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# PERMANENT INCOME, INFLATIONARY EXPECTATIONS AND THE MONEY DEMAND FUNCTION IN DEVELOPING COUNTRIES

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# PERMANENT INCOME, INFLATIONARY EXPECTATIONS AND THE MONEY DEMAND FUNCTION IN DEVELOPING COUNTRIES

Considerable attention has recently been directed towards the empirical verification of the role which theory suggests for the arguments which might enter the demand function for money. Various studies have examined such issues as the appropriate definition of money (narrow or broad), the relevant scale variable (measured income or permanent income or wealth) and the choice of the variable that most closely approximates the opportunity cost of holding money[1]. Although these studies have clarified many issues in developed countries, a number of points have not been finally resolved in developing countries. The issues which has been assumed settled for developed countries cannot be assumed as settled for the developing ones. For example, it has been accepted that permanent income is the appropriate scale variable in the developed economies[2], while in the developing economies this argument is not clear. Khan [16] Laumas and Laumas [21], Adekunle [2], Mammen [23] and Liu [22] have all found that the permanent and measured income elasticities are very close to each other. Therefore, they argued that because of the typical characteristics of developing economies, permanent income can be substituted by measured income. However, on the other hand Fry [10] estimated the demand for money function for 10 Asian less developed countries (LDCs) and found that the estimates of demand for money are improved substantially by substitution of permanent for current income and expected for actual inflation. Particularly the results improved substantially in the case of Burma, India, Malaysia, Phillipine and Srilanka. Furthermore, Mangla [24] also found that the permanent income is a better explanatory variable than the measured income in the case of Pakistan.

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1 See for example [1, 2, 3, 7, 11, 16, 19].

2 See [11, 19].

Another influence that has generally been considered appropriate in the demand for money function is that of inflationary expectation. Very little importance has been given for the influence of inflationary expectations on money demand function in the United States. Failure to obtain a significant role for this variable is probably the result of a relatively stable price level in the United States[3]. Expectation do play a major role either in the case of high rate of inflation or in the case of greater variability in the rates of inflation[4]. The developing countries of Asia have experienced both high rates of inflation and greater variability in the rates of inflation. The influence of inflationary expectation on money demand has not been rigorously examined in developing countries of Asia[5].

These unsettled issues in developing countries give us enough reasons to embark on yet another empirical efforts. As a further step toward their eventual resolution this study presents some evidence from six Asian LDCs examining the issues of permanent income and inflationary expectations using adaptive expectation model in money demand function for the period 1960-1978.

The paper proceeds as follows. In section I, we specify the function to be estimated and discuss the methodological issues and data. The regression results are reported in section II and the implications of these results, together with a summary, are contained in the concluding section.

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[3]See Laidler [20].

[4]See Khan [17] and Cagan [6].

[5]This issue has rigorously been examined in Latin American countries see [25].

## I. METHODOLOGY

The standard money-demand function which uses the rate of inflation as an opportunity cost of holding money instead of rate of interest is given as,

$$M_t^d = \alpha + \beta y_t + \gamma \dot{P}_t \qquad \ldots\ldots (1)$$

where $M_t^d$ is the real money stock demanded in time t while $y_t$ and $\dot{P}_t$ are respectively real income and actual inflation in time t. Since the purpose of this paper is to examine the issues of permanent income and inflationary expectation, we modified equation (1) to include permanent income and expected inflation as,

$$M_t^d = \alpha + \beta y_t^p + \gamma \dot{p}_t^e \qquad \ldots\ldots (2)$$

where $y_t^p$ and $\dot{p}_t^e$ are respectively real permanent income and expected rate of inflation in time t.

One of the problems associated with the empirical estimation of equation (2) is the fact that $y^p$ and $\dot{p}^e$ are unobserved. We propose to overcome this problem by the use of an adaptive expectations model for both $y^p$ and $\dot{p}^e$. The mechanism of "adaptive expectations", introduced by Cagan [6] in his study on the monetary aspects of hyper-inflation, according to which individuals form expectations about the future behaviour of some economic variables has become very popular in the literature on the behaviour of the demand for money under inflationary conditions[6]. The appeal of the adaptive expectations model has been readily recognized, since it is a fairly simple way of representing what may be a complex set of factors behind the formation and revision of expectations[7].

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[6]See Deaver [8], Diz [9], Hu [14], Silveira [28], and Khan [17, 18].
[7]See Khan [17].

