The Demand for Money and the Uncertainty of Interest Rates and Prices

by

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In most models of the macro economy the final static equilibrium is determined by full stock-flow equilibrium. It is this condition that makes the stock of money, as opposed to interest rates, such a crucial variable in the determination of the full equilibrium position of an economy. However, in the shorter run, where flow equilibrium takes precedence over stock equilibrium, interest rates and prices play a much greater role in influencing the level of activity of the economy. This is because almost all models rely on interest rates and/or asset prices as the transmission mechanism between monetary and real variables, and the price levels and/or expectations or price levels that influence various demand and supply curves.

Of crucial importance to macro-monetary theory is the role that the demand for money plays in this transmission process. Also, because the demand for money is generally assumed to be significantly affected by the levels of interest rates and prices, it might be expected that uncertainty relating to these variables might be an important determinant of this demand. In the case of variations in interest rates, economic units might desire to hold fewer interest-bearing assets while on the other hand they might want to hold more money balances. In the case of variations in the general level of prices, the economic units might regard the medium of exchange with question and want to hold less of their wealth in money balances. In either case, the demand curve for money balances can be affected which will make it more difficult for the people in policy positions to achieve any given level of target variables, such as the level of economic activity, for a given thrust of policy.

The monetary authorities often find the cause of variations in interest rates, and/or prices in their own actions, although this is not necessary.

For example, Mason has shown (see [13]), that an attempt to hit a new target in money income too quickly may cause the monetary authorities to move monetary aggregates in an oscillatory manner. Cagan and Schwartz [4] have confirmed this possibility using several well known econometric models of the U.S. economy. Since policy generally works through interest rates, oscillatory movements in monetary aggregates usually mean oscillatory movements in interest rates.

In the actual conduct of policy, however, a constraint on this oscillatory behavior may be introduced by the monetary authorities. Whereas the central bank is very willing to start the economy moving in the appropriate direction, they may be very unwilling to accept the consequences of their rates will oscillate around their new long-run values (see Burns [2], p. 64). The failure to accept the consequences may result in a monetary policy that is too easy at a time when the central bank is attempting to expand the economy and too tight at other times. The general apologetic of this behavior is that the financial markets cannot stand violent movements in interest rates and the central bank must operate as the guardian of the validity of these markets in order to maintain the general health of the economy.

In this paper, I attempt to assess the impact of variations in interest rates and prices on the demand for money. It is important to know whether these variations are important on money demand because if they are important, the monetary authorities may want to conduct policy in a way that will limit increases in the variation of interest rates and/or prices so as to achieve their ultimate target variables without setting off opposing forces.

THE DEMAND FOR MONEY

In general, the demand for real money balances used in most aggregate economic models has been stated as a function of an interest rate and income,

$$m_t = M^d(r_t, Y_t) \quad (1)$$

where m is equal to real money balances, r is "the" interest rate, and Y is national income. The subscript t refers to the current period. See [1], [5], [8], and [12]. Tobin [18] and others[1] have included in their specification capital gains and losses on interest bearing assets; i.e., the possibility that demanders are concerned with the total yield, interest rate plus capital gain or loss, on assets during the holding period. Also, they have considered that including the possibility of gain or loss depends upon the movement in interest rates over the holding period under consideration and thus upon the level of interest rates expected to hold in the future.

Following Branson [1], and Chandler and Goldfeld [5], these factors can be introduced into the demand for money equation. Taking E as the expected return on bonds, negatively related to the demand for real money balances, g as the expected change in asset prices, H as the dollar volume of bonds held, R as the total risk for holding bonds, and σ as a measure of risk associated with one dollar of bonds, i.e., the expected variation in bond prices due to interest rate changes, we can postulate the following relationship:

$$E = H(r+g), \tag{2a}$$

$$R = H\sigma \tag{2b}$$

$$E = \left(\frac{r+g}{\sigma}\right) R \tag{2c}$$

Substituting E into the demand for money for the interest rate we obtain,

$$m_t = m^d \ [(\frac{r+g}{\sigma}) \ \frac{R}{H}, \ Y_t] = m^d(r,g,R,\sigma,Y_t,H).$$

$$M_1^d, \ M_2^d, \ M_3^d < 0; \ M_4, M_5, M_6 > 0.$$

The M_1^d represent the first derivative of the money demand equation with respect to the $i^{\underline{th}}$ argument in parenthesis.

