications used to estimate the VARs may also have been a source of disparity.

Another reason why tests conducted using the king and Watson methodology may differ is result, depends on the handing of the time series properties of the data sets. Most researchers have used the traditional Dickey and Fuller (1979) methodology to test for the presence of unit – roots in the data series (Chen 2007). This test alone may not be adequate given the realization that it has low power and size distortions (Maddala and Wu, 1998). The need therefore arises to carry out preliminary diagnostics of the data sets, using an assortment of testing techniques to enhance the validity of the conclusions about the time series properties of the variables. This need is satisfied in this paper.

3.0 Methodology

3.1 Model Specification

Following the methodology put forward by king and Watson (1997), we test the validity or otherwise of the long-run money neutrality proposition and the long-run fisher relation in the Nigerian context. The model that forms the basis for testing these long-run neutrality propositions can be summarized by a set of dynamic simultaneous equation with lag length P thus;

$$\Delta mt = \lambda my + \Delta yt + \sum_{j=i}^{p} aj, my \ \Delta yt - j + \sum_{J=i}^{p} aj, mm \ \Delta mr - j + e^{m}t \text{ .. (9)}$$

$$\Delta yt = \lambda my \ \Delta mt + \sum_{j=i}^{p} a; yy \ \Delta yt - j + \Sigma \ aj, ym \ \Delta mt - j + e^{n}t \text{ .... (10)}$$

Where Δy is the logarithm of the first difference of output and Δm is the logarithm of the first difference of the money stock. et^{m} and Et^{n} represents exogenous shocks that may have permanent effects on money and output respectively and are assumed to be independent and identically distributed and are uncorrelated with each other. The parameters λym and λmy represent the impact elasticity of money the level of output with respect to changes in the level of output respectively.

Equation 9 represents the central bank's monetary rate, with feedback effects, while equation 10 is the reduced form of output under the monetary rule. The model is representative of both the Keynesian and classical systems that exhibit long-run neutrality. The matrix representation of the model consisting of Equations (9) and (10) can be written thus:

$$\alpha (L) Xt = Et \text{ .... (11)}$$

Where: $$\alpha (L) = \sum_{J=0}^{p} \alpha j \ L^{3} \text{ .... (12)}$$

and $$Xt = \begin{pmatrix} \Delta mt \\ \hline \Delta yt \end{pmatrix}, \ Et = \begin{pmatrix} Et^{m} \\ \hline Et^{n} \end{pmatrix} \alpha_0 = \begin{pmatrix} 1 & -\lambda my \\ \hline \lambda ym & 1 \end{pmatrix} \text{ .... (13)}$$

$$\alpha j = \begin{pmatrix} \alpha j, \ my & \alpha j, \ mm \\ & \end{pmatrix}$$

Aj, yy αj, ym

Where j = 1, 2, ?, p. The long-run multipliers are Xmy = $\frac{\alpha my\ (1)}{\alpha mm\ (1)}$

and Xym = $\frac{\alpha ym\ (i)}{\alpha yy\ (1)}$ Where Xmy measures the long – run response of money to a permanent unit increase in output and Xmy is the long-run response of output to a permanent unit increase in the money stock. Long – run neutrality implies the restriction that Xym = 0.

King and Watson (1997) noted that it is not possible to estimate the parameters in Equations (9) and (10) because of the inherent econometric identification problem in the model. This problem can be shown clearly by writing the reduced form of the bivariate model thus:

$$Xt = \sum_{x=1}^{p} \varnothing\ xt^{-1} + et \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (14)$$

Where $\varnothing 1 = \alpha o - 1$ α and $et = \alpha o^{-1}$ Et. The matrices αi and Σe are determined by the following set of equations.

$$\alpha o^{-1}\ \alpha I = \varnothing^{I},\ j = 1, \ldots..\ P \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (15)$$

$$\alpha o^{-1}\ \Sigma\ e\ \alpha o^{-1} = \Sigma e = E\ (e\ t\ et) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (16)$$

Equation (15) determines a; as a function of α and ∅, Equation (16) cannot be used to determine both α and Σ_E, given that Σ_E is a 2 x 2 symmetric matrix with three unique elements. Hence, only three of the four unknown parameters (λmy, λym, α em, αEn) can be identified. This is true even with the assumption of independence of $E^{n}t$ and Et^{m}. This clearly implies that one additional restriction is required in order to fully identity the model. Some common identification restrictions used in the literature include: assuming a recursive form and imposing the assumption of contemporaneous money exogeniety, that is λym = 0 as in Rotetenberg (1995), assuming long-run money neutrality Xym = 0, Gali (1992) and Shapiro and Watson (1998), and finally, an assumption on long-run price stability Xmy = 1.

