# CURRENCY SUBSTITUTION AND MONEY DEMAND
# IN MALAYSIA

BY

## HAFIZ AHMED PATWARI

### ADVISOR
### DR. OMAR M. MARASHDEH
### DEPARTMENT OF ECONOMICS

## SUBMITTED TO THE GRADUATE COMMITTEE KULLIYYAH OF ECONOMICS AND MANAGEMENT INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ECONOMICS.

## JULY 1992

317678

14-5-94

t
HG
217
A3
M4
P322C

KULLIYYAH OF ECONOMICS & MANAGEMENT
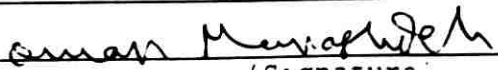MASTER OF ECONOMICS PROGRAMME

SUBMISSION OF THE MASTER OF ECONOMICS

RESEARCH PAPER

This is to certify that Bro./Sis ___HAFIZ AHMED PATWARI___
has written the Master of Economics research paper entitled:

CURRENCY SUBSTITUTION AND MONEY DEMAND IN MALAYSIA
_____

_____

_____

under my supervision. The relevant comments made on the paper
during its presentation have been incorporated in the present
version of the paper to my full satisfaction.

I have pleasure in recommending that the graduate committee may
approve the paper in partial fulfilment of the requirements for
the degree of Master of Economics.

Name of Supervisor : ___DR. OMAR MARASHDEH_____

Date: ___JULY 1992_____     _____
                                         (Signature)

# CURRENCY SUBSTITUTION AND MONEY DEMAND IN MALAYSIA

Hafiz Ahmad Patwari

I.I.U.

## Introduction

The demand for money is one of the critical variables that affect and determine the level of aggregate economic activity in the economy. Especially when the effectiveness of the monetary policy is underconsideration, the actual estimation of the demand function for money is an unavoidable task for economists.

Currency Substitution is usually defined as the phenomenon in which domestic residents substitute local money for the foreign one as they expects a decrease in the value of the local money, i.e., a depreciation of the local money. In the presence of such phenomenon there raises several economic issues- in particular, the implication of currency substitution for the design and effectivness of monetary, fiscal and exchange rate policies.

Several studies have investigated the existance and the effect of currency substitution on the demand for money. Previous studies were mostly concerned with the developed countries and some Latin American countries[1]. In contrast, such studies on developing countries have been very few[2]. Malaysia however, has not been studied yet.

The phenomenon of currency substitution arises when individuals' attempt to protect the value of their income and wealth[3]. Thus, currency substitution generally has taken place in the context of worsen economic and financial conditions that unfavourably affect the return on holdings of local currency as compared to foreign one. The presence of currency substitution has several implications for the conduct of domestic monetary policy. The substitute of foreign currencies for local ones leads to the ineffectiveness of monetary policy, reduces government revenue from seigniorange and weakens the effectiveness of exchange rate policy[4].

---------------------------------------------

1 See Cuddington (1983), Currency Substitution, Capital Mobility and Money Demand, Journal of International Money and Finance, No. 2, pg. 111-133.

2 See Bahmani and Malixi (1991), Exchange rate Sensitivity of the Demand for Money in Developing Countries, Applied Economics, 22, pg. 917-925.

3 El-Erian, M. A. (1988) Currency Substitution: Egypt and Y. A. R. pg. 87.

4 Ibid, pg. 88

## Existing Studies

Studies on developed and some Latin American countries which incorporated currency substitution hypothesis include, among others, Cuddington (1983), Miles (1978), Ramirez-Rojas (1985), and Bahmani-Oskooee and Pourheydarian(1990). While studies on developing countries include, among others, El-Erian, M. A. (1988) and Bahmani-Oskooee and Malixi, M. (1991).

Examining the problems that currency substitution might cause for the conduct of domestic monetary policy, Miles (1978) has argued that although a flexible exchange rate system allegedly insures a degree of monetary autonomy that is impossible under fixed exchange rate, the autonomy is lost in the presence of currency substitution[5].

