

DEMAND FOR NARROW AND BROAD MONEY IN UGANDA

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1. Introduction

This paper presents the estimates of money demand relationships for Uganda during the years 1970 to 1993. This is a period mostly characterised by political and social upheavals which rendered sound economic management ineffective. Subsequently, the country was plunged into a crisis characterised by distortions in all sectors of the economy. With inflation running into double and triple digits, inefficient formal financial intermediation and overvalued official exchange rates became inevitable. Consequently, informal markets in credit and foreign exchange mushroomed as an escape route from the highly overvalued administered interest and exchange rates. This study therefore aims at modelling money demand relationships that takes into considerations the above developments.

The paper is organised on the following lines: Section 2 describes the economic background of Uganda, while section 3 illustrates the link between the non-organised money market and the opportunity cost of money. Section 4 examines the determinants of money demand in Uganda and the data for estimation. Section 5 presents the econometric estimates of the demand for money. Section 6 concludes on the implications of our findings.

2. Uganda's Economic Background

As a result of social and political instability witnessed during most of this period, investment became biased towards short-term projects which could have likely made transaction and precautionary demand for money high. The effect was that domestic saving and investment declined resulting into negative growth rates of income per capita. Under these conditions, nothing much could be done to develop money markets and consequently these are still relatively disorganised, and limited to only narrow systematic activities of dealing in notes, government securities and stocks. To date opportunities of substituting money for financial assets are still limited.

The export sector that had attained satisfactory growth rates in the 1960's and early 1970's deteriorated to depend on only one export commodity coffee, and this was worsened during the period of political turmoil in 1984-1987 and the subsequent collapse of its international price in the latter part of the decade. The tax base which had contributed substantial revenues to the Treasury shrunk as a result of the above mismanagement while the external financing that would have bridged this gap was not forthcoming in substantial amounts as the Idi Amin regime became increasingly unpopular. While in the

1980's, the abuse of human rights in the country and insurgencies slowed down the disbursement of funds already committed by the donor community. Consequently, the resultant budget deficit could only be monetised, an act which further fuelled inflation.

In the 1980's, policies geared towards stabilisation and structural adjustment of the economy were adopted. These were supported by the donor community as the domestic resource mobilisation on its own could not finance the investment contained in the stabilisation and structural adjustment programmes. Since 1987, policies have been adopted to reduce the distortions in the economy especially on relative prices. Repeated devaluations of exchange rates and continual adjustment of interest rates in an attempt to bring them to market clearing levels; and the liberalisation of the payments and exchange mechanism are among the notable policies adopted. The combination of these policies has led to reduction of inflation to manageable levels and raised the growth rate of GDP to an average of 5% per annum over the last six years.

It is worth noting that one of the major policy objective of the structural adjustment programmes currently being pursued by the government is the restoration of financial stability in the economy. To this end, policies geared towards liberalising the financial sector and the development of open market techniques for monetary control have been adopted. In an attempt to understand the dynamic and long-run implications of these policies, there is need to analyse the money demand relationship in the economy over the past period as it provides an insight to the behaviour of the variables of interest in the light of the financial liberalisation currently being pursued.

3. Interest Rate Determination in a Non-Organised Money Market

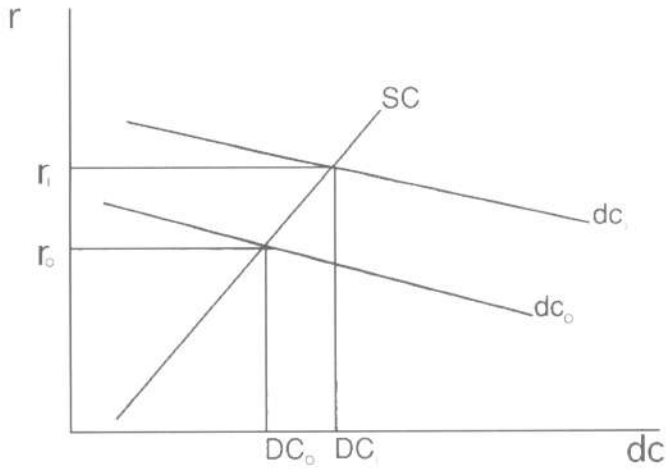
A major problem that researchers into money demand equation face in developing countries is the issue of inclusion of some measure of interest rates in the functions. Many have actually dropped them from the demand equations for the reason that these are fixed in a financially repressed system. Consequently, very little substitution exists between money and financial assets, and the choice of asset holders is limited to holding either money or real goods such as real estates or consumer durables. The expected inflation rate is instead used to represent the cost of holding money.