The adaptive expectations model can be written as

$$\dot{P}^e_t = \dot{P}^e_{t-1} + \lambda [\dot{P}_t - \dot{P}^e_{t-1}] \quad 0<\lambda\leq 1 \quad \ldots\ldots\ldots\ldots(3)$$

where $\dot{P}^e_t$ represents the annual inflation rate expected to take place during time period t and formed during the preceeding year; $\dot{P}_t$ represents the actual annual rate of inflation during year t, and $\lambda$ is the co-efficient of expectation.

If $\lambda = 1$ then equation (3) boils down to

$$\dot{P}^e_t = \dot{P}_t \quad \ldots\ldots\ldots\ldots(4)$$

i.e. the expected inflation is equal to actual inflation. It can be easily shown that the adaptive expectations model (equation 3) is easily convertible into a distributed lag model. This can be done by successive substitutions which transform equation (3) into

$$\dot{P}^e_t = \lambda\dot{P}_t + \lambda(1-\lambda)\dot{P}_{t-1} + \lambda(1-\lambda)^2\dot{P}_{t-2} + \ldots\ldots$$
$$= \lambda\Sigma^{\infty}_{i=0}(1-\lambda)^{i-1}\dot{P}_{t-i} \quad \ldots\ldots\ldots\ldots(5)$$

Similarly, the same model was applied to the determination of expected or permanent income, $y^p_t$. Therefore, we get

$$y^p_t = \theta y_t + \theta(1-\theta)y_{t-1} + \theta(1-\theta)^2 y_{t-2} + \ldots\ldots$$
$$= \theta\Sigma^{\infty}_{i-0}(1-\theta)^{i-1}y_{t-i} \quad \ldots\ldots\ldots\ldots(6)$$

Therefore, substituting eqs. (5) and (6) into eq. (2) we intend to derive a 'general' money demand function. Rewriting eq. (2) we have

$$M^d_t = \alpha + \beta y^p_t + \gamma\dot{P}^e$$
$$\alpha + \beta[\theta y_t + \theta(1-\theta)y_{t-1} + \theta(1-\theta)^2 y_{t-2} + \ldots\ldots] +$$
$$\gamma[\lambda\dot{P}_t + \lambda(1-\lambda)\dot{P}_{t-1} + \lambda(1-\lambda)^2\dot{P}_{t-2} + \ldots\ldots]$$

$$M_t^d = \alpha + \beta\theta y_t + \beta\theta(1-\theta)y_{t-1} + \beta\theta(1-\theta)^2 y_{t-2} + \ldots\ldots + \gamma\lambda\dot{P}_t +$$
$$\gamma\lambda(1-\lambda)\,\dot{P}_{t-1} + \gamma\lambda(1-\lambda)^2\,\dot{P}_{t-2} + \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (7)$$

Multiplying eq. (7) by (1-θ) and taking one period lag, we have

$$(1-\theta)\,M_{t-1}^d = \alpha\,(1-\theta) + \beta\theta(1-\theta)y_{t-1} + \beta\theta(1-\theta)^2\,y_{t-2} + \beta\theta(1-\theta)^3\,y_{t-3} + \ldots$$
$$\gamma\lambda(1-\theta)\,\dot{P}_{t-1} + \gamma\lambda(1-\gamma)(1-\theta)\,\dot{P}_{t-2} + \gamma\lambda(1-\theta)(1-\lambda)^2\,P_{t-3}$$
$$\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (8)$$

Subtracting (7) from (8) we have

$$M_t^d - (1-\theta)\,M_{t-1}^d = \alpha\theta + \beta\theta y_t + \gamma\lambda\dot{P}_t + \gamma\lambda\{(1-\lambda)-(1-\theta)\}\,P_{t-1} + \gamma\lambda(1-\lambda)$$
$$\{(1-\lambda)-(1-\theta)\}\,\dot{P}_{t-2}\ldots\ldots$$

Therefore,

$$M_t^d = \alpha\theta + \beta\theta y_t + (1-\theta)\,M_{t-1}^d + \gamma\lambda\dot{P}_t + \gamma\lambda\{(1-\lambda)-(1-\theta)\}\,\dot{P}_{t-1} + \gamma\lambda(1-\lambda)$$
$$\{(1-\lambda)-(1-\theta)\}\,\dot{P}_{t-2} \quad \ldots\ldots\ldots\ldots (9)$$

