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The Demand For Money in a Developing Economy:

Evidence for Six Asian Countries

by

Syed Sajjadur Rahman, B.A.(Honours), M.A., M.A.

A thesis submitted to

the Faculty of Graduate Studies and Research

in partial fulfilment of

the requirements for the degree of

Doctor of Philosophy

Department of Economics

Carleton University

Ottawa, Ontario

15 April, 1985

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Syed Sajjadur Rahman, B.A., M.A., M.A.
in partial fulfilment of the requirements
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Abstract

This thesis examines the determinants of the demand for money in six Asian developing countries - India, Malaysia, Thailand, Indonesia, (South) Korea and the Philippines. In particular it analyses whether the demand for money in these countries is significantly affected by considerations of rates of return from foreign assets. A secondary concern is to examine the empirical measurement of opportunity costs of holding domestic assets in these countries.

In suggesting that foreign return variables may be significant in the demand for money functions, this thesis questions the traditional 'closed' formulation of the demand for money in these countries. It argues that in these countries: (1) there is considerable evidence to suggest that integration with external asset markets is more widespread than previously thought, (2) conditions in the domestic financial assets markets create additional incentives to hold wealth in terms of foreign assets.

Estimation of an 'open economy' demand for money function for the six Asian countries suggest that foreign interest rates have a significant impact on the demand for money in the low inflation countries - India, Malaysia and Thailand. This result is robust over (almost) all alternative specification of the demand for money in these countries. None of the foreign return variables were significant explanatory variables in the high inflation countries - Indonesia, Korea and the Philippines.

The thesis also examines the empirical measurements of domestic opportunity cost variables in these countries. In the absence of a meaningful domestic nominal interest rate variable (with the exception of Korea), expectations of domestic inflation rates was used as a proxy measure. Of the two alternative measures of inflationary expectations, the autoregressive

measure served as a significant opportunity cost variable for Thailand, Korea and the Philippines. It was not found to be as good a measure in low inflation countries such as India and Malaysia as well as in Indonesia - the country exhibiting the highest inflation rate. The full information rational expectations measure was a significant explanatory variable in Indonesia. In the Korean case, domestic nominal interest rates served as a significant opportunity cost variable.

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My wife, Shirin, displayed truly remarkable patience as she suffered through lengthy periods of procrastination. My son, Sasha, held his peace as his father plodded through yet another draft.

Finally, I dedicate this thesis to my parents whose dreams made it all possible.

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CHAPTER I

INTRODUCTION

Empirical studies of the demand for money have traditionally emphasized the role of domestic variables in the formulation and estimation of the demand for money function. In these studies, the principal determinants of the demand for money are specified as domestic income (as a measure of the wealth constraint) and one or more domestic interest rates (as measures of opportunity cost of holding money) (Laidler, 1977; Feige and Peare, 1977; Judd and Scadding, 1982).

Specifying the demand for money in terms of the domestic variables alone, however, represents a special case of the general demand for money formulation in an open economy. Monetary theory (Friedman, 1956; Laidler, 1977) suggests that the demand for money will be determined by a scale variable and the opportunity cost of holding money relative to all alternative (substitute) assets. If the economy is open, alternative assets would include both domestic and foreign assets. The demand for money would then be a function of the opportunity costs of holding money relative to foreign as well as domestic assets.

While considerable research has been undertaken to examine the 'openness' of the demand for money functions for the developed economies (e.g., Hamburger, 1977; Arango and Nadiri, 1981; Brittain, 1981; Bordo and Choudhri, 1982; Cuddington, 1982), research on this aspect of the demand for money is virtually non-existent for the developing countries. Researchers have viewed the existence of official restrictions on capital flows and regulations on foreign transactions in the developing countries as evidence of the absence of interlinkage between domestic and foreign asset markets. This assumption has led to the treatment of these economies as closed, especiall

with regard to the asset markets. The demand for money could thus be said to depend on returns from only domestic assets as well as the domestic income variable.

This thesis examines the significance of foreign variables in the demand for money functions of a number of Asian developing countries. In doing so, we are implicitly challenging the traditional closed formulation of the demand for money function used for these countries.

To examine the hypothesis that foreign influences significantly affect the demand for money in Asian developing countries, we formulate an extended version of the demand for money function. This formulation suggests that in addition to returns on alternative domestic assets, the returns on two alternative foreign assets - foreign money and foreign bonds - be included in the domestic demand for money. This function is then estimated for six Asian countries - India, Indonesia, (South) Korea, Malaysia, Philippines and Thailand. These countries were chosen to represent a wide array of Asian country experiences. In our sample India, Malaysia and Thailand represent the low-inflation countries and Indonesia, Korea and the Philippines represent the high-inflation countries.

