

ASSESSING THE IMPACT OF MONETARY SECTOR ON THE REAL SECTOR OF AN ECONOMY: THE CASE OF NIGERIA

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1. Introduction

In econometric models, a variety of transmission mechanisms — interest rate effects on investment, wealth effects on consumption and recently the monetary disequilibrium or the buffer stock approach — are incorporated. Most of the existing models of the monetary sector have centred around the Keynesian liquidity preference function — where the demand for money is related to the level of income and the rate of interest (at least in its simplest form). Quite a lot has been written about the inapplicability of Keynesian liquidity preference theory to developing countries¹. For instance the emphasis of the Keynesian approach is that monetary policy impacts enter the real sector through shifts in relative yields. This in turn affects the investment expenditure and hence output. The entire aggregate demand is affected through the incipient multipliers. However, the empirical works that have adopted this approach, in particular the effect of interest rates on expenditure, have generally turned up weak relationships, hence the earlier conception and belief in the impotence (or at least unimportance) of monetary policy. But in these economies, expansionary or contractionary monetary policies have been seen to have some impact on the real side of the economy. This suggests that an alternative approach to the transmission mechanism of monetary policy is called for. It is the purpose of this paper, therefore, to consider the notion of monetary disequilibrium or the «Buffer-Stock» approach suggested by Laidler (1984)² as an alternative way of depicting the impact of the monetary sector on the real sector of the economy.

After briefly describing the approach in section II, we specify the model in section III. Section IV examines the estimation results and section V is about summary and conclusions.

2. Buffer Stock Approach

The main feature of this approach is that it takes account of the disequilibrium between the supply of and desired or target demand for money holdings as an important route

1 See for example Ojo (1974 a, b) for some reasons on this.

2 Although this approach was adumbrated long ago by economists such as D. Patinkin (1965), G.C. Arehibald and R. Lipsey (1958) and also applied by Zellner et.al (1965) in the form of the «Liquidity effect», and later by Laidler and Bertley (1983) (to mention just a few key references), the recent emphasis on this approach was supplied by Laidler's paper - «The Buffer Stock Notion in Monetary Economics» that appeared in the supplement to the Economic Journal, Vol. 194, 1984 pp. 17-34.

3. The Model

As earlier argued, the notion of monetary disequilibrium will be the most appropriate way of assessing monetary policy impact on the real sector of the economy. This term is assumed to influence directly the consumption pattern in the private sector. Hence, we have allowed this term to be one of the determinants of real consumer expenditures. The task before us now is to test the statistical significance or otherwise of this coefficient in the consumption function.

As this is a highly aggregated model, we elude even the distinction between durable and non-durable goods and treat consumption expenditure on bloc.

This aspect of aggregate demand has been one of the areas that have received quite a lot of theoretical as well as empirical attention. This ranges from a simple Keynesian type of consumption function to a more sophisticated type of consumption function specified by Davidson et al (1978). However it is not the attempt of the present study to outline the major advances in the theory of consumption function but rather to specify that form of consumption function that will be applicable to the developing economy in question.

The form of consumption function that is finally specified can be regarded to be derived from a simple lag model based on the notion of partial adjustment. Hence, we have postulated that the change in real consumer expenditures is related to the difference between desired and actual real expenditures. The desired level of real expenditures, on the other hand, is related to real disposable income, the excess flow demand for real money balances and the amount of credits made available to the private sector.

Notationally, we have

$$\Delta 1n C_t = B_1 (1n C_t^d - 1n C_t - 1) \dots \dots \dots (1)$$

or

$$1n C_t = B_1 1n C_t^d + (1 - B_1) 1n C_t - 1$$

where Δ is a difference operator; and B_1 is the coefficient of adjustment and is expected to take a value between zero and unity. That is, $0 < B_1 < 1$ and

$$1n C_t^d = 1_0 + 1_1 1n YDP \times I_2 (1n M^s - 1n M^d) t - 1_3 K_t + \varepsilon_t \dots \dots \dots (2)$$

where

C_t is real consumer expenditure

C_t^d is derived real consumer expenditure

M^d is desired real money demand
 YDP is real disposable income
 M^s is real money supply
 K is real bank credit to the private sector
 ε_t is a random error term assumed to be «white noise»; and
 I_i ($i = 1, 2, 3$) are the parameters.
 we expect $_1 O, _2 O, _3 O$.
 Substituting equation (2) into (1) yields

