The Money Demand Behavior in Bangladesh

Akhtar Hossain*

Abstract

This paper has examined the money demand behavior in Bangladesh with annual data since the mid-1950s. However the focus of the study has been the post-independence period (1972-2003), especially the 1980s and 1990s. The main findings of the paper are as follows. (i) There existed a relatively well-defined narrow money demand function in Bangladesh during the 1950s and 1960s. However the narrow money demand function for this period did not include the nominal interest rate as an opportunity cost variable and has been found inadequate to explain the money demand behavior for the post independence period. (ii) There exists a stable money demand function for Bangladesh for the post-independence period, especially for the sample period beginning from the early 1980s. However the values for income and interest elasticities of demand for money have changed since the early 1990s. The above findings, in conjunction with related findings in other papers, suggest that monetary targeting is the appropriate strategy of monetary policy, at least as an interim measure. Adoption of monetary targeting, in place of a discretionary monetary policy strategy, would provide Bangladesh a nominal anchor for price stability under the present floating exchange rate system.

I. Introduction

With ongoing financial sectar reforms in Bangladesh since the early-1980s, monetary policy has gained increased role in maintaining macroeconomic stability in general and price stability in particular. However, the Bangladesh Bank is yet to announce a monetary policy framework for the conduct of monetary policy to achieve price stability.

* School of Policy, Faculty of Business and Law, University of Newcastle, NSW 2308, Australia, E-mail: Akhtar.hossain@newcastle.edu.au

Until recently the choice of a monetary policy strategy did not get priority in this country. Apparently, under both a pegged exchange rate system and capital controls, monetary policy was conducted passively in conjunction with fiscal policy and their main objective was to maintain a desired level of foreign exchange reserves rather than price stability *per se*. Implicitly, inflation had an external anchor the nominal exchange rate, which was kept at an overvalued level for price stability. However the prices of non-tradable goods, which are determined by domestic factors, dominated the behavior of inflation, given that the share of non-tradable goods in national expenditure has remained high [Hossain 2000].

Historically being a relatively low-inflation country [Hossain and Rashid 1996], exchange rate pegging was neither suitable nor sustainable for Bangladesh as a strategy of monetary policy [Hossain 2000]. It was rightly abandoned on 31 May 2003 in favor of a floating exchange rate system. This was a bold decision, as it has made monetary policy independent, at least in principle. However the gain of monetary policy independence under a floating exchange rate system generally requires a monetary policy strategy that uses a nominal **anchor**[1] for price stability**.** Monetary and inflation targeting are two alternative strategies of monetary policy that can achieve this goal [Blejer, Ize and Leone 2000; Mishkin, 2000]. Having gained some monetary policy independence, Bangladesh should therefore make a choice between the two for the conduct of monetary policy more credibly and effectively.

Monetary targeting has a long tradition and is (was) adopted by many **countries**.[2] There are strong arguments for monetary targeting as a strategy of monetary policy. Milton Friedman's [1959] argument for a 'k-percent' money growth rule is based on the potentially destabilizing effects of active monetary policy when there are long and variable lags present. His suggestion for a constant money supply growth rule was not rigid but pragmatic, in the sense that policymakers not

1. In the monetary literature, a fixed exchange rate is considered a monetary rule, one approach to achieve monetary and price stability. Therefore, by definition, a flexible exchange rate implies the removal of a monetary rule and is not a policy in itself. Given that a flexible exchange rate is consistent with both price stability and hyperinflation [Mundell 1968], a nominal anchor, a variable that is the intermediate target of monetary policy, is needed to maintain inflation at a desired level. For a discussion on different types of nominal anchors, see Flood and Mussa [1994].

2. The developed countries that adopted monetary targeting during the mid-1970s include Australia (1976), France (1976), Germany (1974), Italy (1974), Switzerland (1975), Canada (1975), USA (1975), the United Kingdom (1976), and Japan (1978). Germany, Switzerland and Japan continued with this strategy throughout the 1980s and 1990s, but in a loose form [Cobham 1992; Mishkin 2000; Blejer, Ize and Leone 2000].

bound by a fixed money supply growth rule may be tempted into excess activism, thereby destabilizing rather than stabilizing the economy. Kydland and Prescott [1977] have formalized this theme by way of the *time-inconsistency* problem.

Monetary targeting became popular in the midst of worldwide inflation during the mid-1970s and peaked in the late-1970s. However, once they brought inflation under control by the mid-1980s, most developed countries discarded monetary targeting for all intents and purposes. The situation is somewhat different in developing countries where formal or informal monetary targeting has gradually become popular. There are a number of reasons for such popularity. First, the money demand function, which plays the critical role in the design of monetary targeting, has remained largely stable in these countries despite some financial deregulation and financial innovation since the 1980s. Second, since the mid-1980s most developing countries have switched from a fixed/pegged to a flexible exchange rate system and gained greater control over the monetary base that can act as a nominal anchor. Third, most developing countries find it difficult to fulfil the stringent conditions of inflation **targeting**[3], which has become the favorite strategy of monetary policy in many developed countries since the early 1990s [Blejer, Ize and Leone 2000; Debelle, Masson and Savastano and Sharma 1997].

Insofar Bangladesh is conceoned the question remains what should be the strategy of monetary policy under the present floating exchange rate system. The adhoc manner that monetary policy is conducted is neither effective nor desirable. Changes are afoot. The prevailing view of high officials in the Bangladesh Bank is that inflation targeting is not appropriate for Bangladesh at this juncture. However, monetary targeting is considered as a plausible alterative, given that some form of monetary base targeting is already in place under the World Bank-IMF-supported PRGF program. In practice, whether monetary targeting should be adopted formally depends on the presence of a stable money demand **function.**[4] This follows the general principle that a stable money demand function is the

3. The key requirements of inflation targeting include: a political mandate to achieve and maintain price stability, central bank independence (instrument independence), developed money and capital markets, flexibility in wages, interest and exchange rates, absence of fiscal dominance (that is, monetary policy is not dictated by fiscal needs of the government), central bank's technical ability to forecast inflation, a well-defined and understood analytical framework of monetary policy that includes the transmission channels between policy instruments and inflation, macroeconomic stability, meaning low and stable inflation, and above all, policy credibility and accountability [Debelle 1997; Debelle, Masson, Savastano and Sharma 1997].

4. The main attraction of inflation targeting is that unlike monetary targeting, it can bypass the step of intermediate targeting in the monetary policy transmission mechanism and therefore does not require the presence of a stable money demand function.

necessary condition for any causal relationship between money supply growth and inflation.

Having outlined the necessity for choosing a monetary policy strategy, this paper re-examines the money demand behavior in Bangladesh in a historical context. Annual data since the 1950s are used for the **study.**[5] The remainder of the paper is organized as follows. Section II specifies a monetary model of inflation. Section III specifies and estimates a money demand function for Bangladesh with data for different sample **periods.**[6] Section IV examines the stability of the money demand function for Bangladesh for the post-independence period. Section V draws conclusion**.**

II. A Monetary Model of Inflation

Consider the money market equilibrium condition:

$$m^s = m^d \qquad (1)$$

where $m^s = M/P$ (real money supply, M, is the nominal money stock and P is the price level) and $m^d(y^p,i)$ is the real money demand, which is an increasing function of real permanent income (y^p) and a decreasing function of the nominal interest rate (i). From this money market equilibrium condition, the following relationship can be derived in proportional growth form:

$$= - (_y g_y - _i g_i) \qquad (2)$$

where is the inflation rate, is the money supply growth rate, g_y is the permanent income growth rate, g_i is the percentage change in the nominal interest rate, and $_y$ ($_i$) is the income (interest) elasticity of demand for money.