In most aggregate economic models short-run variations in the financial markets are caused by variations in the money supply; changes in real income and prices occurring over longer periods of time. Thus, the argument can be made that most of the short-run variation in interest rates come about due to short-run variations in the nominal money supply. Thus, we can assume that $\sigma = K\sigma_M$ with k becoming imbedded in the coefficient of σ_M in the demand curve.

Either variable, σ or σ_M, has been left out of previous empirical studies. This was done because it was assumed that σ or σ_M were constant and thus incapable of playng an independent role in affecting the wealthholder's demand for money. A reason for this is that most studies of the demand for money were undertaken in the 1950's and early 1960's, a time that did not experience substantial fluctuations in interest rates. Interest rates may not have fluctuated much, however, because the Federal Reserve conducted monetary policy during this time period so as to minimize variations in interest rates; uncertainty of interest rates were thus not a major concern of the financial markets. Whether σ or σ_M affects the demand for money can be empirically tested. The results of such tests are presented below.

THE STATIC EQUILIBRIUM MODEL

If, for simplicity, we assume that $Y_t = Y_t^o$, full employment out put, and that the monetary authorities completely control the nominal money stock, so that $m_t = M_t/P_t$, where M_t is the nominal money stock and P_t is the general level of prices, then equation (3) can be rewritten as

$$M_t/P_t = m^d(r_t, g_t, R_t, \sigma_{Mt}, Y_t^o, H_t). \qquad (3)$$

Furthermore, we will ignore, in the current analysis the variables g_t, R_t, and H_t: We are primarily concerned with the affect changed in σ_M have on prices. Totally differentiating the entire system, and simplifying we find that the static equilibrium result rearranging dP_t is as follows.

prices. Totally differentiating the entire system, rearranging and simplifying we find that the static equilibrium result rearranging dP_t is as follows. This assumes that

$(\partial \sigma_{Mt}/\partial M_t) \geq 0$.

$$d P_t = (1 + M_1 \frac{\partial r_t}{\partial M_t} - M_4 \frac{\partial \sigma_{Mt}}{\sigma M_t})\ M_t$$

Equation (4) is positive, if the $M_1(\partial r_t/\partial M_t) - M_4(\partial \sigma_{Mt}/\partial M_t)$ is less than one. If not, then an increase in the money supply may actually cause a decline in P_t.

The problem now can be seen explicitly. A monetary policy that increases (decreases) the money supply will raise (lower) the price level, but, if that same policy causes the interest rate risk (associated with financial assets) to rise, an upward (downward) shift in the demand for money will also result, leaving the price level below (above) the amount expected due to the increase in M. This raises the question, how volatile are the markets' expectations about variations in interest rates, and/or the money stock?

The crucial factors here are the magnitudes of M_4 and $\partial \sigma_{mt}/\partial P_t$. The first term represents the sensitivity of the dem and for money balances due to changes in the risk of holding bonds. One might expect this to be non-linear in terms of risk, i.e., the higher the level of risk the more sensitive demand would become. The second term represents the effect of monetary policy on the perception of risk. The formation of the risk measure would have a lot to do with the volatility of this measure. This measure of risk could be formed objectively using a long time series. This value would be expected to change quite slowly. Parts of the time series may be used, however, on the assumption that only the more recent past is of concern to wealthholders. This measure would, of course, be more volatile. Alternatively, expectations could be formed entirely on a subjective basis using such measures as the 'feel of the market' or, as Keynes might have had it, on the degree of confidence one has in the expected value.[3] A subjective measure could be highly volatile.

The perception of this volatility is of great importance because the policy makers must have some conception of it in their conduct of monetary affairs.

