THE IMPACTS OF NON-BANK FINANCIAL INTERMEDIARIES ON THE DEMAND FOR MONEY IN KENYA

BY

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DECLARATION

This is my original work and has never been presented for any degree in any other university.

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DEDICATION

To: My late grandmother may God rest her soul in eternal peace and MA(ECONOMICS) students

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ABSRACT

The subject of money of money demand is one of the most researched areas this is mainly because of the way money in which the quantity of money in circulation interacts with other factors to influence the behavior of interest rates, real income, employment and the general price level.

Commercial banks are the most important lending and deposit institutions. However, they are not the only financial outlets in the country.
The study shows that NBFI's the rapid increase in these institutions most have effects on monetary policy in Kenya.

The principle objective of the study is to investigate the effects of NBFI's on the conduct of monetary policy in Kenya. The analysis of NBFI,s liabilities indicates that they compete favorably with commercial banks in saving mobilization and also in provision of both medium-term and long-term credit.

The estimated coefficients after adding NBFI's deposits suggest that NBFI's deposits are imperfect substitutes for commercial banks deposits.

CHAPTER ONE

INTRODUCTION

The subject of money demand is possibly one of the most heavily researched, this is mainly because of the way in which the quantity of nominal money in circulation interacts with other factors to influence the behavior of interest rates, real income, employment and the general price level. The demand for money has increasingly become a focus in macro economic analysis due to the realization that monetary policy will be effective if the demand for money function is stable. Stability is important in assessing the impacts of monetary policy as well as understanding the behavior of critical sectors of the economy in a developing country.

The stability of money demand is crucial if monetary and fiscal policies are to have predictable effects on the ultimate economic objectives, on real output, balance of payments and price level. It is probably true to say that economists of persuasion who urgue that if monetary policy operating via changes in money stock is to have stable predictable effects on income then the demand for money must be stable. It is frequently questioned whether the demand for money must be stable and predictable particularly in developing countries (Arrau et al 1991). This resulted in money persistently over predicting the actual money demand resulting in the so-called 'missing money episodes'.

Monetary policy is based on the view that monetary phenomenon has important influence upon the behavior of the real economy. The monetary phenomena may include the growth of money, the volume of bank credit, the level of interest rates and exchange rates. Monetary policy focuses on one or a number of these phenomena and is based upon the preposition that money does matter. A lot exists on the demand for money in

developed economies but relatively little systematic analysis of the behavior of private balances exists in developing countries. The study of money demand is of potential importance in that inappropriate monetary policy can deprive a country of part of the benefits of its development effort no matter how well planned the growth program are planned (Arize 1989).

There are basically two categories of monetary instruments, which may be used in stabilization. There are those, which regulate the supply of money, and those that affect the demand for liquidity in the form of money. But the demand for money in developing countries like Kenya needs to be treated with extra caution when compared to developed economies due to different market conditions, which exist in the economy. Ghatak (1981) argues that demand and supply of short-term loanable funds of less developed countries (LDC's) are generally characterized by what has been called financial dualism. This means that a dual market structure exists in the money market namely the organized and the non-organized sector.

Organized monetary sector consists of institutions such as the central bank, non-bank financial institutions and commercial banks. The activities of the organized sector are subject to financial control and their interest rates are observable which are mostly found in urban areas.[1]

The non-organized monetary sector includes local moneylenders, traders and merchants, shopkeepers' friends and relatives. These are characterized by mixing money lending with other types of economic activities flexibility in loan transactions; and personal and informal dealing with the borrowers (Ghatak 1976).

Its important to note that in Kenya just like other LDC's the non organized monetary sector is still widespread due to its hold in the rural areas where agriculture is the main activity and informal sectors which are the backbone of this economy. Ghatak (1981) notes that the flow of funds between the organized and non-organized sector is very small. The dichotomy of these two sectors constrain the growth of these economies

[1] The lack of penetration of organised banks in the rural areas and into small scale urban industry has been collaborated by U Tan Wai in a massive empirical study of LCD's in which data was available.

since it deprives a country off an array of financial assets through which savings could have been mobilized more effectively and converted into significant investment. This makes the task of the central banks use of monetary policy very difficult since a significant portion of money is out of its control.[2]

Financial intermediaries arise due to information asymmetry and transaction costs between agents. They serve to reduce the problem created by information and transaction friction whose main roles are to mobilize savings, diversification, pooling of risks and allocation of resources.

Differences between lending rates and deposit rates also proxies efficiency of the intermediation process e.g. under perfect competition the wedge is narrow. It is composed only of the transaction cost while in an imperfect market the wedge is wider reflecting inefficiency in market operation. Kenya's experience with financial reform process shows a widening interest rate spread following interest rate liberalization in addition, financial institutions witnessed declining profitability, non-performing loans and distress borrowing in the recent past. Although Kenya's financial sector is described as significantly diversified in terms of the number of institutions banking sector services continue to dominate the sector with few banks continuing to dominate the banking sector. (Ngugi 2001)[3].

Commercial banks in Kenya are the most important lending and deposit institutions. However, they are not the only financial outlets in the country. There are many financial intermediaries referred to as non-bank financial intermediaries (NBFI's) which range from small savings and credit associations to very large financial companies. According to the banking act in Kenya a non-bank financial intermediary is a company other than a commercial bank authorized to conduct financial business, which just like

[2] Most people in rural areas keep their money "under the mattresses" due to diverse reasons. Among them absence of financial institution in their locality, unawareness of the advantages of taking money to the bank, and inconveniences of not seizing the opportunity which may arise by keeping the money at the bank

[3] Currently 4 commercial banks, 3 Non bank financial institutions, 2 mortgate finance companies, and 4 building societies.

other countries supplement the commercial banks mainly in deposits and in lending out credit to potential investors.

Statement of the Problem:

The quantity of money is a significant factor in determining the health and prosperity of any economic system. A stable demand for money function and velocity of money is assumed for effective monetary policy. Attempts to determine determinants and stability of money in Kenya are recent yet so far few have looked at effects of the non bank financial intermediaries (NBFI's) on the conduct of monetary policy.