$$1n C_t = V_0 + V_1 1n YDP + V_2 (1n M^s - 1n M^d)_{t-1} + V_3 1n K_t + V_4 1n C_{t-1} + U_t \dots \dots \dots (3)$$

where

$V_0 = 1_0 B_1$;
 $V_1 = 1_1 B_1$;
 $V_2 = 1_2 B_1$;
 $V_3 = 1_3 B_1$; and
 $V_4 = (1 - B_1)$
 $U_t = B_1 \varepsilon_t$.

In the specification we have incorporated bank lending to the private sector as one of the variables affecting real consumer expenditures because in developing countries it has been advanced that both individuals and business firms are liquidity constrained. Also, these liquidity constrained individuals care less (to a large extent) about cost of borrowing. As Tobin (1978) argues:

«... liquidity-constrained borrowers spend every cent they are permitted to borrow,... they do not require the inducement of lower interest rates and they are not borrowing just to reshuffle their portfolios of financial assets and liabilities»⁸.

We therefore, postulate that credit availability will influence consumption pattern of individuals different from the effect of excess money demand as long as we do not confuse credit demand with money demand⁹.

The specification of real consumption expenditure function is completed by including dummy variables to take account of possible structural breaks due to events of the civil war (1967-1969) and the oil price rise of the early '70s. The final equation to be estimated therefore becomes:

8 Tobin, (1978) pp. 472

9 See Artis and Lewis (1976) for some facts on this issue.

$$\ln C_t = V_0 + V_1 \ln YDP + V_2 (\ln M^s - \ln M^d)_{t-1} + V_3 \ln K_t + V_4 \ln C_{t-1} + V_5 \text{WAR} + V_6 \text{OIL} + U_t \dots (4)$$

where WAR and OIL stand for (0,1) Civil War and Oil price hike dummies respectively.

To complete the model, an explicit money demand function is specified. In specifying this equation, we take into consideration some issues that arise from existing work. In particular we have allowed the growth in the banking sector to enter the money demand equation. This is based on the argument that as banking facilities become more readily available in these economies, there is a transition from an informal means of transaction (i.e. trade by barter) to a more formal means (i.e. monetary transaction). This is because banking development serves to educate the general public about the advantages and conveniences of engaging in monetized transaction rather than trade by barter. Thus the growth of the banking sector becomes an important factor contributing to the rise in the demand for money. Its exclusion (as observed by Aghevli (1980)) may lead to over-estimation of income elasticities given that the effects of banking development are likely to be collinear with income growth. Its inclusion, therefore, will allow us to know the true response of money demand to changing income, the rate of inflation (as this is the appropriate opportunity cost of holding money in these economies)¹⁰ and such other factors that may affect demand for money in this type of economies.

When account is taken of the growth in the banking sector, the relevant desired money demand equation becomes:

$$\ln M^d_t = a_0 + a_1 \ln Y_t + a_2 \ln \pi^e_t + a_3 \ln NB_t + \varepsilon_t \dots (5)$$

where M^d is derived real money balances

Y_t is real income

π^e_t is expected rate of inflation

NB_t is the variable representing the growth in the banking sector and the yardstick for this variable is the number of bank branches

ε_t is a random error term assumed to be «white noise»;

and a_i ($i = 0, 1, 2, 3$) are the parameters.

We have also incorporated the civil war and oil price hike dummies into the equation and this makes the estimated equation to become:

10 See Ojo (1974, a, b) for some elaborations on the appropriateness of the rate of inflation as the opportunity cost of holding money in developing countries.

$$\ln M_t^d + a_0 \ln Y_t + a_2 \ln \pi_t^e + a_3 \ln NB_t + a_4 \text{WAR} + a_5 \text{OIL} + \epsilon_t \dots (6)$$

4. Estimation Results

Both equations (4) and (6) were estimated over the period 1953 to 1979 (27 observations) using the Instrumental Variable (IV) method of estimation¹¹. The data used for estimation were obtained from various sources. The major sources, however, are the following:

- (i) Various publications of the Federal Office of Statistics;
- (ii) Various publications of the Central Bank of Nigeria; and
- (iii) Ojo, T.A. and Adewumi (1982).