Multiplying again eq. (9) by (1-λ) and taking one period lag

$$(1-\lambda)\,M_{t-1}^d = \alpha\theta(1-\lambda) + \beta\theta(1-\lambda)\,y_{t-1} + (1-\theta)(1-\lambda)\,M_{t-2}^d + \gamma\lambda(1-\lambda)\,\dot{P}_{t-1} +$$
$$\gamma\lambda(1-\lambda)\,\{\,(1-\lambda)-(1-\theta)\,\}\,\dot{P}_{t-2} + \gamma\lambda(1-\lambda)^2\{\,(1-\lambda)-(1-\theta)\}\,\dot{P}_{t-3}$$
$$\ldots\ldots (10)$$

Subtracting eq. (9) from eq. (10) and collecting terms we have;

$$M_t^d = \alpha\theta\lambda + \beta\theta y_t - \beta\theta\,(1-\lambda)y_{t-1} + M_{t-1}^d\,\{\,(1-\theta) + (1-\lambda)\,\} - \{(1-\theta)(1-\lambda)\}$$
$$M_{t-2}^d + \gamma\lambda\dot{P}_t - \gamma\lambda(1-\theta)\,P_{t-1} \quad \ldots\ldots (11)$$

Therefore, equation (11) is the 'general' money demand function and if we assume $\lambda=1$ and $\theta=1$ then this 'general' equation boils down to the conventional money demand function of equation (1) i.e.

$$M_t^d = \alpha + \beta y_t + \gamma\,\dot{P}_t$$

Coming back to our distributed lag model given by eq. (5) the expected inflation rate is expressed as a weighted sum of past (actual) inflation rates. To be able to obtain estimates of the expected rate of inflation, we ought to estimate these weights. As we know, eq. (2) cannot be estimated directly with standard methods, notably Ordinary Least Squares (OLS), since $\dot{P}_t^e$ and $y_t^p$ are non-observable. To compute the weights we utilize an estimation procedure which has the merit of computational simplicity and yet at the same time is based on economic rationality.

It is generally accepted in economic theory that a reasonable criterion for individuals to use in forecasting future values in the face of uncertainty is one that minimizes their expected losses from forecast errors[8]. Therefore, in the estimation of the weights in eqs. (5) and (6), we have utilized the same criterion. That is, we have estimated the adjustment coefficients, $\lambda$ and $\theta$, which minimizes the average losses from forecasting errors in the quadratic loss function given as[9],

$$L = \Sigma\{ \dot{P}_t - \dot{P}_t^e\}^2 = \Sigma_{t-1}^{n}\{\dot{P}_t - \lambda\Sigma_{i=0}^{\infty}(1-\lambda)^{i-1}\ \dot{P}_{t-i}\}^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots (12)$$

In finding the value of $\lambda$ that minimizes this quadratic loss function, we restricted the number of terms in eq. (5) to three to economize on degrees of freedom[10]. Secondly, to obtain the estimate of $\lambda$ that minimizes

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[8] See Nugent and Glezakos [27].

[9] Nugent and Glezakos [27] has also used this method in estimating the weights for expected inflation and permanent income.

[10] It might be pointed out here that limiting the lagged terms to two in estimating expected values should not make any significant difference regarding their accuracy. A recent empirical study has shown that current price expectations are formed on the basis of the most recent actual price movement, see Toyoda [29].

quadratic loss function, L in eq. (12) by searching the parameter space 0 to 1 in intervals of 0.1. This procedure has two additional advantages. First, it avoids the computational and specification problems associated with the estimation of distributed lags and, second, it gains greater realism by not requiring the weights of the lagged terms to sum to unity[11].

By substituting the optimally chosen value of λ from eq. (12) into eq. (5) restricted to three terms (including the current period), we generate a time series of values for the expected rate of inflation, $\dot{P}^e_t$, for each country included in our sample. By a similar process we chose the optimal value of θ from eq. (12) and substituting this value in eq. (6) we generate a time series of values for the expected or permanent income, $y^p_t$.

## DATA

The countries included in our sample are Pakistan, India, Malaysia, Thailand, Korea and Srilanka. All the data used in this paper are annual observations of the variables for the period 1960-78 and are at the constant price of 1960 and 1960-61 depending upon the country. The data regarding the money stock for Pakistan are taken from Kemal et. al /¯15_7 while for the rest of the countries under consideration these are taken from different issues of International Financial Statistics (IFS). The data regarding national income for Pakistan are taken from different issues of Pakistan Economic Survey while for the rest of the countries except India are taken from the Year Book of National Income Accounts[12]. The Consumer Price Index (CPI) for all the countries except Pakistan are taken from International

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[11]See Nugent and Glezakos /¯27_7.