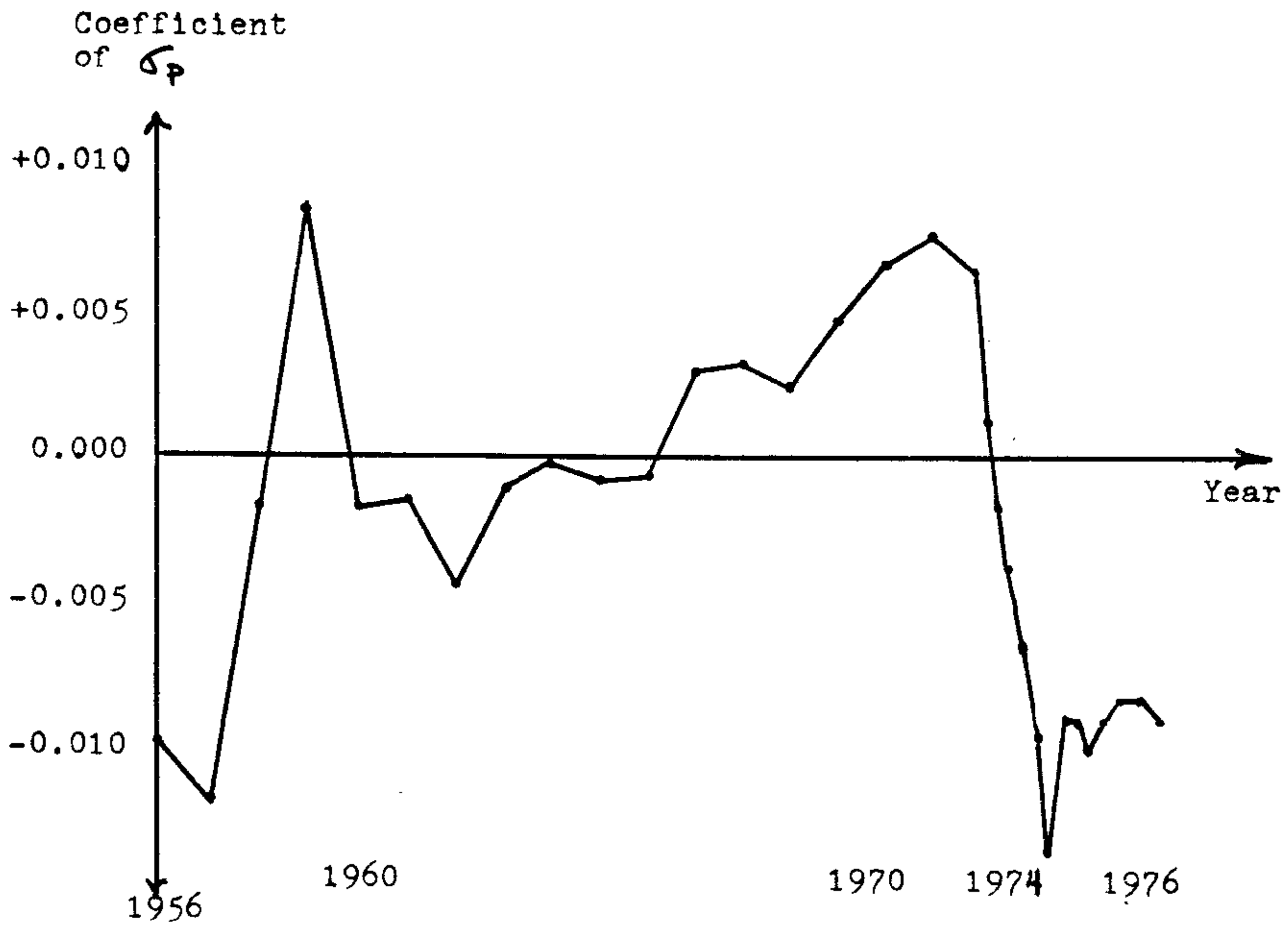
THE VARIABILITY OF THE PURCHASING POWER OF MONEY

Many discussions of the demand for money include the expected rate of change of prices as a determinant of the demand. Friedman [6], for example, contends that "physical goods must be regarded as yielding a nominal return in the form of appreciation or depreciation in money value." Thus, we will amend the demand for money equation presented earlier by including the expected percentage rate of change in prices as a negative determinant of demand, defined as $\dot{P}^e = (P^e - P)/P$.