Our findings suggest that foreign variables, in particular foreign interest rates, have a significant impact on the demand for money in the low-inflation countries, i.e., in India, Malaysia and Thailand. Particularly surprising was this result for India. On a priori grounds, India had appeared to be the least 'open' economy. These results suggest that while capital market restrictions are indeed present, domestic residents are able to evade these restrictions and substitute between domestic and foreign assets. Supporting evidence for this exists in the nature of extra-legal transactions in foreign currencies that are frequently undertaken by residents of these countries.

An alternative explanation of the finding that foreign return variables are significant in the demand for money function of a number of Asian developing countries may be suggested by examining the characteristics of the financial markets in these countries. The shallowness of these markets and controls on the returns on the few available domestic assets mean that the reported interest rate series may not be meaningful, i.e., they may not represent the relevant domestic alternatives. If external linkages exist, the foreign return variables may serve as a proxy measure for the relevant returns on domestic financial assets.

The general formulation adopted in this thesis also permits a closer examination of the traditional way that the returns on domestic assets have been incorporated in the money demand functions of developing countries. The absence of a meaningful interest rate series have led economists to ignore domestic financial assets and to regard domestic physical assets as the only relevant domestic alternatives to holding money. The return from holding domestic physical assets consists of two components - the real return from these assets and the expected domestic inflation rate. Because the data on real returns are not easily available, the latter component - expected domestic inflation rate - is often used as a proxy for the return variable.¹ This procedure raises two problems. First, if variation in real interest rate is large relative to the variation in the expected inflation rate, expected rates of inflation will not serve as a good proxy for the total yield variable. This is more likely to be the case in countries where inflation rates are low and do not change much. Second, most studies have tended to use adaptive expectations process to generate expected inflation rates. Recent theoretical considerations have suggested that rational individuals may use more information in generating expectations

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than is implied by the above learning process. In our empirical work then, two alternative expectation formation processes were used. One of these formulations allowed for the use of more information than simply the past values of the variable for whom expectations are formed. The other process used an autoregressive procedure to derive expectations.

The autoregressive formulation of the expected rate of domestic inflation was found to serve as a good measure of domestic opportunity costs in Korea, the Philippines and Thailand. It was not found to be as good a measure in India, Malaysia as well as in Indonesia. For India and Malaysia which are relatively low inflation countries, this result may be due to the fact that changes in real rates (in total changes of domestic yields) may be more important than previously thought.

The use of additional variables in forming expectations of inflation was found to improve the significance of expected inflation rates as a determinant of the demand for money in Indonesia - a country exhibiting consistently high inflation rates. This suggests that individuals in Indonesia use more information than simply that derived from past observations of inflation rates in estimating expected returns.

The organisation of this thesis is as follows. Chapter II briefly reviews the existing demand for money literature for the developing and the developed economies. It then specifies an 'open' economy demand for money function for the Asian developing economies.

Chapter III reviews some relevant features of the asset markets in the Asian developing economies. In particular, evidence on the nature and extent of extra-legal linkages in the foreign exchange markets are presented.

Chapter IV discusses the empirical issues involved in estimating the demand for money functions developed in Chapter II. Particular attention is

paid to the formulation of expectations about inflation rate and exchange rate changes.

Chapter V presents the results of econometric estimations of money demand equations in selected Asian countries.

Finally, Chapter VI states the conclusions of this study and outlines scope for further research.

Footnotes to Chapter I

- 1.. Almost all studies of the demand for money for developing countries have taken this argument as their starting point. Some examples of these studies are Vogel (1974) for Latin American countries; Harburger (1963) and Deaver (1970) for Chile; Diz (1970) for Argentina; Campbell (1970) for Brazil and Korea; Hu (1971) for Taiwan; Adekunle (1968) for a group of developing countries; Aghevli et al. (1979) and Khan (1980) for a group of Asian Countries. Alternative formulations have specifically taken into account the constraints implied by fixed nominal interest rates (Wong, 1979) or have regarded the demand for money as being primarily determined by the demand for credit (Bruno, 1979; Taylor, 1979). One issue of particular interest has been the suggestion by McKinnon (1973) that there might exist (over a certain range) a complementarity between the opportunity cost variable and the demand for money. This arises because of the necessity of self-financing of investment as a result of repressed or underdeveloped financial markets. Evidence on this aspect has not been conclusive (Coats and Khatkhate, 1980).