However, Wong (1977) suggested that interest rates are relevant in the demand for money in developing countries and these could be proxied from the existing link between the non-organised informal money markets (IMM) and the organised money markets. The interest rates though non-observable reflect a degree of credit restraint in the economy because borrowing is a major source of financing economic activity. It follows therefore

that the degree of credit restraint itself, if properly measured, can be treated as a proxy variable for the interest rates in the money demand function.

The model used here assumes that demand for credit in the non-organised money market is influenced by availability of domestic credit from the organised money markets and economic agents finance economic activities by borrowing from either market. It also assumes there are two different agents in the non-organised markets i.e. the suppliers and borrowers of credit. The loanable funds are mobilised by either paying depositors in this money market an interest rate (which being proxied in this study) or from their own resources (e.g. landlords and merchants) although the opportunity cost for this is still represented by the deposit rate. Figure 1 shows a graphical presentation of this.

Figure 1: Impact of Changing Domestic Credit from Official Sources on Interest Rates in the Informal Credit Market



r - interest rate charged in the non-organised credit market

dc - quantity of credit in the non-organised money market.

The government is assumed to be pursuing a domestic credit policy consistent with some economic objective. If an adoption of some monetary policy results into the reduction of credit available to the private sector, some form of credit rationing would be introduced so as to meet this target. The rationed agents are now forced to borrow from the non-organised money markets, therefore shifting the demand curve (dc_o) to the right (dc_u). This also lowers the ratio of credit to GDP and thereby increases the degree of credit restraint in the economy.

The supply curve (sc) is inelastic in the short-run because agents who supply credit cannot immediately raise enough of it to meet the increased demand. Since the agents are profit maximisers, interest rates will go up as the possibility of credit rationing in this market does not exist i.e. price rationing takes effect. The short-run interest rates increase by a proportion larger than the proportionate change in the credit supplied reflecting an interest rate inelastic supply of credit. In order to attract more loanable funds, the credit suppliers may increase the deposit rate but this can only take place over time and assuming that the increased demand for credit persists. This simple illustration shows how a negative change in domestic credit (credit restraint variable) could therefore proxy the movements of interest rates in the non-organised money markets. Likewise a policy that would increase the amount of domestic credit from official sources would have the reverse effects.¹

1. We assume that the total stock of credit (L_t) is made up of credit from the organised sector (L_o) and credit from the unorganised sector (L_u). The flow of demand for loanable funds is given by private sector investment demand, where private investment is a negative function of the cost of borrowing (r) in the unorganised sector i.e.

$$\frac{dL_t}{dt} = I(r, \dots) \quad I_r < 0 \quad \dots \quad (i)$$

The profitability (π) of lending in the unorganised market is given by

$$\pi = r \frac{dL_u}{dt} - C \quad \dots \quad (ii)$$

substituting for $\frac{dL_u}{dt}$ and differentiating yields

$$\frac{\partial r}{\partial \left(\frac{dL_o}{dt} \right)} = I_r^{-1} < 0$$

This shows that an increase in the amount of credit allocated to private investment from the official sources results in a decline of interest rates in the unorganised money markets.

In some cases however, foreign borrowing can become a main source of money creation in the economy for some period. In this case, money stocks may continue to grow even if domestic credit has been tightened up. Furthermore as argued, when bank credit is tightened, economic activities can continue to be financed from the available resources in the non-organised markets and as long as the economy has gathered sufficient momentum, there will be continuous pressure on the demand for money. The credit restraint variable may not therefore be significantly related to the observed stock of money which could be affected by the degree of openness in the economy, the performance of the external sector through balance of payments and the non-organised money markets in the economy.

