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INCOME EXPECTATIONS AND THE DEMAND FOR MONEY IN MALAYSIA; SOME EMPIRICAL EVIDENCE

Muzafar Shah Habibullah
Department of Economics, UPM.

Introduction

Most economists agree that the demand for money function is stable if the scale variable is defined in term of wealth. Friedman (1959) concluded from an empirical test for the United States that the demand for money is a stable function of, and only of, permanent income, a concept which is very closely related to that of wealth. Metzler (1963) found out that wealth in the model provided a more stable demand-for-money function. If both income and wealth are included, the former variable seem to be redundant in the presence of the later. Chow (1966), Brunner and Metzler (1963), Laidler (1966, 1977) also had concluded that the money demand function incorporating wealth performed better results and gave more accurate predictions of the velocity of circulation.

The above empirical evidences on wealth as the scale variable in the money demand function implies that current income is subjected to uncertainties. This is so because current income is generated as a result of the performance of the economy. This situation is more critical particularly for the developing countries. It is noted that the developing country's incomes ware generated and derived from a norrow range of export of primary commodities. The prices of these primary commodities are susceptible and vulnerable to the fluctuation of world demand and supply forces. In other words, when the prices of the primary commdities are subjected to uncertainties, income generated from the primary commodities are also uncertain. This in term would affects the behaviour of the public in consumption or in holding real balances.

The main objective of thfs paper is to determine the type of expectation the people form about future income when deciding to hold real balances in a developing economy such as Malaysia. Four types of expectation formation processes are dealt with, namely, the Cobweb, extrapolative, adaptive and rational expectation hypotheses. In this section the estimating form of the model will be derived. These expectation models will be discussed in section 2 of this paper. Empirical results will then be presented in section 3. Finally, the conclusion will be presented in section 4.

II. Theoretical Framework

Expectation Formation

Uncertainty about future economic conditions has been regarded as one of the crucial factors that influences the thinking and bahaviour of the economists, politicians and the general public. Mayes (1981) pointed out that[1]

> 'In a fairly normal economic condition, it may not be of great importance to know as to how expectations are formed....if price inflation **or commodity prices** is fairly constant....However, in recent years, no such uniformity has been observed for the rate of inflation **or commodity prices** and it has become much more important to consider with some care what people's expectations actually are and how they are formed.'

It is natural then in deciding the amount of money balances that one wants to hold, one will have to form his view about the future, for example, the future commodity prices, if he is given a choice between current consumption and future consumption. If he expects that the commodity prices will rise, then he will hold more money and this could increase his transaction purposes. Thus, expectation is crucial in determining the behaviour of an economic agent.

The concept of expectations has long been recognised. Some of the common ones are the 'cobweb' theory, extrapolative, adaptive and the rational expectation hypotheses. The 'cobweb' theory was formulated by Ezekial (1938) which stated that the current expected income are based only on most recent past value:

$$y_t^* = y_{t-1} \qquad (1)$$

where y_t^* is the expected income for the period t, and y_{t-1} is the observed income in period $t-1$.

An alternative to the cobweb expectation model is the extrapolative expectation hypothesis introduced by Metzler (1941). It could be expressed as

$$y_t^* = y_{t-1} + \delta(y_{t-1} - y_{t-2}) \qquad (2)$$

where y_{t-2} is the observed income in period $t-2$ and δ is the coefficient of expectation. The extrapolative expectation hypothesis asserts that the expected income, y_t^*, is given by its previous recent past values and the direction of change in the past, taking into account the most recent trend in prices. If $\delta>0$, it is

[1]The word in hold id added.

extrapolated that the past trend is to continue and if $\delta < 0$, it is expected that the past trend reverses and in which case the expectations are said to be regressive. However, if $\delta = 0$, the model becomes the traditional cobweb model.

A more widely recognised expectation model, however, is the adaptive expectation hypothesis. It was first suggested by Cagan (1956) and later developed by Nerlove (1956). Under the adaptive expectation hypothesis, the economic units are assumed to revise their expectations according to the most recent experience. Algebraically, it could be written as

$$y_t^* = y_{t-1}^* = \beta(y_{t-1} - y_{t-1}^*) \qquad (3)$$

where β is the coefficient of expectation and, $0 \leq \beta \leq 1$. The above hypothesis implies that the last forecasting error, that is, the error made in an earlier forecast of y, is fed back to the latest expectation.