CHAPTER II

THE DEMAND FOR MONEY IN THE DEVELOPED AND THE DEVELOPING COUNTRIES

The demand for money is one of the most important and frequently studied relationships in the economic literature. Following the general theoretic analysis of such economists as Friedman (1956) and Laidler (1977), a broad consensus exists in the literature that the demand for money is a stable function of the opportunity costs of holding money and a scale variable. In its most general form, the demand for money can be written as:

$$(1) \quad m_d = L(x, I), \quad L_x > 0, \quad L_I < 0.$$

where $m_d = \frac{M_d}{P}$ represents the demand for real balances. M_d is the demand for nominal money stock, P is a measure of aggregate prices, x is a scale variable and I , a vector representing the opportunity cost of holding money. $L_j (j = x, I)$ is the partial derivative of the demand for money with respect to the j^{th} variable. An increase in the scale variable is assumed to increase the demand for money while an increase in the opportunity cost reduces the demand. Formulations such as (1) are consistent with various alternative theoretical derivations of the demand for money such as the quantity theory, portfolio choice and inventory theoretic models.

While the general form of the demand for money is well established there is less agreement on which particular variables should be included in the opportunity cost vector I in a demand for money function used for economic policy analysis and/or as part of an econometric model. Empirical studies have explored the choice of variables that most closely approximate the opportunity costs of holding money, as well as attempted to answer such questions as the appropriate definition of the monetary aggregate (narrow or broad), the appropriate measure of the scale variable (current or permanent

real income or a measure of wealth) and the stability of the functions over time.

Opportunity Costs and the Formulation of the Demand for Money Functions:

The formulation of the demand for money function depends crucially on the specification of the vector of opportunity costs (I). The choice of the vector I in turn depends on what assets are considered the relevant alternatives (substitutes) to holding money. If the economy is open, these alternatives would include both domestic and foreign assets. The demand for money would then be a function of the return on foreign as well as domestic assets.

For simplicity, we shall divide the domestic alternative assets into two groups: interest bearing domestic financial assets (represented by one-period domestic bonds) and domestic physical assets. Also, we shall assume that the only relevant foreign alternatives are foreign money and foreign bonds. Given these alternatives, the substitution possibilities available to domestic money holders are: (i) domestic bond substitution (between domestic bond and domestic money), (ii) domestic physical asset substitution (between domestic physical assets and domestic money), (iii) foreign bond substitution (between foreign bonds and domestic money) and, (iv) currency substitution (between foreign money and domestic money). The rate of return from holding domestic bonds is i_d , the domestic nominal interest rate while the expected rate of return from holding domestic physical assets is $(r + \pi_d)$, where r is the real rate of interest and π_d is the expected domestic rate of inflation. The expected rate of return from holding foreign bonds in terms of domestic currency is $(i_f + e)$, where i_f is the foreign nominal interest rate and e is the expected rate of depreciation of the

exchange rate.¹ Assuming that no interest is paid on foreign money balances, the rate of return from holding foreign money would simply equal e .² Assuming also that no interest is paid on domestic money balances, then, these returns are the opportunity costs of holding domestic money.

Assuming a semi-logarithmic form,³ the demand for money in an open economy can be specified as:

$$(2) \log m_d = a_0 + a_1 \log y_d + a_2 i_d + a_3 (r + \pi_d) + a_4 (i_f + c) + a_5 e,$$

$$a_1 > 0; a_2, a_3, a_4, a_5 < 0.$$

where $y_d = \frac{Y_d}{P}$ and Y_d is the domestic nominal income. The elasticity of the demand for money with respect to income, a_1 , is predicted to be positive and a_2, a_3, a_4, a_5 are expected to be negative. a_4 provides a measure of foreign bond substitution. The possibility that currency substitution exists can be tested by examining whether a_5 is significantly negative.

While (2) represents the general demand for money function in open economies, several variants have been discussed in the literature. Section I presents a brief review of the alternative formulations of the demand for money in the developed countries. Section II, then, examines the existing literature on the demand for money functions for the developing countries and develops an open economy demand for money function for these countries.