4. Determinants of Money Demand in Uganda

Variables that change or alter demand for money are to be included in the money demand specification. According to economic theory, the determinants of the demand for money fall into three groups namely:

- (i) scale variables which represent the relationship between, wealth and income
- (ii) the opportunity cost variables which show yields on assets other than money
- (iii) all other variables which may be relevant in estimating the demand for money.

The theory underlying the model is given by the functional relationship:

$$M^d/P = f(\text{gdp}, \text{PREM}, R_c, \text{DR}, \text{INF})^2$$

$$f_1, f_4 > 0, f_2, f_3, f_5 < 0$$

where M^d/P are the real money balances

gdp - real income

P- is the price level

PREM - exchange rate premium

R_c - the proxy of opportunity cost of holding money (IMM deposit rate)

2. The distinctive character of the money demand function in this model in comparison with other models that have appeared in the money demand literature of developing countries is the inclusion of R_c as an explanatory variable. This variable is intended to replace the role of interest rates in the demand for money functions in an economy where financial markets are just beginning or are underdeveloped, or where deposit and lending rates are administratively fixed. The observable interest rates have therefore ceased to be the key link between holdings of alternative assets (Wong, 1977).

INF - the rate of inflation

DR - the own rate of return to monetary aggregate (Deposit Rate)

To make the above equation estimable, a number of analytical issues warrant comment. The definition of real stock of money suggests that prices are homogenous with money stock. It is noted that the holding of real narrow money did not earn any interest even when demand deposits are considered, its rate of return during the sample period is negligible. In relation to demand for broad money, we adopt the DR as the own rate of return.

In relation to the price level, this paper will not go into an analysis of whether the GDP or CPI deflator is an appropriate proxy for price movements. However, for the obvious reason that the GDP deflator is constructed as a value added variable which includes exports but excludes imports that are purchased by the domestic residents, the CPI deflator is preferred since consumption of imports by domestic residents and exclusion of exports is catered for in this series. The CPI deflator also covers a broader amount of consumption expenditure and could therefore provide a reasonable approximation to the true price deflator.

Inflation as derived from the CPI reveals high levels and turbulence during this period although it stabilised in the latter quarter of the period. This implies variability in respect of return to financial assets and consequently future inflation becomes unpredictable, and real returns to financial assets also become riskier.

Currency substitution effects are to be incorporated in this paper. In orthodox economics, the expected return to holding foreign currency is considered a function of the foreign interest rate and the expected depreciation of the domestic currency. Given the fact that the Ugandan economy experienced an active parallel market in foreign currency particularly in the 1980's, the foreign rate of interest considerations are ignored and instead the premium on the official exchange rate is considered. The premium in this case is taken to proxy the returns of holding foreign rather than domestic currency such that a decline in the premium will lead to an increase in the acquisition of domestic currency. The premium also incorporates both the official and parallel market implications on the demand for domestic currency. The data on parallel market rates for the 1979-1990 is obtained from Bank of Uganda and is the period when this market was very active³.

3. As for the period 1970-1978, one of the authors suggested that because the parallel exchange market was not very active, its rate remained very close to the official rate. It is also noted that foreign exchange receipts were able to finance most of the import requirements such that the premium can be assumed to have been relatively constant and only reflecting transaction costs and efforts to avoid taxes, consequently he suggests it to be around 15% based on unofficial statistics.

A dummy variable with a value of one is assigned to the period of stabilisation and structural adjustment which are respectively 1981 and 1987; this is treated as a temporary shock that affected the demand for money during the sample period.

This study will apply the theory of cointegration and error correction which have to date been established in empirical money demand studies of some Sub-Saharan African economies. Among the most well known are Domowitz and Elbadawi (1987); and Simmon (1992). Adams (1991) specifies robust error-correction models of money demand for the various ranges of standard and Divisia monetary aggregates for Kenya and this was shown to encompass existing studies. Fielding (1993) modelled money demand functions for four African countries i.e. Cameroon, Nigeria, Cote d'Ivoire and Kenya using this approach, these turned out to be robust. Mbire and Mckinnon (1991) modelled a money demand relationship for Uganda, however, their study revealed absence of proven co-integration and this may be attributed to the relatively short sample period available, which characterise most African economies.