This shows that the inflation rate equals the growth rate of the money supply less the growth rate of money demand. Assume that the money supply growth rate is a policy instrument and set by the monetary authority and that it does not affect the money demand growth rate in the **long run.**[7] This makes inflation a policy variable that roughly equals the money supply growth rate less the growth rate of the economy times the income elasticity of demand for money.

This simplified monetary model of inflation rests on a number of testable propositions:

---

5. The low-frequency data capture the long-term monetary relationship better and are in the spirit of the classical-monetarist tradition [Laidler 1990].

6. The post-independence period remains the analytical/empirical focus of this paper. For earlier studies on money demand in Bangladesh, see Basset [1996] Hossain [1993,1995,1996,2003], Sidgwick [1996] and Taslim [1983] and references therein.

- the nominal interest rate does not affect the long-run money demand,
- the money demand function is stable, in the sense [Friedman 1956; Judd and Scadding 1982] that:

1. there exists a parsimonious relationship between real money balances and the scale variable, say, real permanent income,
2. the real permanent income is functionally related to macroeconomic variables that represent economic activity, such as consumption expenditure, and
3. the money demand relationship is robust in the statistical sense of high explanatory power, precision of parameter estimates, and forecasting ability,

- the monetary authority has the ability to bring changes in the monetary base growth rate through monetary policy instruments at its **disposal.**[8]

The fulfilment of above conditions may establish a *causal* relationship between money supply growth and inflation under monetary targeting.

III. The Demand for Money: Theory, Specification and Estimation

In the theoretical literature at least three broadly defined groups of money demand models are dominant. They are single equation demand theory models, portfolio theory models, and inventory theory models. The *Chicago School*-based demand theory models derive the money demand function in the same way as the demand for other durable **goods.**[9] The portfolio theory models are associated with the *Yale*

7. This follows the classical neutrality and super-neutrality of money propositions. According to the neutrality of money proposition, the expansion of money supply in the long run leads to an increase in the price level but not an increase in real income, which is determined in the real sector of the economy by real, and not nominal, factors of production. The super-neutrality of money proposition suggests that economic growth remains invariant to an increase in the money supply growth rate, implying that the money growth rate would not increase the money demand growth rate through the income growth channel. However, the money supply growth can lower the nominal interest rate in the short run through the liquidity effect but the nominal interest rate would rise proportionately to the inflation rate in the long run through the Fisher equation, leaving the real interest rate, capital-intensity and per-capita output (or consumption) independent to the rate of money growth. For a review of these propositions and critiques, see Friedman [1992], Orphanides and Solow [1990] and Tobin [1992].

8. This is based on the assumption that the country operates under a flexible exchange rate system and thus has control over the monetary base.

9. Real money balances are considered a type of real asset ¾ a form of wealth with the attractive property of higher liquidity, providing a flow of non-observable services, which are proportional to the stock of real money balances and which enter into an individual's utility function. Individuals maximize their utility functions subject to the budget constraints. The demand for real money balances, derived from the utility maximization principle, is then shown to depend on real permanent income (or wealth) and the opportunity cost of holding money instead of other financial and real assets [Friedman 1956, 1959b].

School view of the demand for money. The original insight of this theory is attributed to John Maynard Keynes and has been developed further by James Tobin [1958] in his article on liquidity preference, where the demand for money is viewed in the context of a portfolio choice problem with emphasis on risk and expected returns from alternative financial assets. The inventory theoretic approach to transactions demand for money was originally developed by William Baumol [1952] and James Tobin [1956], and later extended by Feige and Pearce [1977]. It focuses on the need to hold money in order to smooth the difference between income and expenditure flows, and explicitly specifies a transactions cost function, where the cost function includes inventory holding costs as well as brokerage **costs.**[10]

Of these theoretical models, the Friedmanite demand theory model is widely used for empirical studies. This model is appropriate for developing countries, including Bangladesh, for both theoretical and pragmatic reasons. For example, in the absence of broad range of financial assets and due to a relatively narrow durable consumer goods market, money plays the role as a major component of wealth, its important virtue being its versatility. The absence of well-developed money and capital markets, and the resultant lack of various financial assets of domestic and foreign origins, makes the portfolio approach less appropriate for poor countries. In the similar lines of argument, the inventory theoretic approach is too rigid in its specified form one would also face practical difficulties in finding the data series on brokerage costs and other forms of transactions costs.

This paper uses the Friedmanite demand theory model in its spirit but not in the exact form that he has developed in his classic paper [Friedman 1956]. For Bangladesh, whether this model is appropriate remains an issue. One prevailing view is that, in the absence of well-developed money and capital markets, the demand for money in a country like Bangladesh originates from the transaction and precautionary motives and as a result, at least from a theoretical point of view, Baumol or Tobin's transactions demand theory may be appropriate [Taslim 1983]. Yet the fact that money is used for transaction purposes does not necessarily imply that a more general theory is not appropriate for Bangladesh. This is because the Friedmanite model acknowledges the use of money for transactions and precautionary **purposes.**[11]

10. The money demand function that emerges from the cost minimization procedure provides a precise formula for the transactions demand for money. The expected values of income and interest rate elasticities are 0.5 and - 0.5, respectively.

Modelling of Money Demand

In the lines of the traditional literature [Friedman 1956; Ericsson 1998; Laidler 1993], the asset theoretic money demand can be specified in the following general form:

$$M^d/P = m = m(y, \mathbf{R}, {}^e) \qquad (3)$$

where m is real money demanded, defined as nominal money M^d deflated by the price level P, y is a generic scale variable, for example, real measured or permanent income, **R** (in bold) is a vector of returns on various financial assets, and ^{e} is expected inflation. The function m(.,.) is increasing in y, decreasing in those elements of **R** associated with financial assets excluded from M, and increasing in those elements of **R** associated with financial assets included in M. Goods are an alternative to holding money and the function m(.,.) is decreasing in expected inflation ^{e}.

In empirical studies, such as Ericsson [1998], Equation (3) is specified in the following log-linear form, albeit with interest rates entering in logs or **levels.**[12]

$$\ln (M^d/P) = 0 + 1 \ln y + 2 \mathbf{R}^{out} + 3 \mathbf{R}^{own} + 4 {}^e \qquad (4)$$

where s are coefficients; and somewhat symbolically, $\mathbf{R}^{out}$ and $\mathbf{R}^{own}$ are the rates of return on assets outside of money and on money itself. The expected signs and magnitudes of coefficients are: 1 = 1 (quantity theory) or 1 = 0.5 (Baumol-Tobin framework), 20, 30 and 40. Empirically, the own and outside rates of return may have coefficients of equal magnitude but opposite sign. If so, $2\mathbf{R}^{out}+3\mathbf{R}^{own}$ in (4) simplifies to $2(\mathbf{R}^{out}–\mathbf{R}^{own})$ with the spread $(\mathbf{R}^{out}–\mathbf{R}^{own})$, being economically interpretable as a measure of the opportunity cost of holding money.