This paper follows an informative approach suggested by king and Watson (1997) by imposing a wide range of identifying restrictions rather than a particular one. We estimate equation (9) and (10) based on three identification schemes; (i). Eepilon is diagonal and $\lambda ym = 0$. (ii) Eepsilon is diagonal and $\lambda my = 0$, and (iii) Eepsilon is diagonal and $\lambda my = 0$.

Operationally, the estimation of Equations (9) and (10) involves simultaneous equation methods. If λmy is Equation (9) were known, then the equation could be estimated by regressing $\Delta mt - \lambda my$ into ($\lambda yt - j$, $\Delta mt - j$). However, equation (10) cannot be estimated by ordinary least square regression since it contains Δmt, which is potentially correlated with the error term. Hence, the maximum likelihood estimator of equation (10) is constructed by instrumental variables, using the residuals from the estimated monetary feedback equation together with lags of Δmt and Δyt as instruments. Many others like Chuku (2011) and Chen (2007) have used the same instruments.

3.2 The Data

We investigate two long run neutrality propositions in Nigeria using post-independence quarterly data. The test is carried out on the basis of a sample of 192 quarterly observations covering the period 1962:1 to 2010:4. Four variables are considered, the money supply m, output y, price level ii, and the nominal interest rate R. The monetary measure is taken to be broad money M_2 and output is provided by the real gross domestic product (1992 = 100). The price level is taken to be the consumer price index (2005:2 = 100) and the nominal interest rate is taken to be the central banks minimum rediscount rate. The output, money stock and price series are converted to natural logarithms. The data for the four variables were obtained from the Central Bank of Nigeria Statistical Bulletin.

4.0 Empirical Analysis

4.1 Integration Properties

Tests of the long-run neutrality propositions using the king and Watson methodology depends essentially on the order of integration of the real and nominal variables. Therefore, it is crucial to

get the prerequisite stage of unit-root testing right. Hence, we carry out a battery to unit – root tests in order to arrive at firm conclusions concerning the integration properties of the macroeconomic time series variables used in the model.

Table 1 presents unit-root and stationarity test results using the Augments Dickey-fuller (ADF), Phillips – Peron (pp), Ng – Peron (NP) and Kwiatkowski, Phillips, Schmidt and Shin (KPSS)8 techniques to test for the order of integration in the time series data. At the levels, the four techniques return results that lead to the rejection of the unit-root hypothesis at the 5% level of significance. When the series where differenced, the ADF, PP and NP tests were unable to reject the unit-root null for the four variables, implying that all the variables became stationary after first differencing. The KPSS test returned results that lead to similar conclusions, but, with an exception in that of prices which did not become stationary even after first-differencing.

Table 1: Unit Root Test Results

	Levels				**First differences**				
	ADF	**PP**	**NP**	**KPSS**	**ADF**	**PP**	**NP**	**KPSS**	
Variables									conclusions
y	-1.07	-0.95	1.01	3.72	-5.55	-14.03	-4.07	0.12	1(1)
m	1.36	1.97	3.6	3.99	-4.28	-13.72	-2	0.44	1(1)
π	0.4	1.28	2.14	3.94	-3.91	-11.05	-2.47	0.58	1(1)/1(2)
R	-1.5	-1.87	-1.2	2.83	-7.94	-13.66	-7.18	0.01	1(1)
Critical values	-2.87	-2.87	-1.98	0.49	-2.87	-2.87	-1.98	0.49	

The test results offer reliable information concerning the integration properties of the series which is a prerequisite condition for progressing with tests of URN. Since the series m, and R arc integrated of order one (with a caveat on π), it therefore implies that there has been sustained and permanent changes in the money stock, output, prices and the nominal interest rate in Nigeria. This order of integration, [1(1)1 satisfies the necessary condition for proceeding with tests of URN.

4.2 Cointegration Properties

Following the observation by Fisher and Seater (1993) that LRN tests arc inefficient in the presence of cointegration in the two variables comprising the VAR, we test for cointegration in the money-output relation and the Fisher relation (inflation-Interest rate). The Intuition is that while cointegration may not affect the long-run restrictions derived, it implies that a final VAR in first differences does not exist and hence a sufficient condition for rejecting LRN.