Despite the weaknesses attributed to small sample periods that moreover use annual data, we attempt to specify a dynamic money demand equation using this theory. Where cointegration analysis can be applied, the power of the 't' test in a dynamic model attached to the error-correction term can be used to check on the ability of the model to pick up the real relationship.

The study uses annual data of the variables that influence money-demand in Uganda for period 1970-1993. The time-series properties of these variables are first investigated to determine the possibility of co-integration in the data set. The Dickey-Fuller test is used to check on the stationarity of the economic variables before embarking on empirical studies.

The results of the test are reported in the table 1 below.

From the results in table 1 and using the DF t-statistic, the following variables were found to be I(1): $\ln CC$, $\ln M1$, $\ln M2$, $\ln R_c$, $\ln PREM$, $\ln DR$ and $\ln F^4$.

4. $\ln F$ is taken to be I(1) because differencing it yields a stationary variable i.e. price acceleration.

Table 1: Time Series Properties of the Data Sample 1970-1993

	I(0)		I(1)		I(2)	
	DF	ADF	DF	ADF	DF	ADF
cv	-2.9970	-3.0039	-3.0039	-3.0115	-3.0199	-3.0294
lnMO1	-1.8356	-1.7010	-2.8248	-1.8383	-5.9492	-2.8816
lnMO2	-1.8921	-1.6845	-2.2308	-2.0566	-4.4555	-2.9742
lnP	-2.1785	-2.5103	-2.4708	-1.3967	-6.9664	-3.8886
ln gdp	-2.1016	-1.4447	-6.0504	-2.9479		
lnPREM	-2.2476	-1.7482	-5.9544	-4.0121		
lnDR	-2.9707	-2.0087	-6.6757	-3.6520		
dummy	-4.9441	-3.5490				
lnRc	0.0904	0.6241	-6.2652	-3.8436		
lnM1	-1.4885	-1.5847	-4.2021	-2.9564		
lnM2	-1.0369	-0.8845	-4.4072	-2.7696		
lnCCO	-1.6324	-1.4623	-2.2308	-2.0566	-4.4555	-3.8886
ln CC	-1.2869	-1.5107	-3.8100	-3.2856		

where cv=critical value at 95% significance level

lnMO1=log(ml) m1 is nominal narrow money

lnMO2=log(m2) m2 is nominal broad money

lnCCO=log(CCO) CCO is nominal currency in circulation

lgdp=log(gdp) gdp is constant gdp at 1966 prices

lnRc=proxy for interest rate movement in the curb money market

lnP=log(CPI) CPI is consumer price index

lnM1=lnMO1-lnP

lnM2=lnMO2-lnP

lnCC=lnCCO-lnP

lnDR=log (1+DR); DR is the nominal deposit rate.

The above results revealed that the various measures of money (ln CCO, lnMO1 & lnMO2) and prices (ln P) are I(2) variables which conforms well with the theoretical priors as it suggests that money and prices cointegrate (2,1), i.e. money and prices are I(2) variables and they combine to become an I(1) series which can then cointegrate with the remaining variables. This therefore allows us to work in terms of real money stocks which are I(1) rather than nominal prices and money stocks⁵. The dummy variable is seen to be an I(0).

The assumption of homogeneity of money stocks and prices; and the use of DF statistic are discussed in the appendix 1.

5. Since we cannot use price series as a regressor on real money balances, inflation variable is then included as an explanatory variable and this is justified because it is an I(1) variable.

5. Estimating the Money Demand Function with ECM

The first stage in the estimation of the money demand function will search for a stationary linear combination of the following variables: (a) real narrow and broad money (ln CC, lnM1 and ln M2) (b) real incomes (ln gdp) (c) interest rates in the informal money markets as proxied by the credit restraint variable (ln Rc = $\log(1+Rc)$) (d) inflation (INF = $\log(1+p)$) (e) a dummy variable (dummy) an I(0) variable.

Table 2: Currency in Circulation (Ln CC)

Johansen and Juselius Cointegration Procedure

Null	Alternative	Max Eigen Value	95% critical value
$r=0$	$r=1$	69.37	39.37
$r\leq 1$	$r=2$	50.72	33.47
$r\leq 2$	$r=3$	29.52	27.06
$r\leq 3$	$r=4$	12.85	20.97

There are three Cointegrating vectors i.e.