On the other hand, a more recent expectation hypothesis that has been seriously given attention is the rational expectation hypothesis. The rational expectation hypothesis was developed by Muth (1961). Muth asserts that the economic units generally does not waste information, and that expectations depend specifically on the structure of the entire system. Muth (1961) states that

> 'Expectations, predictions of future events, are essentially the same as the predictions of the relevant economic theory'

The rational expectation hypothesis assumes that all agents knew the correct model of the economy, that is , they know the process which will ultimately generates the actual outcomes in question (Maddock and Carter 1982). This means that the economics units gather and use information efficiently. Algebraically, the rational expectation process could be written as

$$y_t^* = E_{t-1}(y_t \mid \Omega_{t-1}) \qquad (4)$$

where E_{t-1} is the expected value operator based on information available through the $(t-1)$th period and Ω_{t-1} is all the information available at time $t-1$.

Therefore, from the above discussion, ones' expectation formation process could take any of the form of equation (1) through (4).

The Model and Method of Estimation

The three models used in this study; the basic model, the partial stock adjustment model and the expectation formation models are as follows;

$$\left(\frac{M}{P}\right)_t^* = f(y_t^*, r_{it}, P_t, r_{Mt}) \qquad \text{(basic model)} \qquad (5)$$

$$\left(\frac{M}{P}\right)_t - \left(\frac{M}{P}\right)_{t-1} = \theta\left(\frac{M}{P}\right)_t^* - (M/P)_{t-1} \qquad \text{(stock adjustment)} \qquad (6)$$

$$y_t^* = y_{t-1} \qquad \text{(cobweb)} \qquad (7)$$

$$y_t^* = y_{t-1} + \delta(y_{t-1} - y_{t-2}) \qquad \text{(extrapolative)} \qquad (8)$$

$$y_t^* = \beta y_{t-1} + (1 - \beta)\, y_{t-1} \qquad \text{(adaptive)} \qquad (9)$$

$$y_t^* = E_{t-1}(y_t \mid \Omega_{t-1}) \qquad \text{(rational)} \qquad (10)$$

Equation (5) postulates that the demand for real money balances is a function of expected real income y_t^*, rate of inflation P_t, interest rate on short-term financial assets r_{it}, and the rate of return on money r_{Mt}. Equation (6) is the real partial stock adjustment process offered by Chow (1966), where (M/P) and (M/P)* are the actual and desired real money balances respectively and, θ is the coefficient of adjustment. Equations (7) through (10) are the expectation formation processes.

To arrived at the estimating demand for money function, equations (5) and (6) are defined in their logarithm form as follows

$$\log (Mk/P)_t^* = a_0 + a_1 \log y_t^* + a_2 \log r_{it} + a_3 \log P_t + a_4 \log r_{Mkt} \qquad (5')$$

and

$$\log (Mk/P)_t - \log (Mk/P)_{t-1} = \theta\, [\log (Mk/P)_t^* - \log (Mk/P)_{t-1}] \qquad (6')$$

Then, we substituted equation (6') and (7) through (10) into equations (5'), we have the following respective estimating equations

Cobweb Model

$$\log (Mk/P)_t = \alpha_0 + \alpha_1 \log y_{t-1} + \alpha_2 \log r_{it} + \alpha_3 \log P_t$$
$$+ \alpha_4 \log r_{Mkt} + \alpha_5 \log (Mk/P)_{t-1} + \mu_{kjt} \qquad (11)$$

Extrapolative Model

$$\log (Mk/P)_t = \Phi_0 + \Phi_1 \log y_{t-1} + \Phi_2 \log (y_{t-1}\ y_{t-2}) + \alpha_3 \log P_t + \Phi_3 \log r_{it} + \Phi_4 \log P_t + \Phi_5 \log r_{Mkt} + \Phi_6 \log (Mk/P)_{t-1} + \mu_{kjt} \quad (12)$$

Adaptive Model

$$\log (Mk/P)_t = \phi_0 + \phi_1 \log {}_{t-1} + \phi_2 \log r_{it} + \phi_3 \log r_{it-1} + \phi_4 \log P_t + \phi_5 \log P_{t-1} + \phi_6 \log r_{Mkt} + \phi_7 \log r_{Mkt-1} + \phi_8 \log (Mk/P)_{t-1} + \phi_9 \log (Mk/P)_{t-2} + \mu_{kjt} \quad (13)$$

Rational Model

$$\log (Mk/P)_t = \pi_0 + \pi_1 E_{t-1} (\log y_t | \log \Omega_{t-1}) + \pi_2 \log r_{it} + \pi_3 \log P_t + \pi_4 \log r_{Mkt} + \pi_5 \log (Mk/P)_{t-1} + \mu_{kjt} \quad (14)$$

where α's, Φ's, ϕ's and π's are the parameters to be estimated. The error terms μ_{kj} (where k = 1, 2 and 3, and j = respective expectation processes) are assumed to follow the first order autoregressive scheme, $\mu_{kjt} = o\mu_{kjt-1} + \epsilon_{kjt}$. ϵ_{kjt} is assumed to have mean zero and constant variance.