Most studies have ignored or failed to examine the impacts of NBFI's on the demand for money and have continued to do so even when NBFI's continue to experience rapid increase in size. For example Kenya witnessed a period of rapid growth in non-bank financial intermediaries, especially in the last half 1970's and 1980's.These financial intermediaries have become potential competitors of commercial banks as far as credit and savings mobilization is concerned. For example, in 1997/1998 financial year deposits in NBFI's grew by 7.2%, while bank deposits grew by 5.3%.

These financial intermediaries have continued to strive alongside commercial banks to as far as credit and savings mobilisation in the country is concerned hence this development of financial intermediaries must have effects on the functional form of the demand for money and effectiveness of monetary policy in Kenya.

The study also tries to avoid the problem associated with time series data this will involve testing for stationarity and co-integration. It has commonly been found that income interest rates and real money balances are non-stationary since they are integrated of order one. If these variables are all individually non-stationary inferences on demand for money model can only be made if a linear combination of its variables exist. The error term associated with that co-integration vector is stationary, well defined for

process and ordinary least squares (OLS) provides consistent estimate of the true parameters and inferences making can proceed as usual. Otherwise absence of co-integration in a traditional money demand specification would indicate that the models do not have long run implications, that is fundamental economic forces that make variables move stochastically together and deviations from a given equilibrium are bounded.

Significance of the study

An empirical analysis of the nature and stability of money demand function is a vital input in a monetary targeting regime. Thus the study will utilize the empirical finding of a money demand function to determine the extent to which NBFI's activities influence any monetary policy. The principle objective of the study will be to investigate the effects of NBFIs' on the conduct of monetary policy in Kenya paying attention to rapid growth in NBFIs' liabilities .It would be wrong to formulate demand for money function without considering liabilities of NBFI's. The main purpose of this study therefore is to investigate the effects of the rapid growth in NBFI's liabilities on the demand for money and it's components.

Objectives of the study:

The study intends to investigate the impacts of NBFI's on the demand for money and trying to avoid problems associated with the time series data and the specific objectives are:

- Specify and estimate the money demand function taking into account NBFI's liabilities.
- Discuss policy implications based on the above findings.

CHAPTER 2

LITERATURE REVIEW

THEORETICAL LITERATURE

The theoretical literature on money demand can be grouped into 3 major broad groups. These models are based on:

1. The modern quantity theory.
2. Portfolio theory models
3. Inventory theory model

The Chicago school of thought seems to suggest that demand for money depends on a measure of wealth and a vector of asset yields in arriving at a functional relationship. Friedman makes use of empirical data and thus identifies the factors that determine the demand for money schedule. His objective is to test theory against empirical evidence. He treats money as any asset yielding flows of services, which may be discounted over a given period of time. Permanent income (wealth), rate of interest adjusted for capital gains and losses, rate of return on equities, rate of change in prices and the ratio of human to non human wealth are determinants of the demand for money schedule.

The portfolio theory model is attributed to Keynes (1936) and developed further by Tobin (1958). This was derived by considering the demand for money as a choice problem with emphasis on risk and expected returns. This is from different financial assets depending on the trade off between returns (expected wealth) and risk of holding bonds so that the nature of portfolio determines the demand for money.

The theory of speculative money demand for an individual depends upon the individual wealth rate of interest which stands as expected yield on bonds and risks of bonds measured by the standard deviation of the probability distribution of rates of capital gains and losses. Theory suggests that some measure of economics and assessment of risks of assets other than money should be included in the demand for money function.

The inventory theory models are based on the transactions needed for holding money to smoothen the difference between income and expenditure flows. This was developed by Baumol (1952) and Tobin (1956) and later extended by Fiege and Pearce (1977). This explicitly specifies a transaction cost function, which includes inventory holding cost as well as brokerage fees. This function is then minimized with respect to the cost of transactions. Key elements of this model are that all information is known with certainty. However there are major limitations concerning the ability of the inventory theory model to explain the transaction balances of firms and persons (Cuthbertson 1915:32). Further more application of the model in developing countries is not possible simply because of the nonexistence of data on brokerage costs and other form of transaction costs.

The portfolio model is less appropriate in developing countries because of the special features of these economies in particular the financial markets in LDC'S are less developed or virtually nonexistent and therefore financial asset such as government bonds and other private securities are very few. Hence the substitution between money and other financial assets are not widespread. Further more observable interest rates do not generally reflect market conditions since in most cases they are institutionally pegged. In such circumstances the desired holding of money balances are insensitive to observable interest rates on financial assets.

The modern quantity theory of money has an edge over other two models from the above reasons that is why most studies done in LDC'S have followed this approach. According to the modern quantity theory approach individuals demand money because of

the services it offers such as facilitate transactions. Money is one form of asset among many others, which an individual chooses to hold out of his total income or wealth. Therefore the demand for money can be treated in a similar manner to the demand for consumer good where income or wealth is considered as a budget constraint for holding a desired amount of money.

EMPIRICAL LITERATURE

Studies in LDC are enormous but similar in approach for different countries. These studies have shown evidence that in undeveloped monetary system the role of expected price in the demand for money function is more important than interest rates. This means that expected price changes rather than interest rates provides a more realistic guide to the opportunity cost of holding money balances vis a vis physical asset.

Gujarati (1968) postulates a money demand function for India (He assumes a standard approach in estimating money demand function). Assuming a log linear relationship between money demand and its variables. Gujarati using annual data from 1948/5 found income elasticity to be to be greater than one and was the most significant of the demand for real cash balances. While interest rates was statistically insignificant. His argument for the insignificant interest rate was that the money market in the Indian economy was still undeveloped. He concurs with Kaufman and Latta (1966) that interest for money function would be more significant in countries with developed financial markets.

Wong (1977) introduced another dimension in his study in analyzing money demand for 5 developing Asian countries (Korea, Philippines, Sri-Lanka, Taiwan and Thailand). He introduced a simple model reflecting the common characteristics of developing countries.