A:Ln CC = 0.89 ln gdp - 5.16 Rc - 0.98 lnDR - 0.63 ln PRE - 0.63 lnINF

B:Ln CC = 0.65 ln gdp - 1.12 Rc - 3.84 lnDR - 1.87 ln PRE +3.03 lnINF

C:Ln CC = 0.92 ln gdp - 6.47 Rc - 1.26 lnDR - 1.88 ln PRE +1.20 lnINF

The three error terms (residuals) from the above vectors are respectively *ecm1*, *ecm2* and *ecm3*

	Dynamic modeling of Δ Ln CC by OLS co-efficient	Sample Period 1970-1990 t-VALUE
inpt	0.50	2.71
Δ lnRc	10.61	2.11
Δ lnPre		
Δ lnInf	-0.48	-3.54
Δ Ln CC (-1)	0.77	3.27
dum2		
<i>ecm2</i> (-2)	-0.17	-3.03
R ²	0.64	
DW	2.05	
F(4,10)	4.51	

Serial Correlation Test (first order) $F(1,9) = 0.1061$

Functional Form $F(1,9) = 0.02$

Heteroskedascity $F(1,13) = 0.86501$

Predictive Failure Test using the CHOW TEST $F(3,10)=2.56$

F-Test for adding *ecm1* and *ecm3*: $F(2,7)=1.0447$

F-Test for adding *ecm1*: $F(1,8)=2.269$

F-Test for adding *ecm3*: $F(1,8)=0.346$

Table 2 shows the results of a vector autoregression of $\ln CC$ on gdp , $\ln Rc$, $\ln DR$, $\ln PREM$, and $\ln INF$. We accept the null hypothesis that there are at most three co-integrating vectors and not four and this leads to the suggestion that there are three combinations of these variables which are stationary. There is however, only one linear combination (vector B) which is readily interpretable as a long-run currency in circulation (C.I.C.) equation. This is further confirmed by the acceptance of the hypothesis of zero restrictions on the error terms for vectors A and C i.e. *ecm1* and *ecm3* in the dynamic equation.

Table 2 also shows the dynamic model of $\Delta \ln CC$ which uses the results from its long-run relationship. It is constructed as an autoregressive distributed (AD) model of annual $\Delta \ln gdp$, $\Delta \ln Rc$, $\Delta \ln DR$, $\Delta \ln PREM$ and $\Delta \ln INF$, it also adds the dummy variable for the stabilisation and structural adjustment programmes plus an error correction term derived from the stationary VAR. The procedure followed a simple general-to-specific model approach that eliminates insignificant explanatory variables but without reparameterisation. A variable deletion test is applied and a joint test of zero restriction on the coefficients of the deleted variables is also carried out.

The predictive failure test extends the sample period to 1993 and uses the initialisation period for 1970 to 1990. It is noted however, that the period 1990-1993 saw the reduction of financial instability through implementation of financial liberalisation policies with monetary management based on open market techniques; the exchange rates and interest rates were largely determined by market forces. The aim of this extension is to test the hypothesis that the original and additional data points were both generated from the same structural relationship.

The variable $\Delta \ln Rc$ suggests that the short-run increases in the credit restraint (thus increases in the Informal Money Market (IMM) rates) increases the currency held outside the banking system in order to facilitate the acquisition of assets in the IMM. The results also suggest that price acceleration ($\Delta \ln INF$) serves to decrease the demand for real C.I.C. money in the short-run probably as agents will prefer to hold inflationary hedges. In the long-run however, increases in Rc do lower the demand for real C.I.C. while inflation increases its demand. It could be the case that economic agents substitute their holdings of broader monetary aggregates with increased holdings of C.I.C. such that they can easily effect transactions in the IMM and increase their holdings of foreign currency denominated assets which serve to lower the real C.I.C. This is reflected by the negative signs attached to Rc and $\ln PREM$ in the long-run equations.

The dynamic base money equation presented in Table 2 suggests that the diagnostic tests are acceptable as satisfactory given the respective F statistics. Most important is that the equation passes the stability test at the 95% level and could therefore be used for forecasting and simulation purposes.