$$m_t = m^d(E_t/H_t, Y_t, \dot{P}^e_t) \tag{5}$$

Since we are interested in the concern demanders may have about the usefulness of the medium of exchange we need to couch the argument in terms of the purchasing power of money; I will, therefore, define g' as the percentage return wealth-holders receive by holding money balances rather than the percentage loss attributable to holding durable goods. Defining the purchasing power of one dollar as (1/P) we get,

$$g' = \frac{(\frac{1}{P})^e - (\frac{1}{P})}{\frac{1}{P}} = \frac{P-P^e}{P^e}, \tag{6}$$


Coefficient of σ_p
+0.010
+0.005
0.000
-0.005
-0.010
Year
1956
1960
1970
1974
1976

where P^e stands for expected prices. Now $\dot{P}^e$ is not equal to g', so we must modify $\dot{P}^e$ by multiplying it by $-(P^e/P^e)$ so that

$$\dot{P}^e = -\left(\frac{-P^e}{P^e}\right)\left(\frac{P^e - P}{P}\right) = -\frac{P^e}{P}\left(\frac{P - P^e}{P^e}\right) = -\frac{P^e}{P}\,g'. \tag{7}$$

We can now introduce the possibility that the level of prices is uncertain. Assuming that the total risk of price variations is proportional to the purchasing power of one dollar we write (8), similar to equation (2b).

$$R' = (1/P)\sigma_p \tag{8}$$

Thus,

$$\dot{P}^e = -P^e g' R'/\sigma_p, \tag{9}$$

and, the demand for money becomes

$$m_t = m^d(E_t/H_t, Y_t, P^e g' R'/\sigma_p) = m^d(r, g, R, \sigma, Y_t, H_t, P^e_t, g', R', \sigma_p); \tag{10}$$

the signs of the new variables are

$$M_7, M_8, M_9 > 0;\ M_{10} < 0.$$

We now ignore g', R', and P^e, as we ignored g, R, H, before. Furthermore, it is assumed that $Y_t = Y^o_t$; the money supply is completely controlled by the monetary authorities; and that $\partial\sigma_{pt}/\partial M_t \geq 0$ then the static equilibrium solution for $d\,P_t$ is

$$d\,P_t = \left(1 + M_1\frac{\partial r_t}{\partial M_t} - M_4\frac{\partial\sigma_{Mt}}{\partial M_t} - M_{10}\frac{\partial\sigma_{pt}}{\partial M_t}\right) dM_t \tag{11}$$

Since $M_{10} < 0$, and $\partial\sigma_{pt}/\partial M_t \geqslant 0$, a monetary policy that increases price variability is seen to also increase aggregate demand for a given level of money balances. A definition of hyperinflation can be couched in these terms, i.e., hyperinflation is a situation in which a given level of nominal money balances supports higher and higher levels of nominal income.[4] We must briefly compare the results of this model with some of the results found in the hyperinflation literature.

Most studies of hyperinflation result in something like Cagan's model [3] where the real demand for money is a function of current and past rates of inflation. As more rapid monetary growth results in more rapid rates of inflation, the demand for real money balances declines. The speed at which demand declines depends, in Cagan's model, on the relationship between expected changes in prices and real money balances, and the rate at which expectations of inflation adjust to actual rates of change of prices.

The model presented in this paper has a stable demand relationship for real money balances similar to Cagan's. However, I have used the expected uncertainty relating to the value of the medium of exchange as the crucial variable[5] whereas Cagan uses the expected deterioration in value. The difference is one of perceived risk versus a certainty equivalent approach. The results are complementary. If the monetary authorities do not constrain prices and variations in prices then σ_p will increase and the demand for real money balances will decline in a fashion similar to that shown by Cagan. Thus, hyperinflation can result, in either case, from a mismanagement of the stock of money.

The question becomes one of how sensitive the public is to the risks associated with the medium of exchange. One might expect that as the risk increased people would become more sensitive, i.e., in the model presented above, M_{10} would increase. Cagan's analysis missed on this point. In cases where time enters into the estimated equations significantly, the results show that the public does in fact become more sensitive. However, further testing needs to be completed before strong statements can be made concerning the possibility of increasing sensitivity of price changes.