---

11. It is maintained that once the quantity of money demanded is determined by the asset demand theoretic approach, there is no inconsistency in money's providing services to wealth-holders in the same way as other durable goods provide services to them. Note that in a world of certainty, the two reasons for holding wealth are to straighten out the consumption stream and to earn interest. In a world of uncertainty, another important motive for holding wealth is the availability of liquid funds or reserves for emergencies [Friedman 1957]. However, not all forms of wealth are equally satisfactory as a reserve for emergencies. Of the various kinds of wealth, money has been an attractive asset to wealth-holders because of its versatility. The more uncertain is the future, the greater the value of liquidity (or money's other unique attributes) and thus the greater the demand for money [Friedman and Schwartz 1963].

12. There are no clear-cut theoretical guidelines for the appropriate functional form of the money demand function. A log-linear form is commonly preferred to alternative forms on statistical grounds. For example, in such a specification, the estimated parameter values are easy to interpret as elasticities.

Finally, the expected inflation rate measures the expected return on holding goods, so the coefficient 4 on ^{e} should be negative.

The Short-Run Money Demand Function

Whilst there is reasonable consensus in the literature on the specification of the long-run money demand function, a cloud of controversy and uncertainty has surrounded the entire subject of the short run specification of the money demand function. The controversy persists due to lack of understanding of dynamic adjustments of the economy in the event of monetary disturbances. While in the long run the desired demand for real money balances is equal to actual real money balances, in the short run there may be a discrepancy between the two. In such a situation it is expected that actual real money balances would show a tendency to move towards the desired level, not instantaneously but rather through a series of partial adjustments over time. The reasons for such adjustment include market imperfections and implicit and explicit costs of adjustment, such as transaction costs, search costs, and optimization costs.

Chow [1966] suggests that actual changes in real money balances spring from two sources: first, a fraction of the discrepancy between desired and actual real money balances is eliminated through changes in actual real money balances; and, second, a fraction of savings out of transitory income (savings being defined by measured income less consumption expenditure where consumption expenditure is a fixed proportion of permanent income) is held in monetary form and brings changes in the actual real money balances.

Assuming that changes in real money balances arising from savings out of the transitory component of income are white noise, Chow's real money balances adjustment function can be specified as:

$$\ln (M/P)_t - \ln (M/P)_{t-1} = (\ln (M/P)^{d}_t - \ln (M/P)_{t-1}) + _t \qquad (5)$$

where is the coefficient of elasticity of adjustment, and is the random error term.

Substitution of equation (4) into equation (5), and after rearrangement of terms, yields the following estimable equation:

$$\ln (M/P)_t = \quad 0 + 1 \ln y_t + 2 \mathbf{R}^{out}_t + 3 \mathbf{R}^{own}_t + 4 \, ^{e}_t$$
$$+ (1-) \ln (M/P)_{t-1} + t \qquad (6)$$

In the empirical literature, this is the widely used specification of the money demand function in disequilibrium form. A brief discussion follows on the choice of variables that enter into the empirical money demand function for Bangladesh.

Empirical Money Demand Function: Choice of Variables

In the money demand literature, the choice of an appropriate definition of money remains an empirical **issue.**[13] The choice is between the narrow and broad definitions of money. This is useful for examination of whether the estimated coefficients are different for the two money variables and whether one definition of money is superior to other in the sense of stability of a money demand function. The demand for money, as widely agreed, is a demand for real balances. That is, in the absence of money illusion, an increase in the price level would induce a proportionate increase in the demand for nominal money, leaving the level of real balances unchanged. This paper uses this proposition as a maintained hypothesis.

Given the competing theories of money demand, there is controversy over the use of scale variable in the money demand function. Measured income and permanent income are the main contenders. In the asset-theoretic demand for money, real permanent income, rather than real measured income, is used for estimation purposes. This paper uses real permanent income as a scale variable. There are two reasons for it. First, measured income, due to its volatile nature in an agricultural economy, may not be a good proxy for wealth and therefore may exhibit instability in an otherwise stable money demand function. Second, money may not act as a key shock-absorber for transitory component of income; this function could be performed by other items in a wealth-holder's balance sheet, such as durable goods, consumer credit outstanding, personal debt, and securities [Friedman 1959b]. To the extent that the transitory component of income is stored in the form of money, this may have the characteristic of a white noise. In the short run money demand function, this can be captured by a random error **term.**[14]

The choice of a proxy for the opportunity cost of holding money remains a difficult one. In developed countries, the nominal interest rate is the appropriate opportunity cost **variable.**[15] However the case for this variable has less force in developing countries. This is because in most developing countries nominal interest rates are institutionally set at levels below the rates that competitive

13. Milton Friedman, Alan Meltzer and others suggest that the appropriate definition of money should be considered an empirical matter. If it is found empirically that broad money is more stably related to economic variables than narrow money, the broad money should be taken as the appropriate definition of money [Mishkin 2003].

14. In Friedman's permanent income hypothesis, the transitory components of the measured income of the community as a whole tend to average out, so that the mean measured income of the community equals the mean permanent income, and the mean transitory component equals zero [Friedman 1957].

markets would have otherwise generated. In many instances, the interest rates are kept well below the actual or expected inflation, implying negative real interest rates. Furthermore, in the absence of a broad range of financial assets, asset substitution may take place between money and real assets (like land, houses, gold, silver, and consumer durables) and not between money and interest-earning financial assets, since if the prices of alternate assets rise with the general price level, their real returns are zero, whereas the real return on money (unlike other assets its nominal value is fixed) would be minus the inflation rate. Physical assets thus represent the major hedge against inflation and the alternative asset in the portfolio of the non-bank public. All these factors make expected inflation a proxy for the opportunity cost of holding money, especially in an inflationary economy. Whether this remains true for a low inflationary country like Bangladesh is an empirical issue. In the empirical literature, the nominal interest rate and expected inflation are sometimes used simultaneously and their respective effects on money demand are determined empirically**.**

This paper adopts the empirical approach, which would allow the investigation of structural change in the money demand function in Bangladesh due to financial deregulation and financial innovation since the early 1980s. To be specific, in the case of real narrow money demand, the time deposits are considered alternative assets to holding demand deposits. This makes the time deposit rate of interest (i^d) the appropriate opportunity cost variable. However, as neither currency nor demand deposits pay interests, the opportunity cost variable in the narrow money demand function $2(\mathbf{R}^{out}\text{–}\mathbf{R}^{own}) = 2(i^d\text{-}0)$ would bear a negative sign. Likewise, in the real broad demand function, real goods are considered an alternative to holding time deposits. Therefore the real deposit rate of interest $(\mathbf{R}^{out}\text{–}\mathbf{R}^{own})= -(i^d\text{-})$ is the relative return on time deposits and the coefficient of $2(i^d\text{-})$ would bear a positive sign. Whether expected inflation would have an independent negative effect on money demand in the presence of an interest rate variable is considered an empirical issue in this study.

15. The argument for the nominal interest rate (it) being used as one of the proxies for the opportunity cost of holding money has some merit. This is because with money narrowly defined so as to exclude interest-bearing assets, the expected real return from holding money would simply be equal to minus the expected rate of inflation (-pet), whilst the expected real return from holding substitute assets (for example, an interest-bearing financial asset) would equal the nominal rate of interest minus the expected rate of inflation (it-pet). It follows that the appropriate measure of the relative return from holding money compared with other assets is simply measured by the nominal interest rate, as -pet-(it-pet) = - it.