Table 3 suggests that there are three Cointegrating vectors for $\ln M1$. However, vector B and C have the same signs for the respective variables and their co-efficients are just about equal in magnitude. It could then be the case that the Johansen procedure is picking up the same relationship twice. We however, adopt vector C because it nears a unit income elasticity of money demand as suggested by *theory a priori* and we later test the significance of adding the other two error terms from vector A and B in the dynamic equation. The dynamic equation for $\ln M1$ (C.I.C. + demand deposits (DD)) suggest that the error term $enm1$ is not very significant. The diagnostic residual test results are good given the corresponding F-statistics and the dynamic equation also passes the stability test. The positive influence of $\Delta \ln INF$ in the short-run could be coming via the C.I.C. component that is being picked up by $M1$.

Table 3: Narrow Money ($\ln M1$) (C.I.C. + DD)

Johansen and Juselius Cointegration Procedure

Null	Alternative	Max Eigen Value	95% critical value
$r=0$	$r=1$	57.61	39.37
$r \leq 1$	$r=2$	44.84	33.47
$r \leq 2$	$r=3$	32.41	27.06
$r \leq 3$	$r=4$	13.99	20.96

There are three Cointegrating vectors i.e.

A: $\ln M1 = 1.06 \ln gdp - 11.19 R_c - 0.35 \ln DR + 0.81 \ln PRE - 0.57 \ln INF$

B: $\ln M1 = 0.62 \ln gdp - 12.16 R_c - 1.97 \ln DR - 0.35 \ln PRE + 1.04 \ln INF$

C: $\ln M1 = 0.87 \ln gdp - 12.84 R_c - 0.58 \ln DR - 1.74 \ln PRE + 1.90 \ln INF$

The three error terms (residuals) from the above vectors are respectively $enm1$, $enm2$ and $enm3$

	Dynamic modeling of $\Delta \ln M1$ by OLS co-efficient	Sample Period 1970-1990 t-VALUE
$\ln p_t$	-0.10	-0.10
$\Delta \ln R_c$	9.59	1.89
$\Delta \ln PRE$		
$\Delta \ln INF$	-0.93	-4.25
$\Delta \ln M1 (-1)$	0.73	2.92
$enm3 (-1)$	0.38	2.61
$enm3 (-2)$	-0.17	-2.17
R^2	0.72	
DW	1.60	
F(5,9)	4.62	

Serial Correlation Test (first order) $F(1,8) = 0.19$

Functional Form $F(1,8) = 0.271$

Heteroskedasticity $F(1,13) = 1.58$

Predictive Failure Test using the CHOW TEST $F(3,9)=2.24$

F-Test for adding $enm1$: $F(1,8)=0.319$

Table 4 suggests that the presence of co-integrating vectors is only established at the 90% level of significance. The null hypothesis for the existence of three vectors is accepted with vector B being the true long-run relationship for broad money ($\ln M2$). It is interpretable in terms of parameters and signs; and is further confirmed in the dynamic broad money equation by the acceptance of the hypothesis that the error terms *ebm1* and *ebm3* have a zero restriction on their coefficients. The dynamic equation in this table also suggests that short run changes in broad money positively respond to current changes in the deposit rate ($\Delta \ln DR$) and negatively to the current inflation rate ($\Delta \ln INF$). Inflation in the short-run negatively affects broad money via C.I.C. and $M1$, although its effects in the long-run are positive. This behaviour could be attributed to the high proportion of $M1$ in the overall $M2$ aggregate.

Table 4: Broad Money ($\ln M2$) ($M1 + TSD$)

Johansen and Juselius Cointegration Procedure

Null	Alternative	Max Eigen Value	90% critical value
$r=0$	$r=1$	56.23	36.37
$r \leq 1$	$r=2$	31.00	30.90
$r \leq 2$	$r=3$	26.80	24.73
$r \leq 3$	$r=4$	16.68	18.53

There are three Cointegrating vectors i.e.