Cuddington (1983) have presented a negetive conclusion about the importance of currency substitution both from the stand point of macro model building and the estimation of

---

5 Miles (1978), Currency Substitution, Flexible Exchange Rate and Monetary Independence, American Economic Review, Vol. 68, No. 3.

the money demand. In his study, an attempt is made to empirically isolate the separate effect of high capital mobility and currency substitution for five industrialized countries. The results bring into question the empirical as well as the theoretical relevence of currency substitution[6].

Matti Viren (1990) has presented some evidence of the importance of currency substitution and financial innovations for money demand. He showed that conventional money specifications which do not consider these cases are misspecified and presents unrealistic conclusion. His study also proves that, the specification problem is acute for narrow money. For broader money aggregates the importance of financial innovation and currency substitution diminishes[7].

Bahmani-Oskooee and Pourheydarian (1990) has found real effective exchange rate significantly affects the demand for real balances in Canada, United States, and Japan. On the theoretical analysis, they showed that the size of money spending multipliers are reduced when demand for money depends on the exchange rate.

---------------------------------------------------

6  Cuddington, J. T.(1983), op. cit. pg. 111-133.

7  Viren, M. (1990) currency substitution, Financial innovations and Money Demand: a note, Applied Economics, 22, pg. 1591-1596.

Arango and Nadiri (1981) have estimated demand function for four major industrialized countries[8], by taking into account foreign monetary development ( change in the exchange rate and foreign interest rate ). They concluded that if these factors are omitted the estimation points to significant misspecification biases in the traditional demand functions for real cash balances.

In investigating the impact of a change in real effective exchange rate on the LDCs' money demand Bahmani and Malixi (1991) has shown that the short-run effects of a depreciation could be in either direction but its long-run effects are negetive in most cases, indicating that in most LDCs, depreciation causes a decrease in the demand for domestic money[9].

In Malaysia, several studies have been made to estimate the money demand function, though none of these studies have incorporated the currency substitution hypothesis. Semudram (1981) and Yahya (1984), both have

------------------------------------------------

8 Four industrialized countries which were considered in this study are Canada, Germany, United States, United Kingdom.

9 Bahmani-Oskooee,M. and Malixi, M. (1991), op.cit. pg.1381.

reported the same conclusion, That is money demand (for M1 and M2) could be specified by the real income and interest rate. While Muzafar (1989) has concluded that Malaysian money demand is specified by real income, short term interest rate, inflation rate and own rate of money. In another separate study Muzafar (1990) has shown that, M3 in Malaysia is a function of income level, short term interest rate, inflation rate, rate of return on money, and previous level of money holdings. Roslan and Muzafar (1987) has reported that in the nominal specification, M3 in Malaysia is determined by income level and short-term interest rate but for the real specification only short-term interest rate determines the demand for M3. However, Yusoff (1988) has reported that interest rate is not an important determinant of the demand for money in Malaysia.

Objectives of the Study

The primary objective of this study is to estimate the demand for money in Malaysia (for narrowly defined money) over the period 1975QI - 1990QIV. And determine whether money demand in Malaysia is affected by the expectation about the price level and exchange rate. Specifically, we are testing the currency substitution hypothesis for Malaysian money demand function.

## The Model

Following Irving Fisher, we can write the equation of exchange as follows:

$$(1) \qquad MV = PY \quad ===> \quad M = PY / V$$

where Y = real income

M = money balance

P = price level

V = income velocity

Taking the log of equation (1) we can obtain

$$Lnm^* = Ln( PY ) - LnV$$

or (2) $\qquad Lnm^* = LnP + LnY - LnV$

where $m^*$ = desired real money balances.

Assuming velocity, V, to be constant, then the estimatable form of the equation (2) is

$$(3) \quad Lnm_t^* = F_o + F_1 \ LnY_t + F_2 \ LnP_t + U_t$$

where F 's are elasticities with respect to the given variable.

Now, to take account of the lag between actual and desired real money balances, the following adjustment machanism is applied:

$$(4) \quad lnm_t - lnm_{t-1} = f \ ( \ lnm_t^* - lnm_{t-1})$$

where f is the speed of adjustment coefficient, $0 < f < 1$.