The distinctive characters of this money de·nand function in comparison with other model that have appeared in this literature is the inclusion of CR as an explanatory variable. Wong justifies this variable to replace the role of observable interest rates in the demand for money function for an economy where the financial markets are undeveloped or where lending rates and deposit rates of banks are pegged. He goes further to claim that in such economies observable interest rates ceases to be the key linkage variable between holding of alternative assets. The rationale behind this is that once it is recognized that borrowing in LDC'S is one major source of financing economic activities after self-finance. He suggested many ways to measure the degree of credit restraint e.g. the discount rate of the central bank, the negative of the ratio of domestic credit expansion among others. In estimating the short run version of the model

He found the income elasticity to be statistically significant for all countries expect for Sri-Lanka. The coefficient of the degree of credit restraint variables was significant for Korea, Philippines, and Sri-Lanka while the rest were not using the TSL'S. However corrected for auto-correlation, the coefficient for credit restraint became statistically significant for Taiwan and Thailand.

Studies done in Kenya have not differed with those done elsewhere in LDC's. Studies include Pathak (1981), Darrat (1985), Mwega (1990), Nyongesa (1991), Adam (1991) and Ndungu (1992).

Pathak's main concern was on the stability of the money demand function in Kenya as a function of interest rates income and wealth. But due to unavailability of wealth data, the model boiled down to the equivalent of Gujarat's 1968 model. His findings were that the demand function is positively related to national income and negatively to interest rates. The model however has several shortcomings in that no adjustment was allowed between desired and actual money. That the exclusion of price expectation and other major variables e.g. exchange rate, financial innovation could have caused serial correlation; the few degrees of freedom due to sample size renders the model not suitable for policy consideration.

Darrat (1985) recognizes the important role in formulation and execution of effective monetary policy paid special attention to the model specification, it's dynamic structure and to its temporal stability using both narrow and broad definition of money. He argues that financial assets in Kenya are adequate and there exists little substitution between money and other financial assets. He adds that the choice of assets holders is largely limited to either holding money or real goods such as real estates or consumers durable and that interest rates are pegged by authorities and hence ignores the domestic rate. He notes the fact that contemporary economies are more or less open to each other and that in such economies international opportunity cost of holding money should also be considered as a potential alternative of holding domestic money balances in Kenya.

Using quarterly data (1969-1978) and almon technique the results showed that all the variables were statistically significant and with anticipated signs. He also found out that money demand function in Kenya is statistically stable.

Mwega (1990) tested and re-examined the money demand function on grounds that economy had continued to be buffered by external and exogenous shocks associated with changes in imports and export prices and vagaries of weather. The economy had been subjected to policy shocks as the authorities attempted to stabilize the situation by applying structural adjustment programs (SAP'S) and very rapid growth of non-bank financial intermediaries (NBFI'S) using a semi-log linear relationship. He uses the rates of Treasury bill as a proxy for the cost of holding money vis-à-vis other financial assets. This is especially so for large money holders. Mwega admits that the CBK influences the rate by manipulating the tendering process in an attempt to ensure it moves with other more rigid rates. But the rates were invented drastically in the 1980's in an attempt to keep them positive in real terms. Using the three definitions of money M1, M2 and M3. Real income coefficient was positive as expected though insignificant at 5% level except M2. Expected inflation and expected Treasury bill rate were also significant determinants of the money demand function at 1% level. This suggestion made the treasury bill rate an attractive alternative to M1 and M2 he goes on to agree with Pathak (1981) that interest rates were potentially an important tool of monetary policy in the country. However the

treasury bill rate as not significant at 5% level in explaining the demand for real M3 indicating that the bills were not an attractive alternative to NBFI's deposits to money holders. He goes further to note that the income elasticity of money demand showed a downward trend to which he attributed to structural adjustment programs (SAP's) implementation in the 1980's.

In testing the McKinnon-Shaw hypothesis, Nyongesa (1991) argues that the demand for real balances increase with real deposit rate of interest and that financial capital could be complementary rather than substitutes to one another in LCD's. This hypothesis according to him was valid yet a study by Mwega et al (1988) could not reach the same conclusion.

Adam (1991) major objective was to establish a consistent model for narrow money in Kenya for the period 1973 to 1990. He establishes the extent and form of cointegration relationship of the model, after which he proceeds to estimate an over parameterized error correction model by lagging each variable five times. This allows the identification of the main dynamic patterns of the model so as not to constraint the model by a short lag length. He simplifies and reduces the size of the model taking only significant parameters. This is done so as to make the model easy to interpret. Adam finds a strong significance of the ECM, which supported his contention that money and GNP were co-integrated. The price change had all the expected signs. He found a degree of substitution between the non-interest bearing narrow money and the domestic financial assets.

Ndungu (1991) in his study had three objectives, which included:

- Attempts to investigate the appropriateness of GNP as a scale variable in the money demand equation by comparing other alternatives.
- To show how important technological variable in understanding the money demand in Kenya.

- Address the problems associated with time series data i.e. stationarity of data and cointegration of variables.

After establishing stationarity of the data and co-integration, Ndungu found out that these variables were highly significant and conformable with the theory-underpinning determinant of money demand. He obtained his objective variable in money demand for Kenya as to his concern about the scale variable. His model tended to favour total consumption as the appropriate scale variable in the case of partial adjustment model since it had the least standard deviation from the regression.

CHAPTER THREE

METHODOLOGY

In this chapter, attention is shifted to the discussion on the methodological approach to the research problem and the attainment of research objectives. Firstly there is a presentation of the money demand function specification of a developing country generally and specifically Kenya. The formal test for time series data properties are then presented after which cointegration and diagnostic tests used in this study is discussed. The chapter concludes by looking at the data type, motivation for its use and its sources.