A: $\ln M2 = 0.92 \ln gdp - 13.08 R_c - 1.31 \ln DR - 0.50 \ln PRE - 0.13 \ln INF$

B: $\ln M2 = 0.99 \ln gdp - 15.48 R_c + 1.39 \ln DR - 2.65 \ln PRE + 1.87 \ln INF$

C: $\ln M2 = 0.29 \ln gdp - 10.49 R_c - 4.01 \ln DR - 1.83 \ln PRE + 2.47 \ln INF$

The three error terms (residuals) from the above vectors are respectively *ebm1*, *ebm2* and *ebm3*

	Dynamic modeling of $\Delta \ln M2$ by OLS co-efficient	Sample Period 1970-1990 t-VALUE
<i>inpt</i>	-0.37	-2.73
$\Delta \ln gdp$		
$\Delta \ln DR$	2.28	2.11
$\Delta \ln DR(-1)$		
$\Delta \ln M2(-1)$	0.55	2.37
$\Delta \ln INF$	-0.48	-3.98
<i>dum2</i>		
<i>ebm2</i> (-2)	-0.11	-2.24
R^2	0.73	
DW	2.57	
F(6,9)	6.86	

Serial Correlation Test (first order) $F(1,9) = 3.13$
 Functional Form $F(1,9) = 1.455$
 Heteroskedasticity $F(1,13) = 0.044$
 Predictive Failure Test using the CHOW TEST $F(3,9) = 3.4187$
 F-Test for adding *ebm1* and *ebm3*: $F(2,8) = 0.205$
 F-Test for adding *ebm1*: $F(1,9)=0.0.059$
 F-Test for adding *ebm3*: $F(1,9)=0.147$

The IMM deposit rates (R_c) have negative effects on broad money in the long run although its effect in the short-run are not very significant. The error correction term *emb2* is significant and can be said to have picked up its true relationship. Although the diagnostic test results including the stability test are accepted as satisfactory given the corresponding F statistics, they are so much near their critical values that not much confidence can be placed on them. Moreover, the Cointegrating vector is only derived at the 90% significance level. This then makes the M2 aggregate unreliable for forecasting and simulation purposes.

The weak results for stability on M2 reflects the fact the period 1990-1993 is characterised by a reduction of financial instability in the Ugandan economy. There is strong evidence of agents substituting from foreign denominated financial assets to acquisition of domestic currency interest earning financial assets embodied in M2. This is largely so given the fact that the foreign exchange premium decreased while the real deposits rate became positive. Consequently, parameters generated by the initialisation period of 1970-1990 which is characterised by financial instability tended to break and a structural shift appears to have taken place.

Based on the stability test, the above results suggest that monetary aggregates such as C.I.C. and M1 can effectively be used for forecasting and simulation purposes while aggregates such M2 that have been confirmed rather unstable may not be useful for this purpose.

The long-run money demand equations (for all the C.I.C., M1 and M2) seem to be reflecting the effects of financial repression that have been prevalent in the economy over the sample period. It shows the financial portfolio of the agents which reflects the substitution of these monetary aggregates with the acquisition of curb market assets and foreign currency denominated assets. Following the repression on deposits and exchange rates, agents did lower their holdings of these monetary aggregates in favour of IMM and foreign currency denominated financial assets which are respectively proxied by R_c and PREM. The effects of inflation are seen to increase the currency ratios as confirmed by the long-run equation for C.I.C. which suggests that as inflation increases the agents appear to increase their acquisition of currency (see Table 5).

In the above equations, all the signs attached to the respective coefficients are as suggested by economic theory. The error terms are significant and are t-2 with a negative sign attached to them which suggests that when the economic agents in Uganda hold their real money balances above their desired level, it results into a reduction of its acquisition in the following period. It also suggests that the cost of adjustment to the desired level of real balances is quite high as reflected by the time lag, while the significance of error terms reveals that they have been able to capture the true money demand relationship.

All of the above results seem to bear out the suggestion of economic theory which could lead to the acceptance in the use of cointegration and the error correction model while specifying a money demand relationship for Uganda, despite the short sample period used.