THE EMPIRICAL EVIDENCE

To test the ideas developed above, a study was made of the demand for money based upon the thorough examination recently reported by Goldfeld [8]. In his paper, Goldfeld reported that the "best" demand for money equation -as quite simple and conformed well with the standard theoretical model. For comparison with the results reported later Goldfeld's estimate of the demand for money is presented in equation (12)

$$\underset{}{\ell n\ m} = \underset{(2.2)}{0.271} + \underset{(5.3)}{0.193}\ \ell n\ y + \underset{(11.5)}{0.717}\ \ell n\ m_{-1} - \underset{(6.0)}{0.019}\ell n\ RCP - \underset{(4.0)}{0.045}\ell n\ RTD \quad (12)$$

$R^2 = 0.995$; $\rho = 0.414$; standard error = 0.0043; Durbin-Watson statistic = 1.73.

Goldfeld expressed all variables in terms of natural logarithms. The real money stock was defined as the quarterly average M_1 divided by the implicit GNP price deflator; real GNP was used as the income variable and RCP and RTD were the interest rate on commercial paper and time deposits, respectively. The sample period was 1952-II - 1972-IV.

In the present study I have defined the variables as did Goldfeld; my sample period, however, runs from the second quarter of 1954 through the fourth quarter of 1976. Goldfeld's results were duplicated for his sample period, but I chose the later starting point due to the closing of the Korean conflict and the inflation that attended the war time period. My other alternative was to begin the sample period in the late forties, but I chose not to do that because the longer time period would be less similar to Goldfeld's than the shorter sample. I also tested to see whether the demand for money equation was homogenous of degree one, as did Goldfeld [8], pp. 624-25), and found that this assumption held for my estimates as well as his. The estimated equation for my sample period is as follows (Note: all equations presented below have corrected for auto-correlation using the Corchrane-Orcutt technique). The values in parathensis below the coefficients are the relevant absolute values of t-statistics.

$$\ell n\ m = -0.183 + \underset{(3.5)}{} 0.038\ \ell n\ y + 0.938\ \ell n\ m_{-1} - 0.016 \ell n\ RCP \quad (13)$$

$$(3.5) \quad (3.7) \quad (23.8) \quad (4.3)$$

$R^2 = 0.990$; $\rho = 0.526$; standard error = 0.0055; Durbin-Watson = 1.94

The next step was to introduce some measure of the variability of the money stock and of prices into the demand for money equation. The first pass at this was in terms of the standard deviation of the real money supply realizing that this variable contained the variance of the nominal money supply, the variance of the price level and their covariance. The crucial test was to see what sign was attached to the variable.

To arrive at a value for the standard deviation of the real money stock, a moving average value was taken for this variable. Estimates of the standard deviation were made over the previous 12,16,20 and 24 quarters, including the current quarter, and this value was then used as the current value of the variable for estimation of the demand for money: thus, the value of the standard deviation was constantly changing. The final length of the series used was decided to be the one that contributed the most to the goodness of fit of the estimated equation. Since the variables already in the equation generally explained most part of the variance of the real money supply, the contributions made by the different measures of the variance of the real money supply were not greatly different. However, the estimate of the standard deviation using 16 quarters of information was chosen as the "best" estimate and therefore is the value used in the results presented below.

The demand for money estimated over the whole sample period was as follows.

$$\ell n\ m = \underset{(0.1)}{0.00} + \underset{(4.9)}{0.052}\ell n\ y + \underset{(26.3)}{0.930}\ell n\ m_{-1} - \underset{(5.8)}{0.020}\ell n\ RCP - \underset{(2.6)}{0.012}\ell n\ \sigma m \qquad (14)$$

$R^2 = 0.994$; $\rho = 0.414$; standard error = 0.0050; Durban-Watson Statistic = 1.893

The variable σm is the standard deviation of the growth of the real money supply described above. It is apparent that the public was concerned about variations in the real money supply over the time period used for estimation.[6] It is also apparent, from the sign attached to the coefficient, that concern was in regards to the variability of prices and not the variability of the nominal money stock.