Arising from the theoretical literature it is seen that equilibrium demand for money is influenced by a scale variable, income, relating to the level of transactions in the economy and opportunity cost of holding money relative to other financial assets. A scale variable essentially attempts to measure the 'work' that money, as a medium of exchange has to perform. Opportunity cost variables proxy the second best alternative of holding money balances. Empirical studies on demand for money suggests that money could be treated as a durable consumer good, (Chow 1966). This is because holding money by agents yields services to them so that holding money and other real goods by consumers will depend on levels of income and prices just as the theory of consumer behavior postulates. Prices of goods depend on prices of relative goods while the price of money is determined by the rate of interest. To explicitly specify the model we assume that there is a stable equilibrium in the money market given income, interest rates, opportunity cost of holding money so that the demand for money in non-linear functional form is specified as:[4]

[4] Adapted from Judd and Scadding in their article 'The Search For a Stable money Demand function'.

$$M^{*d}_t = \alpha_0 Y^{\alpha 1}_t RI_t^{\alpha 2} \Pi_t^{\alpha 3} \epsilon^{ut} \qquad (1)$$

Where:

M^{*d}_t = Desired real money balances at time t.

Y_t = real income at time t.

RI_t = Rate of interest (reflects yield on financial assets) at time t.

Π_t = Opportunity cost of holding money relative to other real assets.

ϵ^{ut} = Disturbance term.

Economic theory postulates that real income has a positive impact on money demand while rate of interest and opportunity cost for holding money relative to other assets have negative impacts on real money balances. The most appropriate measure for opportunity cost of holding money relative to other real assets in a developing country is the expected rate of inflation. Since substitution can occur between money and alternative financial assets. Interest rates also provide another opportunity cost variable of holding money relative to other real assets. However, this is a very controversial issue with inclusion of interest rates in money demand functions in developing countries. Most developing countries do not have well organized money and other financial markets such that substitution between money and other financial assets doesn't occur hence wealth owners are limited to holdings their assets either as money or as real goods such as land, agricultural commodities, buildings etc (Wong, 1977). Interest rate display very little variations over time and this makes it difficult to establish empirically any relationship between money and interest rates. These arguments are applicable to the Kenyan case and to this study the Treasury bill rate is used as a proxy for the rate of interest[5].

So that the demand for money will be estimated as;

[5] Darrat (1985) in his Kenyan study used foreign interest rates and found that the variable statistically significant.

$$M = f(y, Tbr, \Pi,) \qquad (2)$$

Equation (2) in log form is expressed as;

$$\ln M^{*d}_t = \ln \alpha_0 + \alpha_1 \ln Y_t + \alpha_2 \ln Tbr_t + \alpha_3 \ln \Pi_t + U_t \qquad (3)$$

Where;

Y_t= Real income at time t.

Tbr_t= Treasury bill rate (reflects yield on financial assets) at time t.

Π_t= Opportunity cost of holding money relative to other real assets(inflation rate)

U_t= Stochastic disturbance term.

In the model specification we have both inflation and interest rates. The inclusion of both variables which are likely to be highly correlated, this is not a misspecification error. This is because in developed countries both variables move in the same direction, while in developing countries because of controls the variables are expected to be uncorrelated. In Kenya interest rates have a tendency to display very little variations over time and this makes it difficult to establish empirical relationships between money and interest rates. Inflation on the other hand is a significant variable, which affects portfolio decisions of wealth holders in Kenya. Wealth holders prefer to keep their wealth in real assets rather than deposit money in a bank if they anticipate increases in inflation in future.

Substantial empirical literature supports the view that there exists a time lag in the adjustment of actual money stock to desired money balances.

As such the short-run demand for money should contain lagged money balances as an explanatory variable. Adjustment of money balances from the actual to the desired level is likely to be incomplete because of rigidity inertia, ignorance, transaction costs etc.

Since desired stock of money is non-observable we assume a money stock adjustment of the form:

$$M^{d}_{t} / M^{d}_{t-1} = (M^{*d}_{t} / M^{d}_{t-1})^{\beta} \qquad (4)$$

$$0 < \beta < 1$$

Where:

β =Is a coefficient of adjustment of money stock

Equation 4 in log form is expressed as:

$$\text{In } M^{d}_{t} - \text{In } M^{d}_{t-1} = \beta (\text{In } M^{*d}_{t} - \text{In } M^{d}_{t-1}) \qquad (5)$$

Substituting (3) in (5) and rearranging we obtain:

$$\text{In } M^{d}_{t} = \beta \text{In } \alpha_0 + \beta\alpha_1 \text{ In } y_t + \beta \alpha_2 \text{ In tbr} + \beta\alpha_3 \text{ In } \Pi_t + (1-\beta)\text{In } M_{t-1} + \beta U_t \qquad (6)$$

Equation (6) is the short run demand for money function. Deriving the long run demand for money entails dividing through by β and dropping out M_{t-1} to get:

$$\ln M^d_t = \ln \alpha_0 + \alpha_1 \ln y_t + \alpha_2 \ln tbr + \alpha_3 \ln \Pi_t + U_t \qquad (7)$$

So that the equation for estimating components of the money stock is specified in the general form as:

$$M^i_t = f(Y_t, Tbr_t, \Pi_t) \qquad (8)$$

Where:

M^i_t =real stock of the i^{th} money stock at period t.

Y_t = real income as time t.

Tbr_t = Treasury bill rate as time t.

Π_t = Opportunity cost of holding money relative to other real assets (inflation rate).

M^i_t is therefore defined as currency held by the public in real terms, demand deposits held by the public in real terms and time/savings deposits in real terms.

In order to observe the impacts of NBFIs'on the demand for money in Kenya equations 6 to 8 specified above will be estimated. The equations will be estimated using quarterly data over the period 1970 to 2000. Adjustment will be made on the standard demand for money formulation. This is done by adding NBFI liabilities to both narrow and broad defination of money and the model estimated in log-form to establish the impacts of NBFI growth on demand for money.

Estimation procedure;

The equations are estimated in the log linear functional form. So that once the short-run coefficient are estimated the long-run demand coefficient are obtained by solving the short-run demand algebraically. The study caries out some unit root test such as the dickey-fuller (DF) and the Augmented Dickey-fuller (ADF) so as to test for stationarity of the time series data. ADF will be used in case there exists auto-correlation in the error term. Which biases the estimates; and cannot be handled by DF test, which assumes that the data generating process is an AR (1) under the null hypothesis.