The Time Series Properties of Variables

After identifying the variables in the money demand function, their time series properties have been examined by conducting unit root tests in order to determine whether the variables are eligible to establish a long-term equilibrium relationship. Four tests for the unit roots the Augmented Dickey-Fuller (ADF), the GLS-detrended Dickey-Fuller (DF-GLS), the Phillips-Perron (PP), and the Kwiatkowski, Phillips, Schmidt and Shin (KPSS) have been conducted for both complete and post-independence sample periods.

The test results, not reported in the paper, suggest that real narrow money balances, real permanent income and the deposit rate of interest are eligible to form a long-term money demand relationship. The real deposit rate of interest, however, does not seem to be a long-term determinant of real broad money demand. The inflation rate, as a proxy for expected inflation, also does not seem to be a long-term determinant of money demand. The time series properties of variables thus provide the desired parsimonious specifications for the real narrow and broad money demand functions for Bangladesh.

Regression Results[16]

Table 1 reports the empirical results for the narrow money demand function, which has been estimated for different sample **periods.**[17] As specified, the log-levels specification of the partial adjustment model is used for estimation purposes. In the estimating model, the real money balances represent the narrow money stock in Millions of Taka, deflated by the GDP deflator (P) (1995=1.00). Real permanent income (y^p=$RGDP^p$) is computed as the weighted average of current and two lagged real GDPs, with 0.5, 0.3 and 0.2 weights as they perform best empirically. In the real narrow money demand function, the nominal deposit rate of interest (i^d) is used as a proxy for the cost of holding **money.**[18]

Real Narrow Money Demand Function

In the real narrow money demand equation, the coefficients on real permanent income and one period lagged real balances bear their expected signs and are

16. Unless specified otherwise, all the regression equations have been estimated by OLS. Given the small sample size, no system estimator has been used to capture the simultaneity and other statistical problems.

17. The cointegral and error correction models of real money balances are also estimated for purpose of the stndy, althangh the results are not reported in the paper.

18. Although the real broad money demand function was estimated with a real interest rate variable, only the results obtained without this variable are reported in this paper.

significant at the one percent level. The estimated value for the short-run income elasticity of demand for real narrow money is lower than one for most sample periods. This coefficient value is marginally greater than one in the long run.

The narrow money demand equation was estimated with the time deposit interest rate for a shorter sample period during the pre-independence period. The coefficient has been found statistically insignificant. However, when the equation has been estimated for the post-independence period (1977-2003), the nominal interest elasticity of demand for real narrow money is found–0.15 in the short-run and –0.28 in the long-run. With data for the period 1983-2003, that covers the period of financial reforms, the interest elasticity of demand for narrow money is found –0.32 in the short-run and -0.76 in the long-run. This can be considered an important finding, given the emerging importance of the nominal interest rate in the narrow money demand function.

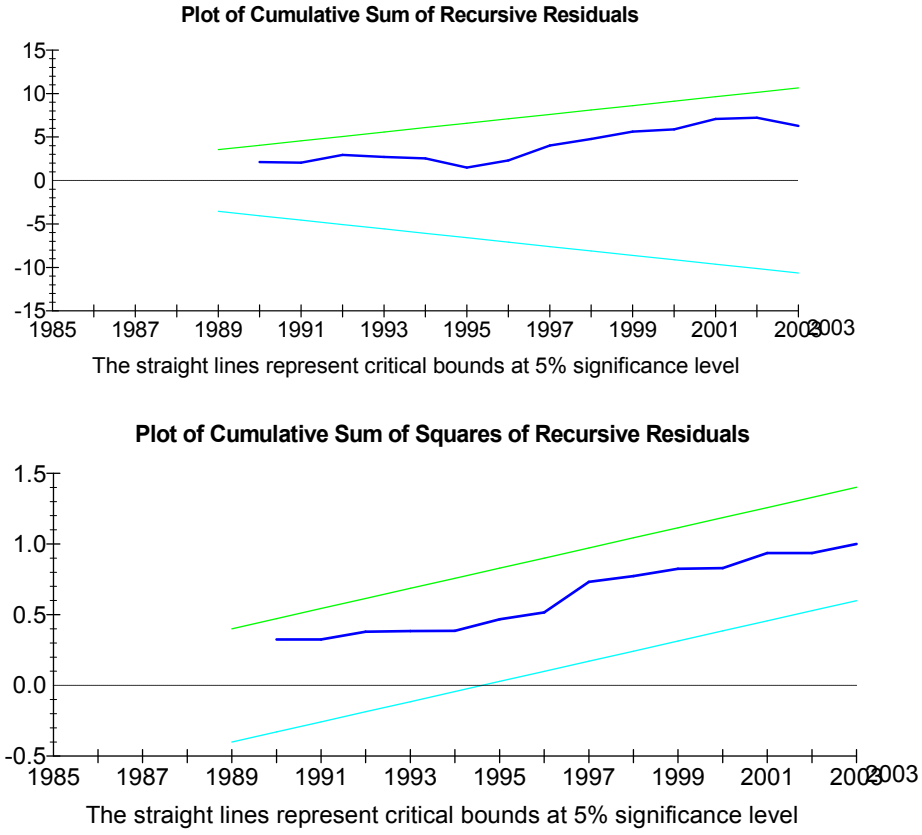
Thus the regression results in Table 1 suggest that there was a structural change in the narrow money demand function for Bangladesh since its independence. To put it another way, this caused instability in the money demand function. For example, one condition for stability of the money demand function is its ability to forecast money demand accurately out of sample [Judd and Scadding 1982]. On an exploratory basis, the narrow money demand function was estimated for the period 1954-1971 and used for dynamic forecasting during 1972-2003. Table 2 reports the summary statistics, based on 32 observations (1972-2003), which show that the forecasting performance of the estimated equation is not good.

When the narrow money demand function was estimated with data for the post-independence period (1973-2003), it exhibited some instability. This is somewhat expected because the 1970s were a period of economic instability and uncertainty. The empirical results reflected this situation. However, when the model was estimated with data for the period 1985–2003 that represents the period of deregulated financial system, it was found stable. Apparently, the money demand function remained stable despite financial reforms over this period. The CUSUM and CUSUMSQ plots in Figure 1 reveal this stability.

Real Broad Money Demand Function

Table 3 reports the regression results for the real broad money demand **function.**[19] In the estimated equations, the coefficients on real permanent income and one-period lagged real balances bear their expected signs and are significant at the one percent level. The estimated value of the short-run income elasticity of demand is lower than one but remains significantly greater than one in the long run**.**

Figure 1 : Stability of the Real Narrow Money Demand Function, 1985-2003



The explanatory power of the estimated equation is very high. The Dh statistic does not suggest any first-order autocorrelation problem in any of the estimated equations. Further diagnostic statistics do not suggest other statistical problems. However, like the narrow money demand function, the broad money demand function is found relatively stable for a shorter sample period, 1983-2003. The plotted CUSUM and CUSUMSQ residuals in Figure 2 reveal this stability

19. In a regression equation of the broad money demand function (not reported here), the coefficient of the real interest rate is found positive and significant. Note that the share of time deposits in the stock of broad money has increased sharply since the late 1980s and the positive sign of the real deposit rate of interest reflects this development. It appears that the real deposit rate of interest induced asset-holders to put their assets in monetary rather than other financial and real asset forms. As the absolute value of the coefficient of the real interest rate is very small (0.01), the exclusion of this variable on the basis of time series properties may not make much difference to overall empirical results.