[12]I am grateful to Prof. N. Bhattachrya of the Indian Statistical Institute, Calcutta, for supplying me the relevant data of National Income Accounts for India. I also wish to express my thanks to Dr.(Mrs) Bina Roy of the National Income Research Unit of this Institute who took the pain of preparing the National Income Accounts data.

Financial Statistics (IFS)[13].

*RESULTS*

We estimated eq. (2) by Ordinary Least Squares (OLS) method for all the countries included in our sample. In order to compare the performance of the permanent income and inflation expectations we also estimated eq. (11) [ assuming $\lambda=1$ and $\theta=1$ ] for all the countries under consideration. Before we delve into the details, a few words regarding the optimal value of $\lambda$ and $\theta$ which minimizes the quadratic loss function i.e. eq. (12) are in order.

Not surprisingly, the optimal value of $\lambda$ and $\theta$ for all the countries included in our sample is 0.9. There are many reasons which tend to suggest that in developing economies the adjustment coefficient may be very near to unity[14]. According to Nerlove [26] one factor that accounts for the size of the coefficient is the length of the economic horizon. It is expected that the shorter the length of the economic horizon, the larger will be the adjustment coefficient or in other words, the more static the expectations are. Various studies [4, 5] on the economics of the developing countries argue that the length of the economic horizon in the developing countries is shorter compared to the developed countries and therefore, the adjustment coefficient is likely to be higher in developing countries. With the optimal value of $\lambda$ and $\theta$ we constructed the time series estimates of $\dot{P}^e_t$ and $y^p_t$ for each individual country for the years 1960-78.

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[13]Since Consumer Price Index (CPI) series separately for West Pakistan are not available for the period 1960-61 to 1970-71, our analysis has been carried out with GNP deflator as the relevant variable for inflation.

[14]See Adekunle [2].

Preliminary results are presented in tables 1-6 for the countries under consideration. Presented in table I is the estimated coefficients of eqs. (1) and (2) for Pakistan. A glance at the table is sufficient to see that the permanent income and inflation expectations did not improve the results. The permanent and measured income coefficients are statistically significant at the traditional level of significance but both the actual and expected rate of inflation remained statistically insignificant. There is virtually no difference in the estimated coefficients of measured and permanent income and actual and expected rate of inflation. The only significant difference is the negative sign when the expected rate of inflation is used in place of actual rate of inflation. The permanent and measured income elasticities corresponding to narrow definition of money are respectively 1.10, 1.06 and 1.09, 1.06 depending upon the specification of the model.

The results corresponding to broader definition of money are not very much different from that of the narrow definition of money[15]. The permanent and measured income elasticities are virtually the same. Similarly, the actual and expected rate of inflation turned out to be statistically insignificant. The substitution of permanent income for measured income and expected for actual rate of inflation did not improve the results. However, we got the anticipated sign for expected rate of inflation.

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[15] We have used both the narrow (currency in circulation plus demand deposits) and broader (currency in circulation plus demand deposits plus time deposits) definition of money for Pakistan. This is because in an unpublished study made at the Pakistan Institute of Development Economics, it was found that the degree of substitution exists between $M_1$ and time deposits, and, therefore, $M_2$ (broader) definition of money can also be used. Since definition of money is a debatable issue we refrain to indulge ourselves into this issue and as such used only narrow ($M_1$) definition of money for rest of the countries.

The analysis of Table 1 further reveals some interesting results. The permanent and measured income elasticities corresponding to both narrow ($M_1$) and broader ($M_2$) definition of money are greater than unity which clearly shows the absence of economies of scale in cash holdings. Secondly, the permanent and measured income elasticities corresponding to $M_2$ definition are greater than the income elasticities corresponding to $M_1$ definition of money. This finding suggest that $M_2$ definition of money is more appropriate than $M_1$ definition in Pakistan. The adjusted $R^2$ throughout in Table I remained fairly high which shows that most of the variations in endogeneous variable are explained by exogeneous variables. The Durbin-Watson statistics are also fairly reasonable and show the absence of serial correlation.