Diagnostic Tests;

The diagnostic test for the log-linear model will include; testing for residual serial correlation, heteroscedasticity, weak exogeneity of the regressors, functional form misspecication and parameter stability.

Data sources;

Data for this study will be sort from the following sources;
International Financial statistics, Central Bank Of Kenya Quarterly Economic Review and the Central Bureau Of statistics, Economic Survey.

CHAPTER FOUR

DATA ANALYSIS AND EMPIRICAL RESULTS

This chapter is concerned with data analysis and a discussion of empirical results based on the model presented in chapter three. In order to delineate the effects of NBFI's on the conduct of monetary policy in Kenya equations 6 to 8 specified in the preceding section will be estimated and results are presented in tables 1, 2, 3 and appendices 1 and 2.

Additional results are presented in equations 9 to 12. These equations were estimated using quarterly and annual data over the period 1970. 1 to 2000. 4. In addition the tables contain a variety of goodness- of- fit statistics such as the adjusted coefficient of determination, the standard error of the estimated equation, the Durbin- Watson test statistic and the F- test statistic.

The equations were corrected for the first order serial correlation by the Cochrane-Orcutt iterative method. A description of variables used is found in appendix 1. Since these tables report results for a number of equations, we discuss results with policy implications.

SHORT-RUN AND LONG-RUN DEMAND FOR MONEY

Tables 1 and 2 reports results after estimating both short-run and long-run demand for money equation using quarterly data. The t- values of the coefficients are in parentheses with an asterisk indicating the level of significance. These equations are estimated in the log- linear functional form. The long-run money demands as reported in table 2 were estimated independently. Normally, once the short- run demand coefficients are estimated, the long- run demand coefficients are obtained algebraically. We solve the

long- run demand algebraically to test whether the estimated long- run demands were statistically different but found they were not. However we decided to report the estimated coefficients. In the next few paragraphs we discuss together the short- run and long- run coefficients presented in table 1 and 2.

Regressing M1 on income, opportunity cost, etc the results are in equation 1.1.1 in table 1. All the variables have the expected signs and are therefore consistent with economic theory. The constant term is significantly different from zero. Both real income and Treasury bill are statistically significant at the 1- percent level. The opportunity cost of holding money relative to other assets has the anticipated sign but is statistically insignificant. The goodness- of- fit variable shows that over 93 percent of the variables in the demand for money in Kenya are accounted for by the explanatory variables included in this equation. The short- run income elasticity is not only positive but within the expected range for most developing countries. Except in one case, this variable is more than unity and statistically significant, indicating that real income is an appropriate explanatory variable in demand for money function in Kenya. The coefficient of lagged money balances is 0.582 and is statistically significant at the 1- percent level. The coefficient of adjustment is β= 1- 0.582 and indicates that about 41 percent of the discrepancy between the desired and the actual real money balances is eliminated in one quarter.

We have made adjustment to the narrow defination of money, which distinguishes our model specification from the standard demand for money formulation by adding demand deposits of NBFI's to establish how the model compares with normal formulations of demand for money function. The results with this adjustment are reported in equations 1.1.2 and 2.2.2. The coefficients have correct signs and fit of the data to this specification is good, as indicated by the high values of $\bar{R}2$; the F- test statistic is significant and the standard error of the estimates (SEE) is relatively small. The results after this adjustment seem to indicate that NBFI's deposits are substitutes for commercial bank deposits and should thus be subjected to monetary controls.

However, the coefficient of real money balances is low, especially in equation 2.1.2. The adjustment of the actual money stock real balances to changes in demand for money is high and statistically different from zero at the 1- percent level.

Defining real money balances is a broad sense, that is, M1 plus quasi- money, the regressions results are given in equations 1.1.3 and 2.2.3. The $\bar{R}2$ is high, suggesting our model specification fits Kenyan data very well. The real income variable is high and within the expected ranges of about 1.5 and statistically different from unity at the 1-percent level. The interest elasticity of money is not significantly different from zero at the 5 percent and 1 percent levels and the opportunity cost holding money relative to other real assets is statistically insignificant.

M3 was estimated and the results are reported in equations 1.1.4 and 2.2.4 of tables 1 and 2. M3 is defined as M2 plus liabilities of NBFI's. The results again suggest that NBFI's deposits could be substitutes of commercial banks as far as the general public is concerned. People treat deposits in NBFI's as part of their wealth. Therefore, monetary authorities in Kenya should take into consideration the demand for money in NBFI's. Income elasticity ranges between 1.9 and 2.1, which is higher than when money is defined as M1 plus quasi- money. The results are contained in tables 1 and 2 are consistent with studies carried elsewhere in developing countries (Wong, 1977; Adenkule, 1980; White, 1978).

Annual data covering the period under review was used to estimate our demand for money formulations. These results are presented in appendix 2. The results are uninteresting and not consistent with our apriori expectations. They are presented here for a curious reader. Throughout the adjusted $\bar{R}2$ is invariably lower for all specifications than the one obtained when quarterly data was used. The opportunity cost of holding money vis-a-vis physical assets has the wrong sign though it is statistically significant at

the 1- percent level. This is a surprising result because in Kenya financial markets people could choose to hold their wealth in assets other than money.

Income elasticity is low when annual data is used, and in some specification has unanticipated signs. In equations 4.4.1 and 4.4.4 the variable is not statistically different from zero at 1- percent level. In equation 4.4.6 the variable is within the expected range but lower than when quarterly data was used. In equation 4.4.5, if real income increase by 100 percent, demand for real money balances rises by only 0.8 and this is a disturbing result. The regression results using annual data as reported in appendix 2 are different from those obtained using quarterly data. The results obtained using quarterly data are consistent with the theoretical prediction and fit our model specification well.

The period under review was split into two to investigate the possibility of structural breaks resulting from the likely effects of rapid growth of NBFI's on the functional form of demand for money and also to test stability of the estimated demand for money coefficient. Stability of any function depends upon the variables include in the function and the appropriate demand for money function which monetary authorities should target depends on stability test.