Table 1 : Regression Results of Real Narrow Money Balances

Variable	1954-2003	1954-1971	1973-2003	1977-2003	1983-2003	1985-2003
Dependent Variable	$\ln (M1/P)_t$	$\ln (M1/P)_t$	$\ln (M1/P)_t$	$\ln(M1/P)_t$	$\ln(M1/P)_t$	$\ln(M1/P)_t$
Intercept	-2.72 (2.94)	-2.17(1.66)	-2.94 (3.09)	-1.30(-1.84)	0.91(1.03)	-0.60(0.96)
$\ln (M1/GDPD)_{t-1}$	0.33 (2.36)	0.54 (3.32)	0.10 (0.66)	0.47 (2.98)	0.58 (4.30)	0.60 (6.66)
$\ln RGDP^p_t$	0.76 (4.54)	0.55 (2.61)	1.03 (5.73)	0.59 (3.30)	0.36 (2.36)	0.44 (4.36)
$\ln i^d_t$			-0.12 (-1.41)	-0.15(-2.40)	-0.32 (3.44)	-0.26 (4.24)
DUM_{71}	0.37 (3.92)					
Adjusted-R^2	0.95	0.93	0.92	0.96	0.96	0.99
SER	0.134	0.06	0.12	0.08	0.06	0.04
Dh	None	0.57	2.73	1.91	3.43	0.68
Serial Correlation	F(1,45)=7.9	F(1,14)=0.01	F(1,26)=7.6	F(1,22)=1.4	F(1,16)=8.3	F(1,14)=0.1
Functional Form	F(1,43)=0.1	F(1,14)=0.03	F(1,26)=0.2	F(1,22)=0.6	F(1,16)=4.4	F(1,14)=0.2
Normality	$^2_{(2)}$ =83.3	$^2_{(2)}$ =1.1	$^2_{(2)}$ =31.2	$^2_{(2)}$ =1.8	$^2_{(2)}$ =0.9	$^2_{(2)}$ =1.4
Heteroskedasticity	$^2_{(1)}$ = 0.3	$^2_{(1)}$ = 1.2	$^2_{(1)}$ = 4.9	$^2_{(1)}$ = 7.4	$^2_{(1)}$ = 3.5	$^2_{(1)}$ = 1.6
Sample Size	50	18	31	27	21	19
Adjustment Coefficient	0.67	0.46	0.90	0.53	0.42	0.40
Income Elasticity:						
Short-Run	0.76	0.55	1.03	0.59	0.36	0.44
Long-Run	1.13	1.20	1.14	1.11	0.86	1.1
Interest Elasticity:						
Short-Run			-0.12	-0.15	-0.32	-0.26
Long-Run			-0.13	-0.28	-0.76	-0.65
Stability Tests:						
CUSUM Test	Unstable	Unstable	Unstable	Stable	Stable	Stable
CUSUMSQ test	Unstable	Unstable	Unstable	Stable	Stable	Stable

Notes:

(i) The figures in parentheses are absolute t-ratios, unless defined otherwise.

(ii) SER is the standard error of the regression and Dh is the Durbin h-statistic.

(iii) DUM71 is a dummy variable (0,1) that represents the independence of Bangladesh from Pakistan in 1971.

Table 2 : Summary Statistics of Dynamic Forecasting of Narrow Money Demand, 1972-2003

Mean prediction errors = 0.50892	Mean sum absolute prediction errors = 0.52316
Sum squares prediction errors = 0.29162	Root mean sum sq prediction errors = 0.54002
Predictive failure test: F(32,15) = 8.4	Structural stability test: F(3,44) = 5.1

Figure 2 : Stability of the Broad Money Demand Function, 1983-2003

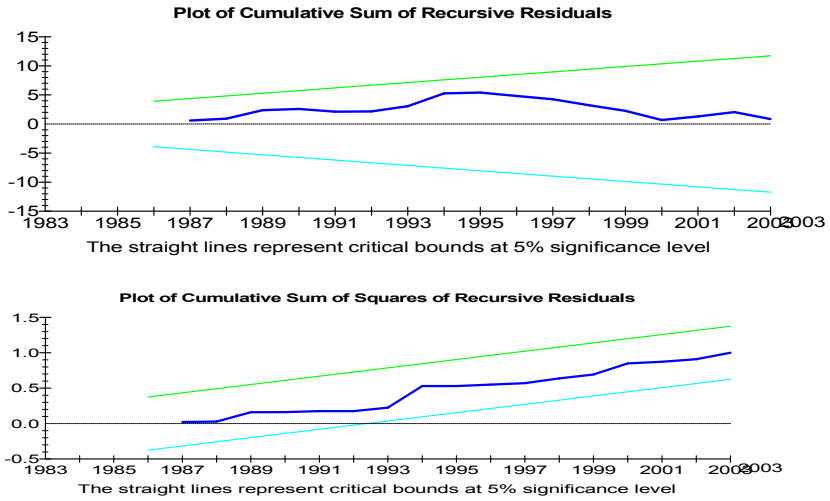


Table 3 : Regression Results for Real Broad Money Balances

	1973-2003	1977-2003	1983-2003	1985-2003
Dependent Variable	ln $(M2/P)_t$	ln$(M2/P)_t$	ln$(M2/P)_t$	ln$(M2/P)_t$
Intercept	-9.07 (5.58)	-3.41(2.12)	5.74(6.39)	-3.86(2.54)
ln $(M2/GDPD)_{t-1}$	0.24 (2.03)	0.67 (4.90)	0.29 (3.06)	0.57 (2.88)
ln $RGDP^p_t$	1.42 (6.14)	0.58 (2.31)	1.13 (7.21)	0.72 (2.36)
Adjusted-R^2	0.98	0.99	0.99	0.99
SER	0.11	0.06	0.03	0.03
Dh	0.98	0.55	1.30	1.32
Serial Correlation	F(1,27)=0.9	F(1,23)=0.1	F(1,17)=1.4	F(1,15)=0.9
Functional Form	F(1,27)=11.2	F(1,23)=0.9	F(1,17)=0.1	F(1,14)=0.7
Normality	$^2_{(2)}$ =58.7	$^2_{(2)}$ =1.4	$^2_{(2)}$ =2.0	$^2_{(2)}$ =5.6
Heteroskedasticity	$^2_{(1)}$ = 2.8	$^2_{(1)}$ = 8.9	$^2_{(1)}$ = 0.1	$^2_{(1)}$ = 0.1
Sample Size	31	27	21	19
Adjustment Coefficient	0.76	0.33	0.73	0.43
Income Elasticity:				
Short-Run				
Long-Run	1.42	0.58	1.13	0.72
	1.87	1.76	1.55	1.70
Stability Tests:				
CUSUM Test	Unstable	Unstable	Stable	Stable
CUSUMSQ test	Unstable	Unstable	Stable	Stable

Notes: The figures in parentheses are absolute t-ratios, unless specified otherwise. Other variables have been defined earlier.

The broad money demand function was also estimated for the period 1983-2000 and used for forecasting for the period 2001-2003. Table 4 reports the forecasts and their summary statistics. They show that the model's forecasting ability is very good.