6. Conclusion

This study has shown that the credit restraint variable that is used to proxy the opportunity cost of money is a strong determinant of the real money demand in Uganda for the period of financial repression and reduced financial instability. It was only possible to get Cointegrating vectors that made economic sense in the variables, after the inclusion of a credit restraint variable. The Chow test revealed that the ECM for our narrow money demand functions (C.I.C. and M1) has remained stable even in the period of reduced financial instability (1990-1993). This suggests that narrow money is a good aggregate for monetary policy purposes. The narrow money model can then be said to be interpretable in terms of the structural parameters of interest, the error terms are white noise and is data coherent. The results also suggest that the demand for monetary aggregates reflect substitution effects in the agents financial portfolio. However, parameter stability is not achieved when broader monetary aggregates are considered and this then suggests that broad money aggregate should be used as an indicator of monetary conditions rather than as a target. Nonetheless, the instability in broader aggregates is not unique to Uganda as empirical findings even in the developed economies have revealed instability in these aggregates particularly in the era of financial deregulation.

It should however, be noted that the above results have been generated using only twenty three annual observations which may limit the degree of confidence in the robustness of these results.

Table 5: Multiplier and Currency Ratios: 1971-1993

Year	INFL (%)	C/D	C/DD	C/TSD	C+D/C+R
1971	10.59	0.564	1.128	1.128	2.330
1972	1.24	0.413	0.688	1.036	2.684
1973	12.88	0.213	0.316	0.658	2.850
1974	49.46	0.398	0.577	1.284	2.884
1975	18.91	0.417	0.735	0.962	2.221
1976	38.84	0.555	0.988	1.268	2.058
1977	74.89	0.642	1.003	1.792	2.148
1978	47.61	0.616	1.025	1.540	1.814
1979	87.63	0.756	1.255	1.903	1.612
1980	45.98	0.667	1.121	1.644	1.595
1981	164.17	0.513	0.704	1.887	2.270
1982	34.85	0.528	0.806	1.529	2.139
1983	21.17	0.581	0.851	1.835	1.857
1984	100.95	0.829	1.145	2.994	1.792
1985	155.50	0.741	0.978	3.049	1.444
1986	153.10	1.031	1.475	3.421	1.509
1987	233.20	0.850	1.079	4.000	1.664
1988	262.10	1.038	1.249	6.170	1.725
1989	70.60	0.885	1.114	4.320	1.881
1990	25.60	0.749	1.054	2.590	1.885
1991	38.70	0.725	1.010	2.574	1.769
1992	56.70	0.605	0.921	1.759	2.118
1993	-0.60	0.579	1.035	1.316	2.268

(where INFL, C/D, C/DD, C/TSD and C+D/C+R are respectively the inflation rates, ratios of Currency/Total Deposits, Currency/Demand Deposits, Currency/Time and Savings Deposits and Money Multiplier).

Source: Derived From IFS and Bank of Uganda Quarterly Economic Reports (Research Department)

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Abstract

This paper presents the estimates of a dynamic money demand equation for narrow and broad money in Uganda. Its broad findings are that a proxy for interest rate movements in the informal money markets is relevant in determining an economically meaningful co-integrating vector among variables of interest. Our results suggest that the real narrow money is stable while the demand for broad money is unstable. The money demand equations also appear to reflect substitution effects in the agents financial portfolio and the real narrow money equation could therefore be used in analysing the financial asset market behaviour during the sample and post sample periods. As a policy recommendation, narrow money could be used for monetary targeting.

LA DEMANDE DE MONNAIE AU SENS ÉTROIT (M_1) ET AU SENS LARGE (M_2) DU TERME EN OUGANDA
Résumé

Cet article présente les évaluations d'une équation pour la demande dynamique de monnaie au sens étroit (M_1) et de monnaie au sens large (M_2) du terme en Ouganda. En général, on a observé qu'une variable vicariale pour les variations des taux d'intérêt dans les marchés non organisés s'avère utile pour la détermination d'un vecteur co-intégrant parmi les variables significatif au point de vue de l'économie. Les résultats suggèrent que l' M_1 effective est stable, tandis que la demande de M_2 est instable. D'ailleurs, il paraît que les équations de demande monétaire reflètent des effets de substitution dans le portefeuille financier des agents et on pourrait, donc, utiliser l'équation de la monnaie au sens étroit du terme effective pour l'analyse des tendances du marché actif des avoirs financiers pendant la période de l'étude et pendant la période successive. La recommandation des auteurs est qu'on pourrait utiliser la monnaie au sens étroit du terme pour le ciblage monétaire.