In each case, the regression results are reported with t — ratios of the estimated coefficients in parenthesis; R^2 (adjusted R^2) measuring the goodness of fit and the D.W. or H — statistic indicating the presence or absence of serial correlation of errors are shown at the end of each equation. Also, the instruments used in each equation are listed along with the estimation results. The main criteria for selecting the reported estimates are that the relevant coefficients have the expected signs, estimated coefficients are statistically significant and there is a satisfactory overall level of explanation (high R^2). Hence whilst both equations were augmented by war and oil price dummies at the estimation stage these were only retained where significant.

In estimating the money demand equation, the definition of money used is currency outside banks plus demand deposits and time and savings deposits with commercial banks less Federal and State Governments' demand deposits at commercial banks (see Ojo, 1978).

Inflation is calculated as the rate of change of the consumer price index. Expectation formation with respect to inflation is assumed to be static such that $\pi_t^e = \pi_{t-1}$ ¹².

The results of these two equations are as given below:

$$\begin{array}{ccccccc} \ln M_t = & -1.92 & + & 0.49 & \ln Y_t & -0.35 & \ln \pi_{t-1} \\ & (-14.02) & & (6.36) & & & (-1.95) \end{array}$$

11 This method of estimation was adopted in order to avoid the problem of «simultaneous equation bias» that may arise if ordinary least squares (OLS) is used.

12 More general proxies for π^e such as a full adaptive expectation scheme and a contemporaneous inflation term were experimented with but results based on these were dropped on the basis of statistical significance of the resulting coefficients and the goodness of fit measured by R^2 .

$$+ 0.34 \text{ NB}_t \dots\dots\dots (7)$$

(10.36)

$$\bar{R}^2 = 0.95$$

$$\text{D.W.} = 2.0431$$

INSTRUMENTS: Constant, Time, Y_{t-1} , $\text{NB}_t - 1$, $\pi_t - 1$,
 $\pi_t - 2$,

$$1n C_t + 0.92 + 0.54 \text{ } 1n \text{ YDP}_t + 0.32 \text{ } (1n \text{ M}^s - \text{M}^d)_t - 1$$

(3.74) (8.80) (2.07)

$$0.05 \text{ } 1n \text{ K}_t^{**} + 0.10 \text{ } 1n \text{ Ct} - 1 - 0.07 \text{ WAR} \dots\dots (8)$$

(1.80) (1.94) (-2.43)

$$\bar{R}^2 = 0.98$$

$$H = 1.56$$

** = coefficient significant at the 10 per cent level.

INSTRUMENTS: Constant, Time, $\text{YDP}_t - 1$, $\text{YDP}_t - 2$,

$$\text{K}_t - 1, \text{K}_t - 2,$$

$$(1n \text{ M} - 1n \text{ M}^d)_t - 2.$$

On the basis of t — values and \bar{R}^2 the equations look to be well determined. Also, the H and $D.W.$ statistics indicate that the estimations are free of the problem of serial correlation of errors.

The result as given in equation (7) above indicates that much as the level of real income is important, the growth in the banking sector does constitute one of the important factors affecting money demand in this type of economy. Also, the result vindicates the choice of the expected rate of inflation as the appropriate opportunity cost of holding money in this type of economy.

Looking at equation (8), the disposable income variable has the right sign and by far the most significant among the independent variables. The result indicates a short-run and long-run income elasticities of real consumer expenditure of 0.54 and 0.60 respectively. This means that even in the long-run, the total household absorption is equal to 60 per cent of disposable income. This proportion seems relatively low given the fact that marginal propensity to consume in economies of this type is known to be very high. However, this result may be due to the fact that our estimate is inclusive of corporate sector income which will have some effects on the estimated marginal propensity to consume (MPC).

One of the most important outcome of our result as given in equation (8) relates to the coefficients of the terms $(1n M^s - 1n M^d)_{t-1}$ and $1n K_t$. These coefficients have the right signs and are both significant (although variable $1n K_t$ is only significant at the 10 per cent level). The result seems to support our earlier argument about the transmission mechanism of the effects of monetary stocks on the real sector of the economy. Here our monetary disequilibrium term gave supporting evidence to the earlier proposition. That is our data support the hypothesis that imbalances between the target money demand M^d and actual money stock M^s exerts a statistically significant influence on consumption expenditures. That this is the case is important since it constitutes evidence that monetary variables affect an important expenditure relationship directly and not just indirectly through interest rate effects which most other previous studies have found to be insignificant. The result indicates that a discrepancy of one per cent between the actual money holdings and target money demand will bring about 0.32 or 0.36 per cent change in consumer expenditure (C_t) in the short-run or in the long-run respectively.