I. Demand for Money Formulations in the Developed Countries

This section reviews the demand for money literature in the developed countries. Such a discussion is necessary to place in context the demand for money formulations used in studies addressing the ~~developing~~ countries.

a. Closed economy formulations:

Traditionally, the demand for money function has been specified in terms of the domestic variables alone. When only domestic assets are considered, the demand for money can be reduced to

$$(3) \log m_d = b_0 + b_1 \log y_d + b_2 i_d + b_3 (r + \pi_d); \quad b_1 > 0; b_2, b_3 < 0.$$

For (3) to represent the demand for money in an open economy, special assumptions need to be made regarding the substitution conditions between domestic and foreign assets. If domestic bonds are perfect substitutes for foreign bonds, i.e., perfect capital mobility exists, then the returns from the two assets will be identical, $i_d = i_f + e$. Either i_d or $(i_f + e)$ may then serve as the opportunity cost of holding domestic money relative to domestic and foreign bonds. Alternatively, if there is no capital mobility, the return from holding foreign bonds will not be a relevant opportunity cost variable in the domestic demand for money. If there is no currency substitution, the returns on holding foreign money can also be ignored.⁴ Thus, (3) becomes an appropriate specification of the demand for money in an open economy when one of the two following conditions are met,

- i. Perfect substitutability between domestic and foreign bonds, and no substitutability between the domestic and foreign currency;
- ii. No substitutability between domestic and foreign assets as well as the domestic and foreign currency.

If either (i) or (ii) holds, little is lost empirically by omitting the foreign return variables from the demand for money functions.

In the developed countries, it is generally assumed that capital markets are closely interlinked and that there is a high degree of correlation between returns on comparable assets denominated in different currencies.⁵ The presence of well developed domestic capital markets ensures that similar movements in the return from different groups of assets within the domestic economy will also occur. Thus in specifying the demand for money, researchers have generally used a single rate of return for domestic assets.

Assuming that $i_d = r + \pi_d$, the demand for money within developed countries can be simplified to,⁶

$$(4) \log m_d = C_0 + C_1 \log y_d + C_2 i_d; \quad C_1 > 0, C_2 < 0.$$

Generally, the predicted values of C_1 (positive) and C_2 (negative) have been verified by empirical findings.

b. Open economy formulations:

More recent formulations of the demand for money have argued that when economies are open, the opportunity cost vector should contain both domestic and foreign return variables. The underlying premise is that, substitution possibilities between domestic and foreign assets will lie between zero and infinity. Following arguments presented in Section I(a), the return on the foreign bonds will be a relevant opportunity cost to holding domestic money when imperfect capital mobility exists. The return of holding foreign money will become a relevant opportunity cost when there is substitution between the domestic and the foreign currency. When both of

these conditions hold, the open economy demand for money function for the developed country becomes,

$$(5) \quad \log m_d = d_0 + d_1 \log y_d + d_2 i_d + d_3 (i_f + e) + d_4 e,$$

$$d_1 > 0; d_2, d_3, d_4 < 0.$$

In contrast to (4) the vector of opportunity cost now includes the returns from foreign assets. As in (2), a rise in $(i_f + e)$ or e is predicted to reduce the demand for domestic money.

The inclusion of foreign variables in the demand for money of developed countries has been generally discussed under the framework of portfolio balance models.⁷ Two types of portfolio balance models are generally seen in the literature. According to the standard portfolio balance models (Branson, 1976; Girton and Henderson, 1976, among others), domestic residents allocate their wealth among domestic money, domestic bonds and foreign bonds. The various monies are treated as non-traded assets. Emphasis is therefore placed on foreign bond substitution as well as direct substitution between domestic and foreign bonds (i.e., capital mobility). The money demand function applicable to this case becomes a special subcase to (5) above, i.e.,

$$(6) \quad \log m_d = g_0 + g_1 \log y_d + g_2 i_d + g_3 (i_f + e); \quad g_1 > 0; g_2, g_3 < 0.$$

In the presence of perfect capital mobility, i_d is equal to $i_f + e$ and the demand for money function becomes the same as in (4). (4) is also applicable when a situation of no capital mobility is present. In the case of imperfect capital mobility, returns from foreign bonds and domestic bonds will be different and (6) becomes the relevant money demand formulation.

More recent models have considered the direct substitution possibilities

between domestic and foreign money (Bordo and Choudhri, 1982; McKinnon, 1982; Brittain, 1981; Miles, 1978). The presence of currency substitution alone would imply that the expected rate of return on foreign money, e , would be a significant determinant of the demand for domestic money, implying an equation of the form,

$$(7) \log m_d = h_0 + h_1 \log y_d + h_2 i_d + h_3 e, \quad h_1 > 0; h_2, h_3 < 0.$$

Equations (6) and (7) then represent special cases of the general formulation of the demand for money as expressed in (2) or (5).