Table 4 : Forecasting of the log of Real Broad Money Balances, 2001-2003

Year	Actual	Prediction	Error	Standard Deviation of Error
2001	13.4436	13.4209	0.022751	0.037757
2002	13.5501	13.5102	0.039939	0.042670
2003	13.5756	13.5926	-0.016930	0.044945

Mean prediction errors = 0.015253
Mean sum absolute prediction errors = 0.026540
Sum squares prediction errors = 0.0008
Root mean sum-square prediction errors = 0.02828
Prediction failure test: F(3,15) = 0.775

Thus, in short, the regression results and the stability tests suggest that both the narrow and broad money demand function were stable for the period beginning from the mid-1980s. It is to be noted that the money demand function for which Friedman [1956] claims stability is the long-run relationship. The fact that even the short-run money demand function is found stable in Bangladesh is reassuring. The presence of a stable long-run money demand relationship has been investigated further within the cointegral and error correction-modelling framework. The detailed results, which are not reported her but may be available from the author on request, are found consistent with those reported in the text.

IV. Income and Interest Elasticities of Money Demand: Application of the Recursive and Rolling Regression Techniques

Financial innovation and financial deregulation are suspected to be the primary cause of instability in the money demand function. They may affect stability of the money demand function in a number of ways. First, in a financially repressed economy the role of the interest rate in the money demand function remains latent, which may become transparent once the interest rate is allowed to be determined by market forces or at least adjusted frequently in response to changes in actual or expected inflation. Second, any reform measures that promote financial market development may create financial assets with attractive yields. This may cause a portfolio shift away from monetary assets, which could be reflected in a shift of the intercept term of the money demand function. Third, the observed

relationships among money, income, prices and interest rates may alter after relaxations of controls over bank credits and interest and exchange rates and a switch from direct to indirect instruments of monetary policy [Jonson and Rankin 1986; Tseng and Corker 1991]. The rise in competition among financial institutions may also lower financial transactions costs and thereby cause money demand to respond differently to interest rates changes than before. Fourth, financial deregulation may lead to unpredictability of money demand by changing the speed of adjustment at which actual money balances move toward the desired level. On the whole, financial deregulation may cause a onetime or a gradual shift in the level of money holdings and alter sensitivities of money demand to changes in income and interest rates [Judd and Scadding 1982; Tseng and Corker 1991].

The empirical results reported in the earlier section confirm that real permanent income is the key determinant of money demand in Bangladesh and that the income elasticity of demand for broad money is significantly greater than one. There is evidence that the nominal interest rate has gradually become significant in the real narrow money demand function, especially since the 1990s. The absolute value of the interest elasticity of demand for money has indeed increased over time. Apparently, this could be the consequence of ongoing financial deregulation and financial innovation.

Table 5A : Recursive Coefficients of Real Narrow Money Balances

Period	Intercept (Short)	Income Elasticity Short (Long)	Interest Elasticity Short (Long)	Adjustment Coefficient
1973-1990	-1.4	0.97 (0.99)	0.01 (0.01)	0.98
1973-1991	1.0	0.76 (0.79)	0.08 (0.08)	0.97
1973-1992	1.7	0.69(0.71)	0.12 (0.12)	0.97
1973-1993	0.0	0.84 (0.88)	0.03 (0.03)	0.96
1973-1994	-2.2	0.99 (1.09)	0.08 (0.09)	0.91
1973-1995	-2.9	1.04 (1.14)	-0.01 (-0.01)	0.91
1973-1996	-3.0	1.04 (1.06)	-0.12 (-0.12)	0.98
1973-1997	-3.1	1.05 (1.16)	-0.13 (-0.14)	0.90
1973-1998	-3.1	1.05 (1.16)	-0.13 (-0.14)	0.90
1973-1999	-3.1	1.05 (1.16)	-0.13 (-0.14)	0.90
1973-2000	-3.0	1.04 (1.16)	-0.13 (-0.14)	0.90
1973-2001	-3.0	1.04 (1.16)	-0.13 (-0.14)	0.90
1973-2002	-3.0	1.04 (1.16)	-0.13 (-0.14)	0.90
1973-2003	-2.9	1.03 (1.14)	-0.12 (-0.13)	0.90

Note: The figures in parentheses are long-run elasticities, calculated as the short-run elasticity divided by the estimated value of the adjustment coefficient.

In order to investigate further the nature of structural change in the money demand function in Bangladesh, the specified money demand equation has been estimated by both the recursive and rolling regression techniques. In the case of the narrow money demand function, the coefficients of interest are income and interest elasticities of money demand, while in the case of the broad money demand function, the coefficient of interest is the income elasticity of money demand.

Table 5A reports the estimated recursive coefficients of the real narrow money demand. It is found that the income elasticity of demand for narrow money has stabilized since the early 1990s. The long-run income elasticity of demand for narrow money is about 1.16, while the short-run income elasticity of money demand is about one. However the interest elasticity of demand for narrow money remains about -0.13 in both the short and long run. In the case of broad money demand, the income elasticity value has shown a declining trend, falling from 2.3 for the sample period 1973-1985 to 1.86 for the sample period 1973-2003 (Table 5B).

Table 5B : Recursive Coefficients of Real Broad Money Balances

Estimation Period	Intercept (Short)	Income Elasticity Short (Long)	Adjustment Coefficient
1973-1985	-16.9	2.23 (2.30)	0.97
1973-1986	-17.0	2.24 (2.31)	0.97
1973-1987	-17.0	2.23 (2.30)	0.97
1973-1988	-17.0	2.21 (2.28)	0.97
1973-1989	-17.0	2.20 (2.27)	0.97
1973-1990	-16.2	2.18 (2.25)	0.97
1973-1991	-15.6	2.12 (2.18)	0.96
1973-1992	-14.9	2.06 (2.17)	0.95
1973-1993	-14.5	2.01 (2.14)	0.94
1973-1994	-14.4	2.00 (2.13)	0.94
1973-1995	-14.1	1.98 (2.11)	0.94
1973-1996	-13.5	1.93 (2.08)	0.93
1973-1997	-12.8	1.85 (2.06)	0.90
1973-1998	-12.0	1.76 (2.02)	0.87
1973-1999	-11.2	1.66 (1.98)	0.84
1973-2000	-10.2	1.55 (1.94)	0.80
1973-2001	-9.7	1.49 (1.91)	0.78
1973-2002	-9.4	1.46 (1.90)	0.77
1973-2003	-9.1	1.42 (1.86)	0.76

Note: The figures in parentheses are long-run elasticities, calculated as the short-run elasticity divided by the estimated value of the adjustment coefficient.

The elasticity estimates by the rolling regression technique suggest that both the short-run and long-run income elasticity of demand for money has declined over time. The absolute value of the interest elasticity of demand for narrow money has, however, increased significantly (Tables 6A and 6B).