The estimating equation (11) to (14), are estimated using the maximum likelihood method of estimation due to Beach and MasKinnon (1978). This is necessary because of the presence of lagged dependent variable as one of the regressors. However, equation (14) is estimated in a special way. Since $E_{t-1}(Y_t/\Omega_{t-1})$ is not observable, a proxy for $E_{t-1}(Y_t/\Omega_{t-1})$ is needed. Thus, assuming that the regression $E_{t-1}(Y_t/\Omega_{t-1})$ is linear in Ω, the proxy for $E_{t-1}(Y_t/\Omega_{t-1})$ is formed by regressing y_t by ordinary least square against a list of variables dated $t-1$ and earlier. This includes all the predetermined variables that appear on the right hand side of the equation in which $E_{t-1}(y_t/\Omega)$ appears (Huntzinger, 1979; Sargent 1973, 1976). In this study, the value of $E_{t-1}(Y_t/\Omega_{t-1})$ is obtained by regressing y_t on Y_{t-1}, Y_{t-2}, P_{t-1}, P_{t-2}, r_{it-1}, r_{it-2}, r_{Mkt-1} and r_{Mkt-2}

III. Empirical Results

This study is based on Malaysian annual time series data over the period 1960-1984. All data are compiled from various issues of the Quarterly Economic Bulletin published by Bank Negara Malaysia. The variables used in this study are money stock M1 (currency plus demand deposit held by non-bank private sector), and M2 (M1 plus saving and time deposits helad at commercial banks). Other variables include gross national product (GNP), consumer price index (CPI, 1967 = 100) and the rate of interest on short-term financial assets, 6-month Treasury bill rate for M1, and 3-month Treasury bill rate for M2. The rate of return on money M2 are proxied by using the commercial bank saving deposit rate. For money stock M1, the rate of return (r_{M1}) are proxied by applying the following formula (Habibullah, 1986);

$$r_{M1} = [r_L - (\frac{r_L}{r_{SD} + r_{FD}})] (\frac{DD}{BA}) \qquad (15)$$

where r_L is the rate of return on investment, r_{SD} is the saving deposit rate, r_{FD} is the time deposit rate (12-month), DD is the demand deposits at commercial bank and BA is commercial bank total assets.

In order to arrive at the best expectation formation model for each of the money stock, the criteria used are: the overall significance of the independent variables (that is the significance of 't-statistics' in the models), the correct signs shown by the coefficient of the estimated parameter and the coefficient of multiple determination (R). The most important criteria, however, is the significant of the expected income. If the expected income is not significant or giving wrong sign, it is automatically rejected. All regressions were corrected for autocorrelation.

Table 1 shows the regression results for the money stock M1. In all cases, the goodness of fit is very satisfactory for four of the expectation formation models and all regressors show correct sign. Comparing all the four expectation models, expect for variable r_{M1t-1} and P_t in the adaptive and rational model respectively, all variables are important. The results suggest that the public formed their expectations using any of the expectations using any of the expectation formation processes - cobweb, extrapolative, adaptive or the rational expectation model.

TABLE 1
Results Of The Coeffcients And Related Statistics For Money Balances, M1

COBWEB MODEL

$$\text{Log}(M1/P)_t = 1.0594 + 0.55027 \log(y/p)_{t-1} - 0.47965 \log r_{lt} + 0.43529 \log r_{Mlt} - 0.92464 \log P_t \; 0.66334 \log (M1/p)_{t-1}$$

(−1.5383) (2.1985)** (−5.0185)*** (2.5161)** (−2.1651)** (3.1808)***

$R^2 = 0.9936$ D.W. = 1.9294 d.f. = 18

EXTRAPOLATIVE MODEL

$$\text{Log}(M1/P)_t = -0.84186 + 0.47141 \log (y/P)_{t-1} - 0.38893 \log [(y/P)_{t-1} - (y/P)_{t-2}] - 0.51220 \log r_{lt} + 0.44915 \log r_{Mlt}$$

(−1.3013) (1.9527)* (−18039)* (−5.2603)*** (2.7862)**

$$-0.80450 \log P_t + 0.73450 \log(M1/P)_{t-1}$$

(−1.7907)* (3.5280)***

$R^2 = 0.9916$ D.W. = 1.8355 d.f. = 17

ADAPTIVE MODEL

$$\text{Log}(M1/P)_t = -1.2182 + 0.54164 \log(y/P)_{t-1} - 0.53059 \log r_{lt} + 0.30626 \log r_{lt-1} + 0.548880 \log r_{Mlt-1}$$