Empirical studies considering the role of foreign variables in the demand for money are fairly recent and have used either equation (6) or equation (7) to examine the evidence.⁸ The results do not provide a clear cut answer. Miles (1978) claims to have found significant the presence of currency substitution between Canada and the United States. Claiming that Miles' formulation is misspecified, Bordo and Choudhri (1982) reestimate the Canada-United States case to find no evidence of currency substitution. Brittain (1981) in examining the evidence for U.K. finds no significant portfolio substitution as does Salemi (1980) in examining the case for Germany in the 1930s. Arango and Nadiri (1981) examining a group of developed countries and Hamburger (1977) examining the situation in Germany and U.K. find significant the effect of foreign variables in the demand for money. Thus the evidence for developed countries appears to be mixed.

On a priori grounds, there is no reason why both foreign money and foreign bonds may not be substitutes for domestic money simultaneously. Equation (6) assumes for example that there is no currency substitution - the coefficient for e is equal to zero. Similarly equation (7) assumes either no capital mobility or perfect capital mobility. Because these

formulations are polar cases, such situations are not likely to arise in the real world. Rather than arbitrarily imposing restrictions, empirical testing should then be conducted by including all the return variables at the same time. In doing so, the omitted variable bias - misspecification of a regression equation due to the absence of a relevant explanatory variable-is guarded against (Cuddington, 1983). Another point raised by Cuddington (1983) questions whether the statistical significance of e in (7) is in itself a valid test for the presence of currency substitution. A change in e will affect the return on foreign bonds (which reflects the presence of foreign bond and capital mobility) and the return on foreign money (i.e., currency substitution per se). Distinguishing between the two effects requires more information than is provided by (7). In effect we must ask whether e affects money demand directly rather than just through $(1_f + e)$. The most straightforward way of doing this would be to estimate equations such as (2) or (5). This will allow us to distinguish between the effects on money demand of foreign bond substitution and currency substitution. The former would be reflected in $b_3 < 0$ in (2) and $d_3 < 0$ in (5) and the latter by $b_4 < 0$ in (2) and $d_4 < 0$ in (5). Either effect would cause e to enter with a significant negative effect in a money demand equation.

While the empirical evidence is mixed, the policy implications of this research are substantive. Whether or not foreign variables affect the demand for money has direct implications for the insulation properties of open economies. In standard models where the demand for money is assumed to be inelastic with respect to changes in the foreign return variables, a flexible exchange regime in the presence of perfect capital mobility insulates the domestic economy from external shocks such as a change in foreign

income and prices (Mussa, 1979). However, if the demand for money responds significantly to e and/or $(i_f + e)$, flexible exchange rates will no longer insulate the domestic economy from external price or income shocks (Saidi, 1980; Rahman and Zandi, 1984). Also, a significant impact of foreign asset returns on the demand for money will undermine the ability of flexible exchange rates to provide for the independence of domestic monetary policy (Booth, Clinton et al., 1985).

II. Formulations of demand for Money Functions in Developing Countries

Research on the demand for money in developing countries has tended to follow the traditional specifications of demand for money (in terms of domestic variables alone). Researchers have viewed the existence of official restrictions on capital flows and regulations on foreign exchange transactions as evidence of the absence of interlinkages between domestic and foreign asset markets. The domestic capital markets in these countries are relatively undeveloped and are usually marked by an absence of alternative financial assets. Also, the presence of administratively fixed nominal interest rates has meant that domestic interest rates display very little variation over time. These conditions combine to make it exceedingly difficult to detect any systematic relationship between domestic money and domestic interest rates (Khan, 1980). These researchers then generally regarded domestic physical assets or durable goods to be the only relevant alternative. The demand for money function commonly proposed for the developing countries is,

$$(8) \log m_d = \alpha_0 + \alpha_1 \log y_d + \alpha_2 (r + \pi_d); \quad \alpha_1 > 0; \alpha_2 < 0.$$

Citing absence of data on the real rate of return, r , empirical studies have

generally used π_d , only, to measure the opportunity cost variable.

a. Open economy demand for money formulations in Developing Countries

Research on the role of foreign variables in the demand for money for developing economies is virtually non-existent.⁹ As discussed earlier, the pressure of official controls on capital flows and foreign exchange transactions have led researchers to assume that these economies can be regarded as closed, at least, for asset transactions.

Yet, there is considerable empirical evidence¹⁰ to suggest that alternatives to official foreign exchange markets have developed and integration with external asset markets is more widespread than previously thought. This evidence is in the nature of the types of extra-legal transactions in foreign currency that are frequently undertaken by residents of these countries. Practices of underinvoicing exports, overinvoicing imports and the existence of a black market for foreign exchange are examples of such channels. The presence of these channels (discussed more fully in Ch. III) imply that transactions in assets denominated in foreign currencies do take place in these countries. Whether these transactions are substantial enough to produce a significant impact on the demand for money in these countries is an empirical question.