To examine this point further, the standard deviation of the real money stock was divided into the nominal money stock component and the price component.[7] Standard deviations were computed for these two variables as was described above. Again the 16 quarter estimate proved to be the "best" estimate as determined by the variable's contribution to the explanation of the real demand for money. These estimates of the demand for money over the whole sample period is shown in equation (15). The results confirm those presented earlier. People were seemingly indifferent to variations in the nominal money stock, as the coefficient attached to σ_M is not significantly different from zero. However, the standard deviation of the price level, σ_p, is significantly different from zero and it's coefficient possesses a negative sign.

$$\ell n\ m = \underset{(1.7)}{-0.216} + \underset{(4.4)}{0.039}\ell n\ y + \underset{(39.6)}{0.992}\ell n\ m_{-1} \underset{(6.5)}{-0.018}\ell n\ RCP + \underset{(0.06)}{0.0002}\ell n\ \sigma_M \underset{(4.7)}{-0.009}\ell n\ \sigma_p \qquad (15)$$

$R^2 = 0.991$; $\rho = 0.250$; Standard error = 0.0052; Durbin-Watson = 1.906.

The conclusion one can draw from this result is that the Federal Reserve conducted its operations so that the demanders of money did not, at least within a quarter's time, have to worry about variations in the nominal money supply. Thus, although variations did take place in the growth of the money stock, the public did not let these variations bother them in terms of their tholdings of financial assets.

This conclusion, obviously, cannot apply to the variation that took place in prices. As can be seen the coefficient attached to σ_p is negative and highly significant.

We must next examine the stability of the observed relationship over the whole time period. To test this the above equation was reestimated for different time segments within the total sample period. Different lengths of periods were used; different starting periods were used; special time periods were defined using times when the variation in interest rates were increasing or decreasing. The coefficient of σ_M was not sufficiently different from zero in any of the time periods tested. The variables σ_m and σ_p did not prove significant until data from the period that included the fourth quarter of 1974 was included. These equations are presented below.

(16)

1954-3 to 1974-3

$$\ell n\ m = -0.098 + 0.038 \ell n\ y + 0.970 \ell n\ m_{-1} - 0.018 \ell n\ RCP + 0.0014 \ell n\ \sigma_m - 0.006 \ell n\ \sigma_p$$

(0.6) (2.8) (28.1) (6.0) (0.4) (1.8)

$R^2 = 0.995$; $\rho = 0.344$, Standard Error = 0.0045; Durbin-Watson = 1.82.

(17)

1954-3 to 1974-4

$$\ell n\ m = -0.205 + 0.029 \ell n\ y + 1.000 \ell n\ m_{-1} - 0.018 \ell n\ RCP + 0.001 \ell n\ \sigma_m - 0.010 \ell n\ \sigma_p$$

(1.3) (2.2) (25.3) (5.7) (0.2) (3.1)

$R^2 = 0.995$; $\rho = 0.345$; Standard error = 0.0045; Durbin-Watson = 1.81

(18)

1954-3 to 1974-3

$$\ell n\ m = 0.065 + 0.055 \ell n\ y + 0.921 \ell n\ m_1 - 0.020 \ell n\ RCP - 0.005 \ell n\ \sigma_m$$

(0.4) (5.1) (25.6) (6.5) (1.0)

$R^2 = 0.995$; $\rho = 0.418$; Standard error = 0.0045; Durbin-Watson = 1.79

(19)

1954-3 to 1974-4

$$\ell n\ m = 0.008 + 0.051 \ell n\ y + 0.933 \ell n\ m_1 - 0.019 \ell n\ RCP - 0.010 \ell n\ \sigma_m$$

(0.1) (4.4) (24.2) (5.) (2.0)

$R^2 = 0.995$; $\rho = 0.465$; Standard error = 0.0046; Durbin-Watson = 1.79.

All demand for money equations that include data after 1974-4 show the price variation variabe to be significant with a negative sign.

For additional information a table has been included to whoe the movement of the coefficient of the price variation variable over the sample period. This table is composed from all equations using 1954-3 as te starting date. The first end point is 19563 and then progress is at yearly intervals, so that the second equation used data through 1959-3 and the third, 1960-3. As can be seen from the table the coefficient varied around zero until early in the seventies although some trend seems to be in evidence. From a peak achieved in 1972 the coefficient declines continuously until it becomes significantly different from zero in the fourth quarter of 1974.

A Chow-test was performed to see when the structural shift actually became significant, i.e., when people began reacting σ_p differently than they had in the past. It seems that people began to weigh σ_p differently than in earlier times in the third quarter of 1973. Thus although the coefficient attached to σ_p did not become significantly different from zero until the fourth quarter of 1974 the specification of the demand for money changed significantly as early as the third quarter of 1973.