Table 6A : Rolling Regression Coefficients of Real Narrow Money Balances

Period	Intercept	Income Elasticity	Interest Elasticity	Adjustment Coefficient
	Short	Short (long)	Short (Long)	
1972-1992	1.74	0.69 (0.71)	0.11 (0.11)	0.97
1973-1993	-0.16	0.71 (0.88)	0.08 (0.10)	0.81
1974-1994	-2.72	0.96 (1.12)	0.01 (0.01)	0.86
1975-1995	-1.01	0.60 (1.07)	-0.16 (-0.29)	0.56
1976-1996	-1.00	0.57 (1.08)	-0.15 (-0.28)	0.53
1977-1997	-1.54	0.51 (1.21)	-0.11 (-0.26)	0.42
1978-1998	-1.07	0.47 (1.12)	-0.14 (-0.33)	0.42
1979-1999	-1.15	0.47 (1.15)	-0.13 (-0.32)	0.41
1980-2000	0.04	0.41 (0.98)	-0.26 (-0.62)	0.42
1981-2001	0.02	0.41 (0.98)	-0.27 (0.64)	0.42
1982-2002	0.90	0.36 (0.86)	-0.32 (-0.76)	0.42
1983-2003	0.27	0.30 (0.94)	-0.26 (-0.81)	0.32

Note: The figures in parentheses are long-run elasticities, calculated as the short-run elasticity divided by the estimated value of the adjustment coefficient.

Table 6B : Rolling Regression Coefficients of Real Broad Money Balances

Estimation Period	Intercept	Income Elasticity	Adjustment Coefficient
	Short	Short (Long)	
1973-1992	-14.9	2.06 (2.16)	0.95
1974-1993	-14.7	2.05 (2.14)	0.96
1975-1994	-17.6	2.4 (2.22)	1.08
1976-1995	-9.7	1.44 (2.00)	0.72
1977-1996	-6.3	0.95 (1.94)	0.49
1978-1997	-5.0	0.74 (2.06)	0.36
1979-1998	-3.2	0.51 (0.75)	0.68
1980-1999	-2.8	0.48 (0.72)	0.67
1981-2000	-2.4	0.45 (0.67)	0.67
1982-2001	-3.5	0.66(1.65)	0.40
1983-2002	-5.7	1.12 (1.58)	0.71
1984-2003	-5.1	1.00 (1.59)	0.63

Note: The figures in parentheses are long-run elasticities, calculated as the short-run elasticity divided by the estimated value of the adjustment coefficient.

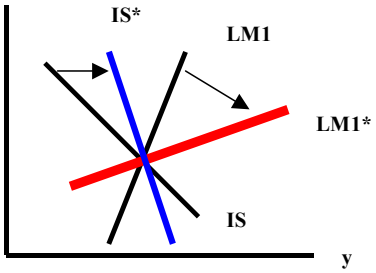
Has the LM1-Curve Become Flatter?

The slope of the LM-curve is given by $\delta i/\delta y = (\delta m/\delta y/\delta m/\delta i)$, provided that the money stock is interest inelastic. Since $(\delta m/\delta y)$ is positive and $(\delta m/\delta i)$ is negative, the slope of the LM-curve is positive and becomes steeper as $\delta m/\delta i \rightarrow 0$. Given that the slope of the LM-curve changes with any change in the income and interest elasticities, there are implications of financial reforms as they may bring structural change in the money demand function. For example, if the interest rate remains insignificant in the money demand function, this would indicate a vertical LM-curve. In such a situation, fiscal policy may not be effective, in the sense that an increase in government spending would raise the real interest rate in a deregulated environment and crowd out private investment (assuming that the latter remains sensitive to the real interest rate). Similarly, if the money demand becomes more and more interest sensitive, the LM-curve would become flatter and this would raise the effectiveness of fiscal policy vis-à-vis monetary policy, especially if there are capital controls under a fixed exchange rate regime.

There are further implications for any change in the income elasticity of demand for money. Given the interest elasticity, if there is a rise in the income elasticity of demand for money, the LM-curve would shift more for a given increase in income and to bring equilibrium in the money market, a large increase in the interest rate would be needed. For the design of monetary policy strategy, this would mean that the monetary authorities would need to raise the money growth rate at a higher level to maintain price stability. The opposite would be the case if there is declining trend in the value of income elasticity of the demand for money.

What happened to the interest and income elasticities of demand for money in Bangladesh over the years, therefore, should be a matter of interest to policy makers in this country? Historically, the LM1-curve for Bangladesh was more or less vertical, as the interest elasticity of demand for money was not significantly different from zero. This study shows that the LM1-curve has gradually become flatter as the interest rate coefficient in the narrow money demand function has become negative and significant. (As the real broad money demand function does not seem to be sensitive to the interest rate, the LM2 curve remains largely vertical.) A relatively larger value of the income elasticity of demand for money was another reason for a steeper LM1/LM2-curve. Lately, with the declining income elasticity of demand for narrow money, the LM1-curve appears to have become flatter. This indicates a rise in the effectiveness of fiscal policy vis-à-vis monetary policy, given that there are restrictions over capital mobility.

Another related question is whether financial reforms change the shape of the IS-curve. This issue has not been investigated in this paper. However, Gordon [2003] suggests that financial reforms usually make the IS-curve steeper. If this were the case, financial reforms would lower the effectiveness of monetary policy and raise the effectiveness of fiscal policy in output **stabilization.**[20]



LM1: interest sensitivity of narrow money demand is low
LM1*: interest sensitivity of narrow money demand has increased after financial reforms
IS: aggregate expenditure (consumption plus investment) is interest-sensitive.
IS*: interest sensitivity of aggregate expenditure has decreased

Figure 3 Slopes of IS and LM1 Curves: Before and After Financial Reforms

V. Concluding Remarks

This paper has examined the money demand behavior in Bangladesh with annual data since the mid-1950s. The data for the 1950s and 1960s have been used for drawing inference on the long-term behavior of money demand. The focus of the study has been the post-independence period (1972-2003), especially the 1980s and 1990s. The main findings of the paper are as follows:

- There existed a relatively well-defined narrow money demand function in Bangladesh during the 1950s and 1960s. However the narrow money demand function for this period did not include the interest rate as an opportunity cost variable and has been found inadequate to explain the money demand behavior for the post independence period.
- There exists a stable money demand function for Bangladesh for the post-independence period, especially for the sample period beginning from the early 1980s. However the income and interest elasticities of demand for money have changed since the early 1990s.

20. This is the standard closed economy case. However, this conclusion does not necessarily remain valid in a floating exchange rate system and with capital mobility. Monetary policy regains its potency under a floating exchange rate system. Also, in an open economy, when the LM curve is steeper than the BP curve, the positive impact of a fiscal expansion on output may be partially neutralized by an appreciation of the exchange rate due to capital inflows in response to the rise in the interest rate [Hossain and Chowdhury 1998].

As indicated earlier, there are two basic requirements for monetary targeting as a strategy of monetary policy: (a) stability of the money demand function and (b) the causal linkage between money supply growth and inflation. This paper has shown that the first condition is satisfied for Bangladesh. As the second requirement: that there exists a causal relationship between money supply growth and inflation is also satisfied, monetary targeting seems the appropriate strategy of monetary policy for this country, at least as an interim measure.[21] Adoption of monetary targeting, in place of a discretionary monetary policy strategy, would provide Bangladesh a nominal anchor for price stability. This would make monetary policy more credible and effective under the present floating exchange rate system.

21. Monetary targeting may become inappropriate over time when the money demand function becomes unstable and there are difficulties in controlling monetary aggregates in a deregulated environment. As a long-term strategy, the monetary authority should undertake necessary policy and institutional reforms so that they can opt for inflation targeting if it becomes necessary. Such a forward-looking strategy would make monetary policy credible and effective, in the sense that it would give a signal to the public that monetary authority remains committed to price stability. The possibility of inflation targeting itself may influence policy-makers to undertake deeper financial and institutional reforms.