On a priori grounds, several reasons may be suggested for why foreign variables may have particular significance for the demand for money function in developing countries. First, domestic residents within the developing economies can be expected to have the same portfolio diversification motivation as is assumed to be the case in the developed economies. For this reason, domestic residents may demand foreign assets as part of their portfolio decision. In addition, it can be argued that conditions in

the domestic financial markets strengthen this motivation for holding foreign assets. By and large, financial markets in these countries are shallow with few alternative assets to money. The nominal returns on the few financial assets that are available are subject to official controls that may often result in these assets having a zero or negative real return (Fry, 1980). Such restrictions typically result in what is sometimes called a financially repressed economy and create an increased incentive for domestic residents to hold their wealth in the form of foreign assets (Shaw, 1973).

The developing countries have also typically followed a policy of fixed exchange rates, where domestic currency is significantly overvalued.¹¹ Maintaining these rates over an extended time period has proved difficult for most of these countries as witnessed by frequent and significant devaluations of their currencies.¹² Discontinuous devaluations lead to perceived capital losses on domestic money balances by reducing their purchasing power in the world markets. Individuals are then led to an attempt to hold money in different currency denominations in such a way so as to capitalize on the possibility of windfall gains arising from periodic devaluations. This incentive to speculate will apply not only to non-interest bearing money but also to interest bearing deposits and non-monies.

Finally, the existence of controls on the returns of domestic financial assets means that the reported interest rate series may not represent the actual returns that can be earned by holding domestic financial assets. This is suggested by the empirical evidence of such economists as Wai (1957, 1977) who finds the presence of substantial financial transactions in markets that lie outside the official asset markets.¹³ Because these returns are

unobservable at the aggregate level, foreign returns may stand as their proxy in the domestic demand for money functions.

All these conditions rely upon the existence of interlinkages between the domestic and the foreign asset markets. If foreign bond substitution and/or currency substitution is important, markets must exist through which asset transactions denominated in foreign currencies can take place. If foreign return variables serve as proxies for domestic returns, there must be enough intermediation (arbitrage) between the domestic and foreign asset markets so that changes in the foreign rates of return are reflected in domestic rate changes, i.e., there exists a class of assets whose returns are closely linked with the foreign return variable.

b. Formulation of an open economy demand for money function for developing economies

To test the hypothesis that the demand for money in these countries will respond to changes in foreign variables, the domestic money demand specification described in (2) will be utilised. To modify the general form in (2) to suit the characteristics of the Asian developing economies, the following assumptions are made:

(i) Only domestic residents are assumed to hold domestic money. Foreign residents may use but do not hold domestic money.

This assumption allows the total demand for domestic money to be determined by domestic residents only.¹⁴

(ii) Domestic and foreign assets are assumed to be less than perfect substitutes. This can be rationalized on the basis of the controls on capital flows and foreign exchange markets in these countries.

(iii) The foreign interest rate, i_f , is treated as exogenous, i.e.,

changes in the demand for foreign bonds on the part of the domestic residents do not affect i_f .

(iv) While the official exchange rates are assumed to be administratively determined, exchange rates in the extra-legal markets, such as the black market for foreign exchange, are assumed to be relatively free to vary.

In specifying the variables used to represent the opportunity costs of holding domestic money, we take into account the existence of controls on the domestic financial markets. This suggests that the reported domestic interest rate series (i_d) may not serve as a meaningful measure of the opportunity costs of domestic financial assets. When this is the case, the nominal return on domestic physical assets, $(r+\pi_d)$, will be the only potential domestic opportunity cost variable. Two foreign opportunity cost variables are considered - the rate of return on holding foreign bonds, (i_f+e) , and the return on holding foreign currency, e . It follows that when these variables are combined with a measure of domestic income, the form of the demand for money relevant for Asian developing economies is,

$$(9) \quad \log m_d = \beta_0 + \beta_1 \log y_d + \beta_2(r+\pi_d) + \beta_3(i_f+e) + \beta_4 e;$$

$$\beta_1 > 0; \beta_2, \beta_3, \beta_4 < 0.$$

As before β_2 is signed on the assumption that domestic physical assets and domestic money are substitutes. The negative signs attributable to β_3, β_4 are consistent with the alternative channels discussed in Section II(a). Foreign bonds and foreign money may be substitutes for domestic money and/or (i_f+e) and e may be proxies for unobservable domestic rate of return variables. β_3 serves as a measure of the degree of foreign bond substitution and β_4 as a measure of the degree of currency substitution.