Next, the demand for money equation was disaggregated to see if people demanded the components of M1 for different reasons. Goldfeld found that one can obtain more information on the demand for money by disaggregating the money supply into it demand deposit component and its currency component ([8], pp. 594-98). Since the Federal Reserve closely follows bank reserves, yet supplies currency upon demand [14], it might be expected that the public would be more concerned about variations in nominal demand deposits than in variations in nominal money supply. The estimated real demand equation exclusive of the variables of variation shows a close fit as did the real demand for money.

$$\ell n\ d = \underset{(2.6)}{-0.173} + \underset{(2.6)}{0.031\ell n\ y} + \underset{(20.4)}{0.983\ell n\ d_{-1}} \underset{(4.5)}{-0.021\ell n\ RCP} \qquad (20)$$

$R^2 = 0.980$; $\rho = 0.502$; Standard error = 0.0065; Durbin-Watson = 1.80.

The model was then estimated using σ_p, as before, and σ_D, the variance of the rate of growth of nominal demand deposits. The estimate for the whole period shows results that duplicate the earlier tests on the real money supply.

$$\ell n\ d = \underset{(4.4)}{-0.173} + \underset{(3.7)}{0.027\ell n\ y} + \underset{(37.2)}{1.005\ell n\ d_{-1}} \underset{(46.2)}{-0.021\ell n\ RCP} \underset{(1.2)}{-0.006\ell n\sigma_D} \underset{(4.6)}{-0.010\ell n\sigma_P} \qquad (21)$$

$R^2 = 0.984$; $\rho = 0.317$; Standard error = 0.0059; Durbin-Watson = 1.87.

In addition, the equation was estimated over different time periods to determine significant changes in the inclusion of either σ_D or σ_P. As was the case for the narrow measure of the money supply, σ_D never obtained a coefficient significantly different from zero, and σ_p obtained a coefficient significantly different from zero in the period 1954-3 to 1974-4. Again as more recent data were added the coefficient for σ_p remained significantly different from zero.

The conclusion that can be drawn from the material presented in this section is that demanders of money balances have not been significantly concerned, during the period under review, about variations in the nominal money supply, or it's commercial bank component, demand deposits. On the other hand wealthholders have shown significant concern with the variation in the rate of inflation and have adjusted their demand for real balances accordingly.

One final test was made; to aggregate the money supply into its borader measure M2. Although Goldfeld found little empirical support for doing so ([8], pp. 592-95), it seemed a desirable thing to do, due to the interest analysts have shown in the broader measure. Secondly, in recent periods growth rates of M1 and M2 have diverged and this divergence has not yet been explained. If this divergence is a demand related phenomena it could result from the concern for inflation being felt by the demanders of demand deposits, an asset that bears no interest. In this case wealthholders would transfer assets into time accounts because time accounts are very close substitutes for demand deposits and since interest is paid on time accounts, wealthholders would recoup some of the loss of principal experienced due to the rise taking place in prices.

Demand for money equations similar to those run for M1 and demand deposits were run using M2 instead of the other variable. Real M2 was thus regressed on ℓny, $\ell nRCP$, $\ell n\ M2_{-1}$ and σ_p for the whole sample period and for each sub-period as was done in the earlier efforts. Only once did σ_p possess a negative coefficient that was significantly different from zero; this was the 1954-3 to 1975-1 period. All other time periods, even the 1954-3 to 1974-4 period, showed the coefficient of $\ell n\sigma_p$ to be insignificantly different from zero, and, in terms of t-statistics, the t-values were quite low.[8]

Thus one can conclude from this that concern about inflation significantly effected the demand for the aggregate (M1) generally designated as the medium of exchange, but did not significantly effect the demand for a broader measure of the money supply. This result can also help to explain why there has been a divergence in the growth rates of M1 and M2. Whereas, the demand for M1 has dropped off somewhat due to the fear of inflation, the demand for M2 has not significantly altered. What we see is that some of the demand for demand deposits has spilled over into the demand for time deposits; the movements have seemingly offset each other in terms of the demand for the broader aggregate.