(−1.3273) (1.8031)* (−5.5842)*** (2.2158)** (3.1158)*** (−1.0633)

$$-1.9325 \log P_t + 1.2997 \log P_{t-1} + 1.5170 \log(M1/P)_{t-2} - 0.91053 \log(M1/P)_{t-2}$$

(−3.3313)*** (2.1127)* (3.8006)*** (−2.8842)**

$R^2 = 0.9988$ D.W. = 2.3720 d.f. = 14

RATIONAL MODEL

$$\text{Log}(M1/P)_t = -1.4439 + 0.64455 \log E_{t-1}[(y/P)_t|\Omega_{t-1}] - 0.36294 \log r_{lt} + 0.44559 \log r_{Mlt} - 0.71700 \log P_t + 0.56623 \log(M1/P)_{t-1}$$

(−1.4703)** (3.0926)*** (−3.8278)*** (2.8355)** (−1.6577) (2.9538)***

$R^2 = 0.9938$ D.W. = 1.8393 d.f. = 17

Note: ***Statistically significant at the one percent level, **Statistically significant at the five percent level, *Statistically significant at the ten percent level. Figures in parentheses are 't-statistic'.

The regression results for the money stock M2 are presented in Table 2. The goodness of it for all regression equation are very satisfactory. And again in all cases, the rational expectation model is superior than the other three expectation models in terms of the significance of the variables and the correct signs of the estimated values of the parameters. The variables Y_{t-1} in the rational expectation model are significant at the ten percent level. Other expectation model are automatically rejected as the expected income is insignificant and showing wrong sign.

TABLE 2
Results Of The Coeffcients And Related Statistics For Money Balances, M2

COBWEB MODEL

$$\text{Log}(M2/P)_t = 0.41445 + 0.00441 \log(y/p)_{t-1} - 0.25578 \log r_R + 0.19173 \log r_{M2t} - 1.0781 \log P_t \; 0.95341 \log (M2/P)_{t-1}$$

(0.79616) (0.02026)** (−4.6239)*** (2.4373)** (−3.4300)** (6.4872)***

$R^2 = 0.9987$ D.W. = 2.0077   d.f. = 18

EXTRAPOLATIVE MODEL

$$\text{Log}(M2/P)_t = -0.52184 - 0.02816 \log (y/P)_{t-1} - 0.26765 \log [(y/P)_{t-1} - (y/P)_{t-2}] - 0.26012 \log r_R \; 0.15801 \log r_{M2t}$$

(0.91836) (0.11763) (−1.5398) (−4.4039)*** (1.8376)*

$$-0.85137 \log P_t + 0.98263 \log(M2/P)_{t-1}$$

(−2.2967)** (6.2166)***

$R^2 = 0.9979$ D.W. = 1.8719   d.f. = 17

ADAPTIVE MODEL

$$\text{Log}(M2/P)_t = 0.80725 - 0.11296 \log(y/P)_{t-1} + 0.21882 \log r_R - 0.11848 \log r_{R-1} + 0.27460 \log r_{M2t} - 0.08132 \log r_{M2t-1}$$

(−1.2333) (−0.41659) (−3.5238)*** (−1.4135) (2.7910)** (−0.69637)

$$-1.4075 \log P_t + 0.00055 \log P_{t-1} + 0.92233 \log(M2/P)_{t-1} - 0.11166 \log(M2/P)_{t-2}$$

$R^2 = 0.9981$ D.W. = 1.7424   d.f. = 14

RATIONAL MODEL

$$\text{Log}(M2/P)_t = -0.46184 + 0.34784 \log E_{t-1}[(y/P)_t|\Omega_{t-1}] - 0.22363 \log r_R \; 0.22213 \log r_{M2t} - 1.0190 \log P_t + 0.72109 \log(M2/P)_{t-1}$$

(−0.95495) (1.8564)* (−4.0120)*** (2.9624)*** (−3.4423)*** (5.5819)***

$R^2 = 0.9986$ D.W. = 1.8558   d.f. = 17

Note: ***Statistically significant at the one percent level, **Statistically significant at the five percent level, *Statistically significant at the ten percent level. Figures in parentheses are 't-statistic'.

Conclusion

It is no doubt that the fluctuation of the primary commodity prices affects the income of the developing countries, and Malaysia is no exception. Therefore, income will be uncertain, and subsequently, this will affect the behaviour of the public in holding real balances. Thus, the public will have to form their expectations about future income when decided to hold real balances.

In this study, four expectation processes are dealt with. And the results suggest that the public are rational in forming their expectations when they decided to hold real balances M1 and M2.

The result implies that, due to income variability, public behaviour in the demand for money are altered. Therefore, it is important that government to proceed for some stabilization policies for the primary commodity prices as this will affect the public holding for real balances.

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