A summary of the findings are in order. The permanent income and inflation expectations did not improve the results. Secondly, the permanent and measured income elasticities are virtually the same, hence there is nothing to choose between measured income and permanent income as a scale variable in the money demand function in Pakistan.

Presented in tables 2,3 and 4 are the estimated coefficients of money demand function in India, Malaysia and Thailand respectively. The reader will note that the permanent income and inflationary expectations did not improve the results at all. The permanent and measured income elasticities are statistically significant at the traditional level of significance while both the actual and expected rate of inflation are at no time significantly different from zero. Like Pakistan, there is virtually no difference in the estimated coefficients of permanent and measured income. Similarly, we get the correct sign when $\dot{P}_t^e$ is used in place of $\dot{P}_t$ in India and Thailand while in Malaysia we did not even get the correct sign for $\dot{P}_t^e$. Therefore, our

Table I: ESTIMATES OF MONEY DEMAND FUNCTION IN PAKISTAN

| No. of Equation | Dependent Variable | Constant (C) | $y_t$ | $y_t^p$ | $\dot{P}_t$ | $\dot{P}^e$ | $\bar{R}^2$ | D.W | F |
|---|---|---|---|---|---|---|---|---|---|
| (1) | $m_1$ | -2.31 (-3.00)* | | 1.10 (14.20)* | | -0.01 (-0.60) | 0.96 | 1.26 | 184.40 |
| (2) | $m_1$ | -1.94 (-2.64)* | | 1.06 (14.50)* | 0.002 (0.13) | | 0.96 | 1.25 | 180.38 |
| (3) | $m_1$ | -2.38 (-2.93)* | 1.09 (13.98)* | | | -0.01 (-0.54) | 0.96 | 1.30 | 179.13 |
| (4) | $m_1$ | -1.93 (-2.54)* | 1.06 (14.36)* | | 0.002 (0.16) | | 0.96 | 1.29 | 176.10 |
| (5) | $m_2$ | -2.80 (-3.58)* | | 1.18 (14.94)* | | -0.002 (-0.08) | 0.96 | 1.16 | 215.24 |
| (6) | $m_2$ | -2.33 (-3.23)* | | 1.13 (15.82)* | 0.01 (0.95) | | 0.97 | 1.25 | 227.77 |
| (7) | $m_2$ | -2.77 (-3.50)* | 1.17 (14.71)* | | | -0.0007 (-0.03) | 0.96 | 1.20 | 208.66 |
| (8) | $m_2$ | -2.32 (-3.17)* | 1.13 (15.60)* | | 0.01 (0.97) | | 0.96 | 1.29 | 221.52 |

Note: 1) All the equations are estimated in the log-linear form. C is the intercept term, y is the real GNP $y^P$ is the real permanent income, $\dot{P}$ is the actual rate of inflation while $\dot{P}^e$ is the expected rate of inflation.

2) The t-values are given in parantheses and star(*) indicates that co-efficients are statistically significant at the 95 percent confidence level.

findings are contradictory to the findings of Fry [10] who found that permanent income and inflation expectations improve the results substantially in India and Malaysia.

Further analysis of tables 2, 3 and 4 show that permanent and measured income elasticities are greater than unity in India which suggests the absence of economies of scale in cash holdings and less than unity in Malaysia and Thailand which implies that economies of scale in cash holdings exist in these countries. Adjusted $R^2$ are fairly high in all the three countries which shows that most of the variations in endogeneous variable are explained by exogeneous variables. Durbin-Watson statistics are also fairly reasonable and show the absence of serial correlation.

The estimated coefficients of money demand function for Korea and Srilanka are presented in tables 5 and 6 respectively. Unlike Pakistan, India, Malaysia and Thailand, the results in tables 5 and 6 are quite different. Besides measured and permanent income, both actual and expected rate of inflation are significantly different from zero and possessed the expected sign in Korea [table 5]. However, the estimates of demand for money did not improve by the substitution of permanent for measured income and expected for actual inflation. The permanent and measured income elasticities are exactly the same (1.20) while the coefficients of actual and expected rate of inflation are exceedingly close to each other. The choice of expected rate of inflation over actual inflation would not make a significant difference in the results. We did not find economies of scale in cash holdings in Korea as both the measured and permanent income elasticities are greater than unity. Adjusted $R^2$ is very high and the Durbin-Watson statistic shows the absence of serial correlation.