Table 2 presents the results of the cointegration test using the Johansen Maximum Likelihood Trace criterion. We followed the procedure recommended by Johansen (1991) by starting from the most restrictive model in terms of deterministic components and then, iterating until the first time the null hypothesis could not be rejected at the 5% level of significance.

Table 2: Cointegration Test Result

Johansen M.L. Trace Test					
Co-variable		**Eigenvalue**	**Trace**	**5% Crt. Val.**	**Conclusion**
y_t	M_t	0.02	6.31	15.49	Ho: r = 0. Not rejected Ho: r = 0
π_t	R_t	0.11	23.41	15.49	Rejected

For the money-output relation [$X_t = (\Delta m_t, \Delta_{yt)}$], we are unable to reject the null of no cointegration (r- 0) at the 5% level of significance. We interpret the evidence as consistent with the notion of an absence of a long-rim relationship between money and output In Nigeria, a sufficient condition for proceeding with tests of LRN of money using the KW methodology. Conversely, the cointegratiou test for the long-run Fisher relation [$X_t = (\Delta m_t, \Delta_{yt)}$], returned a trace statistic of 23.4, thereby leading to the rejection of the null hypotheses of no cointegration. This result is not surprising given the inconclusive stationarity results we earlier obtained for the π it series. The implication of the existence of a long-nm relationship between prices and interest rate is that a final VAR solution for the variables (it arid R) does not exist. This evidence leads us to the firm conclusion that the long-run Fisher relation which hypothesizes that permanent changes in inflation have no long-run effects on the real interest rate does not hold in Nigeria

4.3 Evidence on Money Neutrality

In Table 3, we summarize the evidence on LRN of money in Nigeria. The table presents the point estimates of the coefficient for the long-run impact of money on output Υ_{ym}. The results are obtained from the structural factorization of the money-output equation, using three identification schemes, i.e. contemporaneous money exogeneity, contemporaneous money neutrality and long-run money neutrality $\lambda_{ym} = 0$, $\lambda_{ym} = 0$ and $\Upsilon_{ym} = 0$). Each point estimate is reported with its corresponding standard error and z-statistic. LRN of money cannot be rejected if the estimate for Υ_{my} is significant at the 5% level A significant estimate for Υ_{my} implies that the true parameter is contained within the 95% confidence interval.

Table 3: Evidence of Money Neutrality

Electric SVAR Estimates for λ_{ym}			
Identification Schemes	$\lambda_{ym} = 0$	$\lambda_{ym} = 0$	$\lambda_{ym} = 0$
Coefficient	0.07	0.17	0.19
Standard error	(0.003)	(0.008)	(0.17)
Z-Statistics	(19.59)***	(19.59)***	(1.09)

*** indicates significance at 1% level.

** indicates significance at 5% level

The results show that under the restriction of contemporaneous money exogeniety ($\lambda_{ym} = 0$), the point estimate for Υ_{ym} is 0.07 with a z-statistic of 19.59, indicating that even at the 1% level, long-run monetary neutrality proposition cannot be rejected. Similarly, the result under the restriction of short-run monetary neutrality does not lend to the rejection of the long-run monetary neutrality proposition. This conclusion can be analyzed along the lines of traditional models of the business cycle. First, the result indicates that output does not decline on impact in response to a monetary expansion. That is, ($\lambda_{ym} \geq 0$). However, following the Lucas (1972) monetary misinterpretations theory, λ_{ym}. could be negative, especially because a positive innovation in the stock of money could lead to a decrease in output if that change is less than anticipated.

Finally, the point estimate for Υ_{ym} when money is assumed to be exogenous in the long-run, i.e. Υ_{ym} is 0.19 with a z-statistic of 1.09, which is not statistically significant at the 5% level of significance. The result from this structural restriction lead to the rejection of the long-run

monetary neutrality proposition in Nigeria. Putting all together, the evidence of long-run monetary neutrality in Nigeria is mixed and qualified. The qualification is based on the parallel conclusion derived from the structural assumption of long-run money exogeniety.

4.4 Robustness Checks and Result Comparisons

Table 4 summarizes selected results of the estimated model using alternative variations in the lag specification and sample sizes. In addition to the lag length of 4 used in the baseline model earlier discussed, we also examine the results obtained by using a lag length of 6 to estimate the model over fragmented sample periods. We fragment the sample into two: 1960:1 to 1986:4 and 1987:1 to 2008:4. The essence of the selected time fragments is to observe if our conclusions about LRN propositions arc similar for the Pre and Post-Structural Adjustment (SAP) periods in Nigeria (sec Chuku, 2009, for a review).