Equation (9), therefore, allows us to examine whether domestic and foreign asset markets are interlinked. A significant β_3 will indicate that the linkages are through the capital markets while a significant β_4 will suggest that the linkage exists via the foreign currency markets.

Equation (9) also permits us to examine a hypothesis that is often stated with respect to Asian developing economies. It has been suggested (Tanzi and Blejer, 1982, for example) that substitution between domestic money and foreign assets becomes particularly relevant during periods of rapid inflation when the cost of holding money increases and the exchange rate is adjusting to maintain external equilibrium. If widespread controls in the domestic capital markets depress domestic yields as is the case in the developing countries the relative profitability of foreign asset holding is further enhanced and therefore the ratio of foreign assets to domestic money will rise.

In the context of equation (9) this hypothesis would seem to imply that the absolute values of β_3 and β_4 will increase when rapid inflation takes place. However, if there is rapid inflation both π_d and e will be rising. Individuals will then economize on the holding of domestic money balances. The resulting readjustment of portfolios may have several outcomes:

(a) If the foreign return variables serve as proxies for the domestic returns, i.e., $\beta_3 = \beta_4 = 0$ and $(i_f + e)$ and e are proxies for the 'true' domestic returns and if no substitution between domestic money and foreign assets occur, this economizing will be unambiguously in favor of domestic assets.

(b) If the presence of $(i_f + e)$ and e in (9) is due to direct substitution possibilities, whether the substitution into alternative assets will depend on whether,

$$(10) \quad \Delta\pi_d = \Delta e$$

i.e., whether the change in π_d exceeds, is equal to or less than the change in e (in the event of rapid inflation) and on the values of the parameters β_2 , β_3 and β_4 which may also change. The conditions that will lead to a rise in the ratio of foreign assets to domestic assets are,

$$(11) \quad |\beta_3| \text{ or } |\beta_4| > |\beta_2| \text{ and } \Delta\pi_d < \Delta e.$$

It is clear that this represents one of many possible results.

Demand for money specifications such as (9) assume that linkages exist between the domestic and foreign asset markets. Because of the presence of legal restrictions on movements of capital in the Asian countries, these linkages are through illegal markets such as the black market for foreign exchange. Dealings in these markets may impose additional costs to transactors such as the cost of evading controls on capital flows as well as on foreign exchange transactions.

However, Dornbusch et al. (1983) suggests that these transaction costs are likely to be minimal. While black markets etc. are illegal in the sense that dealers are not permitted to trade in foreign exchange and the participants are not allowed to hold foreign exchange, these markets are not usually clandestine. Indeed such markets are often called 'parallel markets' suggesting 'an intermediate position of legality in that it is illegal but also conspicuously public and it would appear officially tolerated' (Dornbusch et al., 1983). Combined with the evidence presented in Ch. III, these considerations suggest that these markets may work remarkably freely and there appears to be little ground for excluding foreign influences on the demand for money on a priori grounds. (For completeness of the analysis, possible implications of these additional costs are presented in Appendix I.)

FOOTNOTES TO CHAPTER II

1. The derivation of this may be illustrated as follows. Consider an individual in the domestic country holding Q_t amounts

of the domestic currency.

For Q_t , he can obtain $Z_t = \frac{Q_t}{E_t}$

amounts of foreign currency (where E_t is the domestic currency price of the foreign currency). The total expected return by investing in foreign bonds in domestic currency terms would be,

$$Z_t(1 + i_f)E'_t = Q'_t$$

where i_f is the nominal return on the foreign bonds and E'_t is the expected exchange rate at time t . The proportional return is given by,

$$\begin{aligned} \frac{Q'_t - Q_t}{Q_t} &= \frac{Z_t(1+i_f)E'_t - E_t Z_t}{E_t Z_t} \\ &= \frac{E'_t + i_f E'_t - E_t}{E_t} \\ &= \frac{E'_t - E_t}{E_t} + \frac{i_f E'_t - i_f E_t}{E_t} + \frac{i_f E_t}{E_t} \\ &= e + i_f e + i_f \\ &\approx e + i_f \end{aligned}$$

where $i_f e \approx 0$ and $e = \frac{E'_t - E_t}{E_t}$ is the expected rate of depreciation.