Equation (4) implies that the adjustment in actual real money holdings that takes place at period t is a fraction, f, of the gap between the desired level at that period and the actual holdings at period t-1.

By substituting equation (4) into (3) we can derive equation (5) as,

$$(5) \quad Lnm_t = F_o + F_1 \ LnY_t + F_2 \ LnP_t +$$
$$F_3 \ Lnm_{t-1} + U_t$$

Since our primary objective is to estimate money demand function for Malaysia, inclusive of exchange rate, we introduce exchange rate variable in the equation (5) and re-write as

$$(6) \quad Lnm_t = F_0 + F_1 \ Ln \ Y_t + F_2 \ Ln \ P_t + F_3 \ Ln \ e_t + F_4 \ m_{t-1} + U_t$$

To see the devaluation effect in the money demand function , we need to take the expectation of exchange rate.[10] In addition actual prices are not known in advance, therefore the expected price will be used instead of actual price level. Thus our final equation will take the form

$$(7) \quad Lnm_t = F_0 + F_1 \ LnY_t + F_2 \ P_t + F_3 \ e_t + F_4 \ Lnm_{t-1} + U_t$$

we expect $F_1$, $F_4 > 0$ and $F_2$, $F_3 < 0$.

where    $m_t$ = real money balances (M1)

$Y_t$ = real income (GNP)

$P_t$ = expected price level

$e_t$ = expected exchange rate

$m_{t-1}$ = lagged money

-----------------------------------------------------

10  El-Erian, M. (1988), op. cit., pg. 88.

The expectation about price and exchange rate play important role in our money demand function. If people expect an appreciation in the value of local currency, the demand for domestic money will increase. On the contrary, if they expect any depreciation in the value of local currency, then the demand for money will decrease.[11]

To estimate the money demand function outlined in equation (7), first we need to formulate the expectation values for price and exchange rate.

In formulating the expectations about price and exchange rate, we assume that respective agents form their expectation rationally, that is , they utilize all available past information about both price and exchange rate. We assume that the price and exchange rate follow the joint autoregressive model:[12]

$$(8) \quad LnP_t = a_0 + a_1 \; P_{t-1} + b_1 \; e_{t-1} + V_t 1$$

-----------------------------------------------------

11 For further explaination see, Bahmani and Pourheydarian (1990) Exchange rate Sensitivity of the Demand for Money and Effectiveness of Fiscal and Monetory Policies, Applied Economics, 22, pg. 917-925.

12 A similar model was used to form expectation about inflation and exchange rate in an unpublished reasearch work by Marashdeh, Omar (1990) Currency Substitution and Money Demand in Jordan.

(9)     $Lne_t = b_0 + c_1\ e_{t-1} + d_1\ P_{t-1} + V_t 2$

where     $P_{t-1}$  is actual domestic price level at period t-i

        $e_{t-1}$  is actual exchange rate at period t-i

        $V_t 1$  and $V_t 2$  are error terms.


An estimate of the  expected price and expected  exchange rate  is then obtained  by subtracting the  residuals from $P_t$  and $e_t$  as follows:


$$LnP_t = E(\ LnP_t\ ) + V_t 1$$

==>     $E(\ LnP_t\ ) = LnP_t - V_t 1 = P_t$


and     $$Lne_t = E(\ Lne_t\ ) + V_t 2$$

==>     $E(\ Lne_t\ ) = Lne_t - V_t 2 = e_t$



where     $P_t$     is  expected price

        $e_t$     is expected exchange rate



Data and Estimation Procedures

Real money balance is defined as narrow money demand
(M1). Income is real gross national income (GNP). Price is
the consumer price index (CPI). Exchange rate is multi-
lateral weighted effective exchange rate , defined as number
of units of local currency (Ringgit) per unit of foreign
currency.[13]

Data for M1, GNP, and CPI are obtained from various
issues of the Quarterly Economic Bulletins published by Bank
Negara. Exchange rate of Malaysian ringgit are obtained
from various issues of the International Financial
Statistics of the IMF.