SUMMARY AND CONCLUSIONS

The basic problems discussed in this paper derive from the fact that wealthholders, in general, are adverse to risk. Thus, they will desire to hold less of an asset if the uncertainty related to the return on the asset rises. The two assets explicitly considered in this paper are nominal financial claims that bear a fixed interest return, and the medium of exchange, that bears no explicit interest rate. It was postulated that increases in variations in market interest rates that affect the capital value of existing financial claims will cause wealthholders to increase their demand for money, thus reducing the level of national income for any given level of money balances. Also, wealthholders were said to be concerned about the value of the purchasing power of their money balances, and an increase in the variation of this purchasing power would cause less demand for money and hence cause a greater value of national income to exist for any given level of money balances. It was shown that these results carry implications about the effectiveness of monetary policy and possible constraint upon the actions of the monetary authorities.

Empirically testing these possibilities within the construct of a well-known specification of the demand for money it was found that variations in the money supply or in interest rates had no effect on the demand for money throughout the 1954-1975 period. This may be because the Federal Reserve successfully conducted operations so as to minimize fears of these variations, or, it may be that a quarter, the time dimension of the data used, is too long a period time to capture the effects of variations in the money supply on the demand curve for money balances.[9]

Variations in the general level of prices do significantly affect the demand for money. However, this factor only became important in the fourth quarter of 1974. Evidently, people in the United States became sensitive enough to price changes that it began to affect their wealthholding habits,[10] for this factor continued to be significant through the rest of the time period used in the sample. The economy's sensitivity to this phenomonen became more pronounced as the problem increased in magnitude. Furthermore, this result was maintained when money was disaggregated into its demand deposit component.

Finally, it was observed that variations in the general level of prices did not affect the demand for a more broadly defined measure of the money supply. As a result it was postulated that a shift in the structure of asset holdings took place during the period under review as wealthholders attempted to recoup some of the purchasing power lost holding demand deposits through holding close substitutes to demand deposits that bore some interest return. It was further argued that this could be a demand determined reason for the diverging paths of monetary growth during the 1975-76 period.[11]

Footnotes

[1] Also see Laidler [12].

[2] Note that $\partial\sigma_{Mt}/\partial M_t$ has been assumed to be greater than or equal to zero. Monetary policy could be conducted so as to reduce σ or σ_M. If so $\partial\sigma_{Mt}/\partial M_t$ be less than zero and the impact of the charge in the money supply could be greater. We do not regard this as the general problem, and will therefore not discuss this possibility in the rest of the paper.

[3] Keynes [10], p. 77. Also, see Minsky [15], p. 64-67.

[4] J. Robinson [17], p. 72.

[5] Also, see B. Klein [11], for a similar treatment.

[6] It might be said that similar tests were performed using variations in interest rates but the results were similar. For example, the 1954-3 to 1975-4 estimates of the demand for money show the following:

$$\ell n\ m = -0.29 + \underset{(6.3)}{0.05\ell n\ y} + \underset{(36.7)}{0.95\ n\ell m_{-1}} \underset{(7.0)}{-0.02\ell n\ RCP} \underset{(4.0)}{-0.01\ell n\ \sigma_{RCP}},$$

where $\ell n\ \sigma_{RCP}$ is the variable of the interest rate on commercial paper. The $R^2 = -.989$.

[7] I have not considered the other variables, such as R, R', H, P^e, g, g' in these estimates. In general, it is expected that the magnitudes would change very slowly and expectations would also change very slowly, and would not significantly affect the quarterly demand for money. (For a consideration of price expectations, see Goldfeld [8].)

[9] Preliminary work by the author seems to justify this comment.

[10] Perhaps publicity given to the oil embargo that took place around this time caused the public to give greater attention to the problem of inflation. However, it would seem that given the persistence of the influence of variations of prices on the demand for money that the problem of inflation was a more pervasive one than can be attributed to the oil embargo itself.

[11] The equations presented in this paper do not seem to "lose" any of the money supply in the 1975-76 period (see Goldfeld [8]). In fact, in four of the last eight quarters the estimated demand for money has been equal to the actual money supply and in the other four quarters there have been offsetting errors. Thus the model seems to have picked up the movements of the last two years relatively well. The author will provide this information on request.

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