Table 2: ESTIMATES OF MONEY DEMAND FUNCTION IN INDIA

| No. of Equation | Dependent Variable | Constant (C) | $y_t$ | $y_t^p$ | $\dot{P}_t$ | $\dot{P}_t^e$ | $\bar{R}^2$ | D.W | F |
|---|---|---|---|---|---|---|---|---|---|
| (1) | $m_1$ | -1.83 (-1.44) | | 1.26 (9.93)* | | -0.01 (-0.34) | 0.89 | 1.32 | 53.17 |
| (2) | $m_1$ | -2.00 (-1.55) | | 1.28 (9.80)* | 0.001 (0.09) | | 0.89 | 1.29 | 52.69 |
| (3) | $m_1$ | -1.77 (-1.38) | 1.25 (9.77)* | | | -0.009 (-0.26) | 0.89 | 1.30 | 51.45 |
| (4) | $m_1$ | -1.95 (-1.50) | 1.27 (9.67)* | | 0.002 (0.17) | | 0.89 | 1.25 | 51.29 |

Note: 1) All the variables defined in Table I.

2) The t-values are given in parentheses and a star(*) indicates that co-efficients are statistically significant at the 95 percent confidence level.

Table 3: ESTIMATES OF MONEY DEMAND FUNCTION IN MALAYSIA

| No. of Equation | Dependent Variable | Constant (C) | $y_t$ | $y_t^p$ | $\dot{P}_t$ | $\dot{P}_t^e$ | $\bar{R}^2$ | D.W | F |
|---|---|---|---|---|---|---|---|---|---|
| (1) | $m_1$ | 8.78 (1.42) | | 0.73 (10.59)* | | 0.009 (0.38) | 0.93 | 1.19 | 101.85 |
| (2) | $m_1$ | 8.32 (1.39) | | 0.73 (11.10)* | 0.006 (0.28) | | 0.93 | 1.24 | 101.39 |
| (3) | $m_1$ | 9.41 (1.51) | 0.72 (10.41)* | | | 0.01 (0.46) | 0.93 | 1.35 | 98.62 |
| (4) | $m_1$ | 8.88 (1.47) | 0.73 (10.91)* | | 0.007 (0.36) | | 0.93 | 1.29 | 97.98 |

Note: 1) All the variables defined in Table.

2) The t-values are given in parantheses and a star(*) indicates that coefficients are statistically significant at the 95 percent confidence level.

*Table 4:* ESTIMATES OF MONEY DEMAND FUNCTION *IN* THAILAND

| No. of Equation | Dependent Variable | Constant (C) | $y_t$ | $y_t^p$ | $\dot{P}_t$ | $\dot{P}_t^e$ | $R^{-2}$ | DW | F |
|---|---|---|---|---|---|---|---|---|---|
| (1) | $m_1$ | 1.40 (2.22)* | | 0.71 (12.56)* | | -0.007 (-0.28) | 0.95 | 1.35 | 125.40 |
| (2) | $m_1$ | 1.57 (2.50)* | | 0.69 (12.37)* | 0.005 (0.16) | | 0.95 | 1.28 | 124.93 |
| (3) | $m_1$ | 1.44 (2.31)* | 0.71 (12.71)* | | | -0.004 (-0.14) | 0.95 | 1.31 | 128.42 |
| (4) | $m_1$ | 1.58 (2.55)* | 0.69 (12.56)* | | 0.006 (0.24) | | 0.95 | 1.25 | 128.78 |

Note: 1) All the variables defined in Table I.

2) The t-values are given in parantheses and a star(*) indicates that coefficients are statistically significant at the 95 percent confidence level.

Table 5: ESTIMATES OF MONEY DEMAND FUNCTION IN KOREA

| No. of Equation | Dependent Variable | Constant (C) | $y_t$ | $y^p_t$ | $\dot{P}_t$ | $\dot{P}^e_t$ | $R^{-2}$ | D.W | F |
|---|---|---|---|---|---|---|---|---|---|
| (1) | $m_1$ | -4.33 (-5.58)* | | 1.20 (21.73)* | | -0.22 (-2.63)* | 0.97 | 1.48 | 240.40 |
| (2) | $m_1$ | -4.41 (-5.65)* | | 1.20 (21.40)* | -0.18 (-2.52)* | | 0.97 | 1.43 | 233.64 |
| (3) | $m_1$ | -4.38 (-5.40)* | 1.20 (20.84)* | | | -0.20 (-2.35)* | 0.97 | 1.39 | 221.29 |
| (4) | $m_1$ | -4.45 (-5.47)* | 1.20 (20.63)* | | -0.17 (-2.27)* | | 0.97 | 1.51 | 217.02 |

Note: 1) All the variables defined in Table I.