The chow test is used to test stability of the estimated coefficients and this test involves splitting the data into two parts and estimating each data set separately. In dividing the data into two we choose 1980 as a cut- off point because the period after 1980 is characterized by rapid growth of NBFI's liabilities compared with 1970's. We present the estimated coefficients of the two sub- periods and later discuss stability of these coefficients.

Period 1: 1970.1- 1979.4 (all variables in logs)

$$M1 = 1.075 + 1.291\ Y - 0.009\ \Pi - 0.071\ TBR + 0.542\ M1_{t-1} \qquad (1)$$

$$(2.294)^{***}\quad (3.729)^{***}\quad (-0.379)\quad (-1.097)\quad (4.109)^{***}$$

$\bar{R}2 = 0.644$, SEE = 0.0105, DW = 2.223, F = 15.1

$$M2 = 1.931 + 1.872Y - 0.058\Pi - 0.109TBR + 0.650M2t\text{-}1 \quad (2)$$
$$(12.552)^{***} \quad (14.141)^{***} \quad (-0.145) \quad (-3.894)^{***} \quad (4.247)^{***}$$

$\bar{R}2=0.852$, SEE=0.062, DW=1.997, F=17.9

$$M3=0.310 + 2.213Y - 0.032\Pi - 0.041TBR + 0.805M3t\text{-}1 \quad (3)$$
$$(1.293) \quad (2.462)^{***} \quad (-1.916)^{*} \quad (-2.005)^{*} \quad (5.448)^{***}$$

$\bar{R}2=0.914$, SEE=0.416, DW=2.713, F=21.9.

The lagged real money balances are statistically significant variables at the 1-percent level in this period and have anticipated sign. The income elasticity of demand for money ranges between 1.2 and 2.2 in period one and is statistically significant at the 10 percent level in all specifications. Splitting the period of review into two does not change the effects of NBFI liabilities on demand for money as shown in equation 3.

Regression results for the other period is:

Period 2:1980.1-2000.4(All variables in logs)

$$M1=0.662 + 1.200Y - 0.06\Pi + 0.104TBR + 0.696M1t\text{-}1 \quad (4)$$
$$(2.199)^{**} \quad (3.218)^{***} \quad (-3.166)^{***} \quad (1.249) \quad (7.747)^{***}$$

$\bar{R}2=0.938$, SEE=0.084, DW=2.074, F=19.4.

$$M2 = 2.278 + 1.509Y - 0.026\Pi + 0.156TBR + 0.103M2_{t-1} \quad (5)$$

(2.372)** (2.034)** (-0.294) (0.715) (4.491)

$R2 = 0.764$, SEE=0.339, DW=2.283, F=22.5

$$M3 = 2.057 + 1.424Y - 0.461\Pi + 0.404TBR + 0.187M3_{t-1} \quad (6)$$

(2.477)*** (1.994)* (-0.638) (1.886)* (1.926)*

$R2 = 0.871$, SEE=0.285, DW=2.286, F=17.9

The estimated coefficients in the 2nd period shown in equations 4 to 6 differ quite significantly with those of the first period. In this period, income elasticity of demand for money is more than unity and ranges between 1.2 and 1.5. However the coefficient is lower in this period than the first period. The opportunity cost variable is statistically significant in only one equation while the Treasury bill rate variable not only has the wrong sign but also is statistically insignificant throughout. These results are disturbing and probably capturing the wrong relationships especially the Treasury bill rate variable. Interpreting them is difficult since they do not conform to our apriori expectations. However the income elasticity coefficients indicates that, because of the liquidity problems NBFI's faced in the 1980's, wealth holders started treating them as inferior to commercial banks while the level of interest which was fixed throughout the year by the authorities does not affect demand for money in this period.

The empirical results on demand for money when NBFI's are incorporated indicate that NBFI's should be incorporated in monetary control. Since effectiveness of monetary policy depends on the stability of demand for money. The study looked at the appropriate monetary aggregate for policy manipulation. This involved testing stability of M2 and M3 in order to gauge which of the two is appropriate for monetary policy. The

stability methodology developed by Chow 1960 was applied. Residuals of the observed values and estimated coefficients were calculated and a comparison made with the standard errors of estimate (SEE). The residual of M3 turned out to be very small compared with the standard errors of estimate. They did not indicate any significant shifts in demand for money, thus suggesting that M3 is a more stable function than M2. Thus, by incorporating NBFI's. Monetary policy would be much more effective. M3 is therefore, the empirically appropriately functional term for demand of money in Kenya.

THE DEMAND FOR CURRENCY AND DEPOSITS

There are no strong theoretical reasons to estimate the demand for components of real stock because by doing so we are not testing any theory. However, separate analysis of currency and deposits is important and has policy implications. This analysis has also been done by Balino (1977) who argues that:

"There are strong and important reasons to look at the demand for the components of money stock. The difficulty evidence in the efforts to obtain a satisfactory aggregate demand for money is such reasons.... The analysis of currency and deposits separately is interesting in itself."

Another reason for estimating components of money stock is to find out whether the estimated coefficients differentiate in some way between deposits in banks and in NBFI's. This is particularly relevant exercise to the subject at hand.

The components of money stock were estimated in non- linear functional form using both quarterly and annual data. The same explanatory variables used in estimating real money balances were used and the results are given in table 3 and appendix 2. We discuss the most important results which yield better results in terms of plausibility of estimated coefficients. Demand for currency is positively related with income elasticity

of demand and negatively related with income elasticity and opportunity cost of holding currency. The long-run income elasticity of demand for currency is high which is 1.869 and statistically significant at 1- percent level. The variable shows that if wealth of money holders increases by about 18.69 percent. The coefficient of adjustment between actual and desired currency has the correct sign and is statistically significant at the 1-percent level implying that real currency in the previous period is an important explanatory variable in the demand for currency.

In both equations 3.3.1 and 3.3.2 real income is significant at the 1 percent level and within the expected range, indicating that currency is held for transaction purposes. The rate of inflation variable has the anticipated sign. This shows that people reduce their holdings of currency and keep their wealth in other financial assets, which do not depreciate because of inflation.