References

Bangladesh Bank [monthly issue]. *Economic Trends*. Dhaka: Bangladesh Bank.

Basset, S. [1996]. 'The Demand for Money in Bangladesh'. Unpublished Manuscript, Washington, D.C.: IMF.

Baumol, William J. [1952]. 'The Transactions Demand for Cash: An Inventory Theoretic Approach'. *Quarterly Journal of Economics*, 66(November), 545-556.

Blejer, M.I., A. Ize and A.M. Leone (eds.) [2000*]. Inflation Targeting in Practice: Strategic and Operational Issues and Applications to Emerging Market Economies.* Washington, D.C.: IMF.

Chow, Gregory [1966]. 'On the Long-Run and Short-Run Demand for Money', *Journal of Political Economy*, 74, 111-131.

Cobham, David [1992]. 'Monetary Targeting', in Newman, Peter, Murray Milgate and John Eatwell (eds.), *The New Palgrave Dictionary of Money and Finance.* London: Macmillan Press Limited, 2,759-763.

Debelle, G. [1997]. 'Inflation Targeting in Practice'. *IMF Working Paper* WP/1997/35.

Debelle, G., Masson, P.R., M.A. Savastano and S. Sharma [1997]. 'The Scope for Inflation Targeting in Developing Countries'. *IMF Working Paper WP/97/130,* Washington, D.C.: IMF.

Ericsson, Neil. R. [1998]. 'Empirical Modeling of Money Demand', *Empirical Economics*, 23, 295-315.

Feige, E. and D. Pearce (1977). 'The Substitutability of Money and Near Monies: A Survey of the Time Series Evidence', *Journal of Economic Literature*, 15, 439-469.

Flood, Robert P. and Michael Mussa [1994]. 'Issues Concerning Nominal Anchors for Monetary Policy', in Tomas J.T. Balino and Carlo Cottarelli (eds.) *Frameworks for Monetary Stability.* Washington, D.C.: IMF.

Friedman, Milton [1956]. 'The Quantity Theory of Money: A Restatement', in *Studies in the Quantity Theory of Money*. Chicago: University of Chicago Press.

Friedman, Milton [1957]. *The Theory of the Consumption Function.* Princeton: Princeton University Press.

Friedman, Milton [1959a]. A Program for Monetary Stability. New York: Fordham University Press.

Friedman, Milton [1959b]. 'The Demand for Money: Some Theoretical and Empirical Results', *Journal of Political Economy*, 67(4), 327-351.

Friedman, Milton [1992]. 'Quantity Theory of Money', in Eatwell, J. et al. (eds.) *The New Pelgrave Dictionary of Money and Finance* (Volume III). London: Macmillan.

Friedman, M. and A. Schwartz [1963]. *A Monetary History of the United States, 1867-1960.* Princeton: Princeton University Press.

Gordon, R. [2003]. *Macroeconomics*. New York: Addison-Wesley.

Hossain, Akhtar [1993]. 'Financial Reforms, Stability of the Money Demand Function, and Monetary Policy in Bangladesh: An Econometric Investigation', *Indian Economic Review,* 28(1), 85-100.

Hossain, Akhtar [1995]. *Inflation, Economic Growth and the Balance of Payments in Bangladesh: A Macroeconomic Study*. Delhi: Oxford University Press; Dhaka: University Press Limited.

Hossain, Akhtar [1996]. *Macroeconomic Issues and Policies: The Case of Bangladesh*. New Delhi: Sage Publications.

Hossain, Akhtar [2000]. *Exchange Rates, Capital Flows and International Trade.* Dhaka: University Press Limited.

Hossain, Akhtar [2003]. 'An Examination of Some Key Issues in the Conduct of Monetary Policy in Bangladesh'. In Ali, A., Kuddus, R. and Andaleeb, S.S. (eds.) *Development Issues of Bangladesh-II*. Dhaka: University Press Limited.

Hossain, Akhtar and Anis Chowdhury [1998]. *Open Economy Macroeconomics for Developing Countries*. Chelttenham: Edward Elgar.

Hossain, Akhtar and Salim Rashid [1996]. *In Quest of Development: The Political Economy of South Asia*. Dhaka: University Press Limited.

IMF [various issues]. *International Financial Statistics*, Washington, D.C.: IMF.

Juselius, Katarina [1995]. 'Do Purchasing Power Parity and Uncovered Interest rate Parity Hold in the Long Run?', *Journal of Econometrics*, 69 (September), 211-240.

Jonson, P. and R.W. Rankin [1986]. 'On Some Recent Developments in Monetary Economics', *Economic Record*, 62, 257-267.

Judd, J.P. and J.L. Scadding [1982]. 'The Search of a Stable Money Demand Function: A Survey of the Post-1973 Literature', *Journal of Economic Literature*, 20, 993-1023.

Kabir, M. [1980]. 'A Disaggregated Econometric Model of Price Behaviour in Bangladesh'. Unpublished PhD Thesis, McMaster University, Canada.

Kydland, F.E. and E.C. Prescott [1977]. 'Rules Rather than Discretion: The Inconsistency of Optimal Plans', *Journal of Political Economy,* 85, 473-491.

Laidler, David [1990]. 'The Legacy of the Monetarist Controversy', *Federal Reserve Bank of St. Louis Review* (March/April), 49-63.

Laidler, David [1993]. *The Demand for Money: Theories, Evidence, and Problems (4th edition)*. New York: Harper Collins.

Miller, S. [1991]. 'Monetary Dynamics: An Application of Cointegration and Error-Correction Modeling', *Journal of Money, Credit, and Banking,* 23(2), 139-154.

Mishkin, Frederic S. [2000]. 'From Monetary Targeting to Inflation Targeting: Lessons from the Industrialized Countries'. Paper presented at the Bank of Mexico Conference on "Stabilization and Monetary Policy: The International Experience", Mexico City, November 14-15.

Mishkin, Frederic S. [2003]. *The Economics of Money, Banking, and Financial Markets* (6th edition). New York: Addison-Wesley.

Mundell, Robert A. [1968]. *International Economics*. New York: Macmillan.

Orphanides, O. and R.M. Solow [1990]. 'Money, Inflation and Growth', in Friedman, B.M. and F.H. Hahn (eds.) *Handbook of Monetary Economics*, Vol.1. Amsterdam: North-Holland.

Sidgwick, E. [1996]. 'The Demand for Money in Bangladesh: 1973:Q1-1994:Q4', Unpublished Manuscript. Washington, D.C.: IMF.

Taslim, M.A. [1983]. 'Aid-Elasticity of Demand for Money in Bangladesh', *Indian Economic Review,* 18, 285-291.

Tseng, W. and R. Corker, R. [1991]. 'Financial Liberalization, Money Demand and Monetary Policy in Asian Countries'. *Occasional Paper 84,* Washington, D.C: IMF.

Tobin, James [1956]. 'The Interest Elasticity of the Transactions Demand for Cash', *Review of Economics and Statistics*, 38 (August), 241-247.

Tobin, James [1958]. 'Liquidity Preference as Behavior Towards Risk', *Review of Economic Studies*, 25 (February), 65-86.

Tobin, James [1992]. 'Money', in Newman, Peter Murray Milgate and John Eatwell (eds.), *The New Palgrave Dictionary of Money and Finance*. London: Macmillan Press Limited. (Vol.2), 770-778.