Table 4: SVAR Results for Different Sample Fragments and Lag Length

Point Estimate for Y_{ym}				
Sample period lag length		**$\lambda_{ym} = 0$**	**$\lambda_{ym} = 0$**	**$\lambda_{ym} = 0$**
1960:1 – 1988:4	4	0.07 (14.42)***	0.21 (14.42)***	0.26 (0.90)
1962:1 – 1989:4	6	0.06 (14282)***	0.21 (14.28)***	0.73 (2.30)**
1989:1 – 2010:4	4	0.06 (12.88)***	0.04 (12.88)***	0.04 (1.65)
1989:1 – 2011:4	6	0.06 (12.72)***	0.03 (12.72)***	-0.02 (0.71)

*** indicates significance at 1% level.
** indicates significance at 5% level
( ) contains the z- statistic.

Putting all together, the results in Table 4 are very similar to those in Table 3. Long-run monetary neutrality is not rejected for the two sub-samples under the assumption of contemporaneous money exogeniety and contemporaneous money neutrality, even with the alternative lag specifications. However, under the restriction of long-run money exogeniety, long-run money neutrality is rejected. The direct correspondence between the results using the primary model specification and the results obtained from our alternative specification is an indication of the robustness of the results, and a basis for our qualified conclusions about long-nm monetary neutrality propositions in Nigeria.

Comparing our results with the results of LRN tests carried out in developed and developing economies, we find mixed connections. For example, our results are very similar to those of Chen (2007) for Taiwan. King and Watson (1997) also find qualified evidence of monetary neutrality for the U.S economy. Other findings include; Moosa (1997), with robust evidence of the existence of long-run money neutrality in India, Wallace (2004) for Guatemala, Noriega (2004) for Brazil and Wallace and Shelly (2006) for Mexico.

5 Implications for Policy

The results from this study has interesting implications for the policy debate in developing countries and Nigeria in particular. The major finding from our results suggest that monetary policy as measured by the stock of money (M2) has not been fully effective in stimulating real economic activity in Nigeria since independence. For monetary policy to be effective as a stabilization anti-inflationary tool, there should exist a stable and well understood link between money and prices in the long-run, this precondition cannot be said to be the case for Nigeria. Though Akinlo (2006) observed some kind of systematic relationship between money and prices in Nigeria, it will be naive to believe that such a relationship is stable. These results strongly suggest that the effects of non-monetary factors such as fiscal activities may be dominating the policy space in Nigeria. At the moment, we recommend that the policy focus for pro- and counter-cyclical management of the business cycle trajectory in Nigeria should start from the fiscal domain and then, be followed by balanced and coordinated monetary policies. A synchronized fiscal-monetary policy approach will ensure that monetary policies have the desired stimulating or dampening effects on real variables in Nigeria."

6 Conclusion

Using post independence data, the paper implements the eclectic KW methodology in testing two LRN propositions in Nigeria. Special emphasis is placed on the integration and cointegration properties of the variables which establishes the necessary and sufficient conditions respectively for proceeding with tests of LRN. Overall, we find qualified evidence that suggests the existence of long-run money neutrality in Nigeria. The evidence is qualified because it holds under the assumptions of contemporaneous money exogeniety and contemporaneous money neutrality and does not hold when we assume long-run money exogeniety these results are robust with different

lag specifications and sample fragments. Conversely, the long-nm Fisher relation is rejected for Nigeria because of the cointegrating relationship that exists between inflation and real interest rate.

The policy Implication of our finding Is that monetary policy has not been fully effective as a stabilization anti-inflationary tool in Nigeria. Also, the monetarist model of inflation which assumes long-run neutrality, tells us that if the money supply rises by more than money demand, then, expenditure will rise with a consequent rise in output and prices. However, if output is already at or is near the full capacity level, then we obtain the one-to-one relationship specified in Equation (5). This model does not seem to be valid for Nigeria, and hence, we deduce that the Monetarist anti-inflationary prescriptions are bound to be ineffective for the management of the Nigerian economy.

As a final point, we submit that the conclusions from the paper are mitigated by a number of caveats. Although the results arc based on quarterly sample of 48 years which is sufficient to contain adequate long-run information about the relationships between the variables examined, the credibility of the data may undermine the validity of the conclusions. Second, the analysis is based on the assumption that money and output arc the only structural disturbances in the economy. This is clearly inadequate as there arc many other sources of real shocks to the economy. Therefore, an improvement on this work will require the extension of the sample size and the inclusion of more variables (especially fiscal variables) in the study to allow for a richer set of macroeconomic shocks.

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