Long-run income elasticity of demand deposits and the short-run elasticity of time and savings deposits ranges 1.5 and 2.3. The possible explanation for this trend is that when people's income increases they prefer to save their wealth for future transactions and for speculative reasons. The income elasticity has the correct sign. The summary statistic, that is the adjusted $\bar{R}2$, the standard error of the estimate, the Durbin-Watson and the F-test, favour the specification of this monetary model.

Under the assumption that lags affect adjustment between actual and expected demand for currency and deposits, the results are equations 3.3.2, 3.3.4 and 3.3.6, respectively. As anticipated, the lagged real variables have the correct signs and are statistically significant at the 1- percent level. As can be seen in table 3 the estimated coefficients differentiate between deposits in banks and NBFI's. Adding demand and saving deposits with NBFI's to those of the banking system, upon estimating we have results as equations 3.3.1, 3.3.3 and 3.3.6. This adjustment improved the performance of the model. The estimated coefficients of these equations have the expected signs and are statistically significant at 1 percent, 5 percent and 10 percent levels. The income elasticity

of demand for the components of money stock is very high and statistically significant at 1- percent level through out.

Regression results for components of money stock using annual data are presented in appendix 2. Except in equation 5.5.5 and 5.5.6 the adjusted $\bar{R}2$ is small. A surprising result is that the opportunity cost variable of holding currency, demand and time saving deposits has an unanticipated sign and is significant at the 1- percent level through out. The result confirms our earlier findings that lags affect the components of money stock. The real income variable is unity in only three equations with the rest having not only having a coefficient less than unity but an incorrect sign. An important finding is that regression results using annual data to estimate components of money stock as found before do not fit our model well and give distorting and unrealistic results.

CHAPTER FIVE

CONCLUSION

The principle objective of this empirical study was to investigate the effects of NBFI's on the conduct of monetary policy in Kenya; paying special attention to the rapid growth of NBFI liabilities. An adjustment was made to the standard demand for money formulation by adding NBFI liabilities to both narrow and broad defination of money and the model estimated in log-form to establish the impact of NBFI growth on the demand for money.

The paper goes further to look at the components which were currency, demand deposits, and time/savings deposits in order to investigate whether the estimated coefficients differentiate in some way between deposits in banks and NBFI's. Kenyan data over the period 1970.1 to 2000.4 were used to estimate the coefficients.

The main conclusions of this empirical study are:

- The analysis of NBFI liabilities indicates that there is a rapid increase in growth. This implies that NBFI compete favorably with commercial banks in saving mobilization and also in the provision of both medium-term and long-term credit. Hence people treat their deposits in NBFI's as part of their wealth.

- The estimated coefficients after adding NBFI's deposits to both narrow and broad defination of money suggest that NBFI deposits may be imperfect substitutes for commercial banks deposits. In addition, M3 was found to be stable using the chow test compared with M2. Thus this implies that it would be wrong to use a demand

for money function without considering liabilities of NBFI's. In addition, the conduct of monetary without considering NBFI's will be erroneous and is more likely to provide uncertain results. Confining monetary policy to banks alone may add inequality to ineffectiveness of monetary policy (Lindsay, 1970). Thus any monetary policy aimed at stabilizing the economy should take into account the activities of NBFI's.

- The lagged money balances are important explanatory variables for explaining variation of money from period to period. The real money balance in the previous period therefore plays an important role in the portfolio decision of money holders in Kenya. The study also found out that predictions on growth of money based on annual data would definitely be misleading because estimation using annual data will not give good results with policy implications throughout.

Appendix one

VARIABLE	DESCRIPTION
M1	Currency plus demand deposits (Narrow definition)
M1AD	M1 plus NBFI demand deposits
M2	M1 plus time and savings deposits (Broad definition)
Y	Real income (constant 1981 prices). To transform Income on a quarterly basis a mathematical interpolation method developed by Diz (1970) was used. Darrat (1985) used the same technique to calculate quarterly income figures for Kenya.
Π	Rate of inflation
RI	**Treasury** bill rate used as a proxy of interest rates. Since average rate of discount of treasury bills are available monthly data was extracted at the end of each quarter.
M1t-1	M1 lagged by one quarter
M1ADt-1	M1AD lagged by one quarter
M2t-1	M2 lagged by one quarter
M3t-1	M3 lagged by one quarter

CAA	Currency
CAAt-1	Currency lagged by one quarter
DEE	Demand deposits
DEEt-1	Demand deposits lagged by one quarter
TSS	Time and saving deposits
TSSt-1	TSS lagged by one quarter

Appendix II

Regression results for short-and long run demand for money: Annual data, 1970-2000

Equation number	Dependent variable	Constant	Y	π	RI	MAD_{t-1}	$M2_{t-1}$	$M3_{t-1}$	$\bar{R}^2$	SEE	DW	F
4.4.1	M1	0.723	−0.713	−0.123	−0.233				0.712	0.113	2.423	16.7
		(1.341)	(−1.613)*	(−3.414)***	(−8.14)*							
4.4.2[a]	MAD	2.351	0.03	0.272	−0.206	0.319			0.559	0.069	2.444	5.441
		(2.543)**	(1.948)*	(3.234)***	(−3.852)***	(1.452)*						
4.4.3	MAD	−3.077	1.124	2.508	−0.255				0.661	0.651	2.307	10.1
		(1.132)	(1.442)	(3.153)***	(−0.523)							
4.4.4[a]	M2	1.480	−0.03	0.379	−0.20		0.474		0.791	0.063	2.124	14.2
		(2.031)*	(−1.997)*	(4.364)***	(−4.209)***		(2.554)***					
4.4.5	M2	3.219	0.008	0.485	−0.217				0.686	0.077	1.610	11.2
		(10.057)***	(2.252)**	(5.183)***	(−3.772)***							
4.4.6	M3	−2.719	1.519	2.481	−0.252				0.665	0.639	2.298	10.3
		(−1.094	(2.434)**	(3.179)***	(−0.524)							
4.4.7[a]	M3	2.278	1.508	−0.152	−0.027			0.103	0.725	0.032	2.179	8.7
		(2.372)	(2.034)	(−2.714)	(−0.490)			(4.749)***				