In the estimation procedures, first equation (8) and
(9) will be estimated by regressing $P_t$ and $e_t$ on a con-
stant, and 8 lags of price and exchange rate. These
estimated equations will then be used to generate values for
expected price and expected exchange rate.

Second, equation (7) will be estimated by Ordinary
Least Square (OLS) techniques to get an estimate of
parameters.

-----------------------------------------------------

13 Beng, G. W. (1991) calculated the weights for the multi-
lateral merchandise trade flows ( imports and exports ) of
Malaysia's 15 leading trading partners. We have chosen
weights for 5 trading partners and re-adjusted for our
study. The multilateral weights assigned to these countries
are, United States 0.464, Singapore 0.037, United Kingdom
0.196, Japan 0.251, and Australia 0.053.

Finally, a chow test for structural change will be used to test the stability of the estimated money demand function.

## Empirical Results

The money demand function outlined by Equation 7 is estimated for Malaysia, using quarterly data over the period 1975I - 1990IV. The results of a stepwise regressions for price and exchange rate are presented in Table 1.

It is found that seventh and eighth lag of exchange rate and first, fourth, and fifth lag of price are significant in explaining price level. On the other hand, first, second, and third lag of exchange rate are significant in explaining exchange rate level.

## Table 1

**Stepwise Regression of the Price and Exchange Rate Equations (equation 8 and 9): 1975I - 1990IV.**

| Dependent variable\ Explanatory variable | lag | $P_t$ | lag | $e_t$ |
|---|---|---|---|---|
| Intercept | | 0.2872 (3.510) | . | 0.4762 (5.3421) |
| $e_t$ | 7 | 0.03716 (1.728)* | 1 | 1.2072 (8.992)*** |
| | 8 | -0.05729 (-2.541)** | 2 | - 0.45912 (-2.137)** |
| | | | 3 | 0.24733 (1.631)* |
| $P_t$ | 1 | 0.81155 (11.801)*** | | |
| | 4 | 0.7403 (10.432)*** | | |
| | 5 | -0.5971 (-7.472)*** | | |
| Adjusted R-square | | 0.9958 | | 0.9993 |
| Standard Error | | 0.00465 | | 0.34800 |
| F Values | | 2639.898 | | 28023.262 |

Pr.(joint significance)     (0.001)                (0.001)

-------------------------------------------------------------

numbers in brackets are t-ratios.

\*     - significant at 10% significance level.

\*\*    - significant at   5% significance level.

\*\*\* - significant at   1% significance level.


       Results   presented in table   1 is   used to   generate values for expected price and expected exchange rate.   These generated values are used in the main equation (equation 7), to estimate the money demand function for Malaysia.


       Regression results for   equation 7 are presented   in Table 2.    Table 2 shows that an overall fit of the estimated equation is good as indicated by adjusted R-square   (0.9920) and standard error of the estimate (0.043328), implies   that more than 90   % of the variation   in real money balances   is explained by the explanatory variables.   Durbin-h test   (D-h = 0.700), shows that there is no first order autocorrelation present.


       The results presented in table 2 indicated that,   for M1, the   Malaysian money balance is   a function of real   income,   expected price   level,   expected exchange   rate   and lagged   money.    The   income   elasticity   is   positive   and statistically significant at   1% significance   level.    This implies that the higher   real income, the higher demand   for money.

The expected price level is statistically significant but does not show the anticipated sign. The elasticity of expected price variable show a positive sign. This reveals that the higher the inflationary presure or as people expects higher price they will demand more money to finance their needs.

In the behavioral assumption the relationship between money and price expectation is explained as negetive, which is supported by the fact that usually with a high inflation expectation people shifts their money demand to assets. However, in Malaysia, the inflation level has been very low compared to the rest of the world. This makes the people to have confident and not to worry about the price fluxtuations. Therefore, with a low raise in the price level people still mantain their demand for money rather than shifting to assets.