5. Summary and Conclusions

Our preoccupation so far in this paper has been to assess an alternative route through which monetary impulses are transmitted into the real sector of the economy. In particular, we have argued and demonstrated that the buffer-stock approach may be more appropriate when considering the effects of monetary policy on the real sector of developing economies.

The principal findings of our study are as follows:

- (a) that much as the level of income is important in the demand for money in this economy, the growth in the banking sector does constitute one of the important factors affecting money demand;
- (b) that inflation seems to be an appropriate opportunity cost of holding money in this type of economy. This finding in conformity with some other earlier results; and perhaps the most important is
- (c) that the coefficient of the monetary disequilibrium term in the consumption expenditure equation is statistically significant at the 5 per cent level. Our result supports the hypothesis that discrepancies between the money stock and the demand for money have a statistically significant influence on consumption expenditure. The importance of this finding is that it constitutes an evidence that monetary variables affect a major expenditure relationship directly and not just indirectly through in-

terest rate effects which most other past investigations have found to be significant. Hence the approach seems a more plausible technique of assessing the impact of monetary shocks on the real sector of this type of economy than some other traditional approaches.

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Abstract

This paper considers the adoption of the «buffer-stock» approach as a relevant alternative approach to assessing the impact of monetary sector impulses into the real sector of developing economies. In the paper, the relevance of this approach to such economies is viewed to have resulted from the underdeveloped nature of capital and financial markets of these economies.

We set up a model of consumption and desired money demand functions based on Nigeria experience. This is done in order to test for the «importance» of the monetary disequilibrium term in the consumption equation and hence the potency or otherwise of monetary policies on the real sector.

The estimation results reveal that the term (i.e. monetary disequilibrium term) is statistically significant. That is our data support the hypothesis that discrepancies between the money stock and the desired demand for money have a statistically significant influence on a major component of aggregate demand of this economy. This indicates that our monetary disequilibrium term gives a supporting evidence to our earlier proposition. We then conclude, among other things, that monetary variables affect a major expenditure relationship directly and not just indirectly through interest rate effects which most other past investigations have found to be insignificant.

UNE ÉVALUATION DES EFFETS DU SECTEUR MONÉTAIRE SUR L'ÉCONOMIE RÉELLE D'UN PAYS EN VOIE DE DÉVELOPPEMENT: L'EXPÉRIENCE DU NIGERIA

RESUME

Cet article essaie d'évaluer les effets des chocs provenant du secteur monétaire sur le secteur réel des pays en voie de développement. L'analyse se base sur une approche de stock-tampon (buffer stock approach). Dans cette analyse, l'importance de cette approche dans le contexte des économies analysées découle de la nature sousdéveloppée des marchés financiers.

Se basant sur l'expérience du Nigeria, un modèle comprenant des fonctions de consommation et des fonctions de demande de monnaie a été mis en place. Cela peut nous permettre de décèler l'importance du déséquilibre monétaire des fonctions de consommation et donc, en dernière analyse, le degré d'efficacité des politiques monétaires sur le secteur réel.

Les résultats empiriques montrent que le facteur considéré (c'est-à-dire le déséquilibre monétaire) est significatif du point de vue statistique. Dans d'autres termes, les données à disposition confirment l'hypothèse que les déséquilibres entre le stock de monnaie et la demande de monnaie exerce une influence (significative au point de vue statistique) dans l'économie considérée. Cette influence s'exerce plus en particulier sur une des plus importantes composantes de la demande globale.

Cela signifie que notre précédente hypothèse sur les effets des déséquilibres monétaires est confirmée. On peut donc conclure que les variables monétaires influencent d'une façon importante la dépense globale non seulement indirectement mais aussi directement. Le mécanisme de transmission joue à travers le taux d'intérêt contrairement aux résultats empiriques de la majorité des recherches sur le sujet.