Key

a Short-run demand for money equation
t Statistic in parentheses under the coefficients
* Statistically significant at 10 % level
** Statistically significant at 5 % level
*** Statistically significant at 1 % level

Appendix III

Regression results for components of money stock: Annual data, 1970-2000

Equation number	Dependent variable	Constant	Y	π	RI	CAA_{t-1}	DEE_{t-1}	TSS_{t-1}	R^2	SEE	DW	F
5.5.1	DEE	3.626	1.018	0.218	-0.246				0.579	0.079	1.999	7.4
		(0.995)***	(2.533)**	(0.254)**	(-4.135)							
5.5.2[a]	DEE[b]	0.721	1.224	-0.224	0.324	0.869			0.879	0.089	2.867	5.1
		(3.142)***	(2.583)**	(-3.25)***	(3.220)***	(3.171)***						
5.5.3	CAA	1.707	-0.003	0.424	-0.151				0.577	0.091	1.849	4.8
		(2.847)***	(-0.064)	(2.822)***	(-2.193)**							
5.5.4[a]	CAA[b]	0.919	0.005	0.343	-0.159		0.342		0.595	0.086	1.765	5.6
		(1.233)	(0.124)	(2.896)***	(-2.358)**		(1.216)					
5.5.5	TSS[b]	1.131	1.023	-0.713	-1.241				0.971	0.034	2.173	14.3
		(3.123)***	(2.113)*	(-3.434)***	(-1.971)*							
5.5.6[a]	TSS	1.773	-0.198	0.489	-0.22			0.605	0.941	0.065	1.972	58.4
		(1.971)*	(-0.649)	(4.382)***	(-5.079)***			(5.137)***				

Key

a Short-run demand for Components of demand equation
t Statistic in parentheses under the coefficients
* Statistically significant at 10 % level
** Statistically significant at 5 % level
*** Statistically significant at 1 % level
b Demand and savings deposits with NBFIs included in the estimations of these equations.

Table one: Regression results for short-run demand function: Quarterly, data 1970.1-2000.1

Equation number	Dependent variable	Constant	Y	π	RI	$M1_{t-1}$	MAD_{t-1}	$M2_{t-1}$	$M3_{t-1}$	$\bar{R}^2$	SEE	DW	F
1.1.1	M1	0.772	1.320	−0.018	−0.056	0.582				0.932	0.129	2.003	225.9
		(4.388)***	(4.479)***	(−0.771)	(2.543)***	(6.502)***							
1.1.2	M1AD	0.269	0.913	−0.058	−0.027		0.823			0.979	0.117	2.031	229.7
		(2.653)***	(3.343)***	(−2.716)***	(−1.399)*		(5.113)***						
1.1.3	M2	0.922	1.522	−0.018	−0.059			0.467		0.866	0.243	2.174	85.1
		(3.953)***	(4.471)***	(−0.484)	(−1.971)**			(3.915)***					
1.1.4	M3	0.627	2.121	−0.055	−0.023				0.596	0.926	0.229	2.595	207.3
		(3.309)***	(3.979)***	(−1.356)*	(−0.623)				(6.201)***				

Key

t statistic in parentheses under the coefficients

* Statistically significant at 10 % level

** Statistically significant at 5 % level

*** Statistically significant at 1 % level

Table two: Regression results for long-run demand functions: Quarterly, data 1970.1-2000.1

Equation number	Dependent variable	Constant	Y	π	Rl	$\bar{R}^2$	SEE	DW	F
2.2.1	M1	3.529	1.190	0.0004	−0.025	0.916	0.143	2.187	180.8
		(9.716)***	(2.714)***	(0.015)	(−1.002)				
2.2.2	M1AD	5.869	1.163	−0.025	−0.025	0.977	0.124	2.044	122.3
		(3.789)***	(2.764)***	(−1.243)	(−1.182)				
2.2.3	M2	1.769	1.916	0.024	−0.06	0.842	0.266	2.164	120.1
		(1.912)**	(2.612)***	(1.341)	(−2.713)***				
2.2.4	M3	1.409	1.923	0.0018	−0.004	0.885	0.288	1.873	173.0
		(8.224)***	(17.371)***	(0.037)	(−0.095)				

Key

t statistic in parentheses under the coefficients

* Statistically significant at 10 % level

** Statistically significant at 5 % level

*** Statistically significant at 1 % level

Table three: Estimation results for components of money stock, 1970.1-2000.4

Number of equation	Dependent variable	Constant	Y	π	RI	CAA_{t-1}	DEE_{t-1}	TSS_{t-1}	$\bar{R}^2$	SEE	DW	F
3.3.1	CAA	-0.365	1.869	-0.016	-0.181				0.722	0.322	1.991	58.9
		(-1.904)*	(12.024)***	(-0.284)	(-3.523)***							
3.3.2[a]	CAA	-0.327	1.636	-0.0003	-0.116	0.279			0.748	0.308	2.108	49.9
		(-1.717)*	(5.249)***	(-0.006	(-2.095)**	(2.425)***						
3.3.3	DEE	1.553	1.715	0.011	-0.042				0.856	0.198	1.877	133.9
		(13.184)***	(16.093)***	(0.312)	(-1.324)*							
3.3.4[a]	DEE	0.745	0.846	0.003	-0.028		0.524		0.896	0.167	2.538	143.5
		(4.005)***	(4.352)***	(0.091)	(-1.047)		(5.239)***					
3.3.5	TSS	0.407	1.054	-0.062	-0.006				0.924	0.218	1.968	273.5
		(3.143)***	(21.559)***	(-1.966)*	(-0.018)							
3.3.6[a]	TSS	0.102	2.274	-0.54	-0.018			0.805	0.988	0.084	1.902	425.8
		(1.891)*	(4.819)***	(-3.687)***	(-1.972)*			(19.077)***				

Key

a Short-run demand for money equation
t Statistic in parentheses under the coefficients
* Statistically significant at 10 % level
** Statistically significant at 5 % level
*** Statistically significant at 1 % level

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