2) The t-values are given in parentheses and a star(*) indicates that coefficients are statistically significant at the 95 percent confidence level.

Table 6- ESTIMATES OF MONEY DEMAND FUNCTION IN SRILANKA

| No. of Equation | Dependent Variable | Constant (C) | $y_t$ | $y_t^P$ | $\dot{P}_t$ | $\dot{P}_t^e$ | $R^{-2}$ | D.W | F |
|---|---|---|---|---|---|---|---|---|---|
| (1) | $m_1$ | 1.41 (1.80)* | | 0.66 (7.61)* | | -0.05 (-2.04)* | 0.81 | 1.81 | 29.43 |
| (2) | $m_1$ | 1.52 (1.89)* | | 0.65 (7.32)* | -0.03 (-1.75)* | | 0.80 | 1.62 | 27.24 |
| (3) | $m_1$ | 6.24 (9.35)* | 0.13 (1.73)* | | | 0.006 (0.14) | 0.19 | 0.68 | 1.62 |
| (4) | $m_1$ | 6.24 (9.38)* | 0.13 (1.75)* | | 0.008 (0.21) | | 0.19 | 0.67 | 1.63 |

Note: 1) All the variables defined in Table I.

2) The t-values are given in parentheses and a star(*) indicates that coefficients are statistically significant at the 95 percent confidence level.

The results in table 6 are very much different from those in table 5. A glance at table 6 is sufficient to see that the estimates of demand for money are improved significantly by substitution of permanent for measured income and expected for actual inflation. The reader will note that there is a marked difference in permanent and measured income elasticities [0.13 for measured and 0.66 for permanent income]. When measured income is used with $\dot{P}^e$ or with $\dot{P}_t$, the adjusted $R^2$ decreased to 0.19 and the Durbin-Watson statistic shows the presence of serial correlation or in other words, mis-specification of the model. Therefore permanent income is the most appropriate scale variable in the money demand function in Srilanka. Similarly, it is also found that inflationary expectations play an important role in money demand in Srilanka. Therefore, expected inflation is preferred to actual inflation as an opportunity cost variable. These findings are in conformity with the findings of Fry [10] that permanent income and expected inflation improve the results substantially.

The permanent income elasticities are smaller than unity and suggests the existence of economies of scale in money holdings. At this point we are in disagrement with Fry who found the permanent income elasticity as 1.93 which suggests the absence of economies of scale in money holdings[16].

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[16] Using permanent income and expected inflation and covering the time period 1962-72 he found income elasticity as 1.93.

## CONCLUSIONS

One of the major problems in the study of the demand for money in developing countries has been the choice of the appropriate scale variable (measured or permanent income). There is no agreement over this issue. Some authors argue in favour of measured income given the typical characteristics of the developing countries while some argue in favour of permanent income. Secondly, the influence of inflationary expectations of the demand-for-money had not been rigorously examined in the developing countries of Asia.[1]

The purpose of this paper has been to examine these issues and, as a further step toward their eventual resolution, presents evidence from six Asian LDCs. This was done by making use of the adaptive expectations model to calculate the permanent income and expected inflation. By minimizing the quadratic loss function we computed the optimal adjustment coefficients of permanent income and expected inflation. In terms of goodness of fit, we found that substitution of permanent for measured and expected for actual inflation did not improve our estimates for all the countries included in our sample except Srilanka. The inclusion of permanent income and expected inflation in money demand function in Srilanka improved the estimates significantly. The message of this paper is that we cannot generalise the statement, that, permanent and measured income elasticities are exceedingly close to each other and therefore, measured income can be substituted for permanent income in developing countries as a whole. Each country should be examined on their own intrinsic merit.

From the policy point of view the message is clear. There is not much to choose between permanent and measured income as a determinant in the money demand function in all the countries considered in this paper except Srilanka.

However, the policy maker in Srilanka should make it clear that the most appropriate scale variable is that of permanent income and not measured income. Furthermore, inflationary expectations, do not play a significant role in money demand in all the countries except for Korea and Srilanka. Therefore, the interest rate appears to be the appropriate opportunity cost variable in money demand in the countries other than Korea and Srilanka.

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