The expected exchange rate yields a negetive sign and statistically significant at 1% significance level. This indicates that when people expects a decrease in the value of Ringgit, they demand less of it and more of foreign currency. Thus this is an indication of some degree of substitutability between the domestic currency and foreign currencies. Therefore, the result here supports the currency hypothesis for Malaysia.

The variable $M_{t-1}$, lagged money holdings, is highly significant and positively related to the demand for money. That is, if last year's money holdings were high as compared to this year then the demand for money for next year will be high.

## Table 2

Coefficient Estimates of the Malaysian Money Demand Equation: 1975I - 1990IV.

| Explanatory Variable | Coefficient | T-Values |
|---|---|---|
| Intercept | 1.4245 | 2.6830*** |
| Real Income | 0.68697 | 12.634*** |
| Expected price | 0.021925 | 3.6532*** |
| Expected exchange rate | -0.023130 | -2.6969*** |
| Lagged money | 0.000282 | 6.6025*** |

| | |
|---|---|
| Adjusted R-square | 0.9920 |
| Standard Error | 0.043328 |
| Durbin - h | 0.7000 |

Joint significance of
the independent variables : $F(4,56) = 3102.55$

Chow-test : $F(5,56) = 3.27$

$F_{0.01}(5,56) = 3.51$

*** significant at 1% significance level.

Since some previous studies reported short-term inter-
est rate as one of the determinants of the demand for money
in Malaysia, we have tested the effectiveness of the vari-
able by incorporating it into our model. We have sub-
stituted the price variable with interest rate. The results
are presented in Appendix Table 1.

Appendix Table 1 shows that the overall fit of the
estimation is good, which is shown by adjusted R-square =
0.9905 and standard error = 0.047158. The durbin-h test =
-0.608 indicates that there is no first-order autocorrela-
tion present.

It is evident in the appendix table 1 that, all ex-
planatory variables exhibit the anticipated sign. The
short-term interest rate (3 month treasury bill) is found to
be not significant at 10% singnificance level. However,
real income and lagged money are significant at 1% sig-
nificance level, while expected exchange rate is significant
at 10% significance level.

A correct specification of money demand function does
not necessarily mean that it is stable over time and vice
versa. Any money demand function could be subject to struc-
tural change due to a supply shock[14](Bahmani-Oskcoee and

Malixi,1991).

In order to test for the stability of the Malaysian money demand function, we employ the Chow-test[14]. To performe a Chow-test, we need to devide our sample into subdivisions. We decided to choose 1983IV as the breaking point in order to subdivide the sample period into two equal halves.

The F-statistics is $F(5,56) = 3.27$, while 1% critical value is $F_{0.01}(5,56) = 3.34$. Thus the hypothesis of instability is rejected, indicating that the estimated narrow money demand function is stable over the period 1975I - 1990IV.

## Summary and Conclusion

The primary objective of this study was to estimate the Malaysian money demand (narrowly defined) over the period 1975I - 1990IV and to identify wether expected exchange rate has any influence on the demand for money in

-------------------------------------------------

14  Bahmani-Oskooee and Malixi, (1991), op. cit., pg.1381.
15  Gujarati, D. N. (1988), op. cit. pg. 443-445.

Malaysia.

The estimated domestic money demand has been found
stable over the period considered. Beside income, expected
price, and lagged money holdings, expectation about the
exchange rate has been identified as another important
determinant of the demand for money in Malaysia. Thus the
findings support the currency substitution hypothesis for
Malaysia. Therefore, by omitting the variable from the
model we will creat significant misspecification biases in
the traditional demand functions for real cash balances.

The presence of currency substitution implies that
domestic residents' holdings of domestic money are dependent
on expected change in the exchange rates. That is, an ex-
pected change in the exchange rate would induce domestic
residents to substitute foreign money for domestic money.
The presence of currency substitution indicates that the
monetary authority has less control over domestic liquidity
and should be concerned with foreign money holdings in for-
mulating its policies.

A positive relationship between money demand and ex-
pected price has a fovourable policy implication. That is,
if the government uses a policy of inflationary finance, as
our findings suggests, the residents may not reduce their
holdings of domestic money balance but rather increases to