2. Once again let Z_t be the amount of the foreign currency obtained by exchanging Q_t of the domestic currency. The individual now wishes to hold Z_t of the foreign currency because he expects the domestic currency to depreciate. Let his expected E be E'_t . His anticipated total return of holding Z_t in domestic currency is then,

$$Z_t \cdot E'_t = Q'_t$$

and his proportional return is

$$\frac{Q'_t - Q_t}{Q_t} = \frac{Z_t E'_t - Z_t E_t}{Z_t E_t} = \left(\frac{E'_t - E_t}{E_t} \right) = e$$

where e is the expected depreciation rate.

3. For a discussion on the use of semi-logarithmic forms see B. Klein (1974), footnote 19.
4. If perfect currency substitution exists, the exchange rates become indeterminate (Helpman and Razin, 1974; Kareken and Wallace, 1981).
5. Bordo and Choudhri (1982), for example, report a correlation coefficient of .99 between Canadian and U.S. interest rates.
6. While this is the overwhelmingly popular formulation, alternative specifications are also evident. For example Shapiro (1973), Goldstein (1973) for the U.S. and Melitz for France have found the expected inflation to be a significant opportunity cost variable. Barro and Santomero (1972), Klein (1974) have argued that in addition to the opportunity cost variables, money's own rate of return should also be considered and showed this to be a significant factor in affecting money demand. Also specifications which include a single opportunity cost variable must implicitly assume that this variable subsumes all the information about the term structure of interest rates. If the term structure is stable and capital markets highly developed, such approximation may be valid. Knowing this (the stability of the term structure) to be the case only rarely, Heller and Khan (1979) have devised a method by which the entire term structure is included in the demand for money function. Friedman and Schwartz (1982) have utilised the same methodology to estimate a long run function for the U.S. For theoretical discussions on this point see Friedman (1977).

Also, while there is general agreement that the rate of return on financial assets is a relevant measure of the opportunity cost variable, economic theory offers little guidance about which single interest rate is the most appropriate. The empirical evidence in this regard is mixed, with the appropriateness of the short term and the long term interest rates varying from country to country and on the time period studied.
7. In these models, foreign and domestic assets are regarded as direct substitutes for each other in a wealthholders portfolio of assets. A rise in the rate of return on foreign bonds, for example, will lead to a readjustment of the portfolio shares with the result that the share of foreign bonds in the portfolio will rise. Given a fixed stock of wealth, this also implies declining portfolio shares for other assets such as domestic money.
8. Arango and Nadiri (1981) appear to be the only exception.
9. The only work this writer knows is that of Blejer (1978) for a group of Latin American countries.
10. The empirical evidence are presented in greater detail in Ch. III.

11. While in the pre-1971 period, the exchange rates were predominantly fixed, managed float or pegged exchange rates are commonly observed in the post 1971 period. However as Agevli et al. (1979) point out, these exchange rate policies have been much closer to the situation of fixed exchanged rate rather than freely fluctuating rate. For further discussion see Agevli (1982).
12. Pressures for these devaluations are built up by an initial over-valuation of the currency which leads to an excess demand situation. They are intensified by policies followed by these governments. For a discussion on the appropriability of a fixed exchange rate and the above issues see Crockett and Nsouli (1977).
13. Informal markets are defined as markets where the participants are generally outside the control of the central bank and usually consists of money lenders, traders and landlords.

These markets are often regarded as sources of funds that supply some of the unsatisfied demand that arises in the formal market (Bruno, 1979; Taylor, 1979). Alternatively, they can be seen as serving those individuals who do not have an access to the formal market because of geographic and other reasons (Wai, 1957, 1977). These markets are characterised by interest rates that are reportedly very high. For instances, interest rates as high as 100-150 percent are often reported. Such high premiums arise from high enforcement costs, a higher probability of default and relative lack of redress mechanisms. Also, these markets are characterised typically by extreme segmentation and local monopoly (Bottomley, 1975; Bhaduri, 1977).

14. When domestic money is held by foreign residents also, the total demand for domestic money must consider both such demands. Given that perfect substitution exists, the above will imply that, although the real sum of money in the world will be well defined, the nominal supplies of all currencies would be indeterminate as would each price level and exchange rate. See Girton and Roper (1981), King, Putnam and Wilford (1978).

APPENDIX I: Modifications in the foreign return variables in Equation (9) in the presence of transactions costs and their implications.

Consider first the return on holding the foreign currency. Two types of transactions costs may be identified: (i) the cost incurred in buying the currency and (ii) the cost incurred in selling the currency. Let t_b , t_s be the transactions costs of buying and selling the foreign exchange respectively. t_b , t_s are defined as unit costs. Consider now the return from holding the foreign currency as derived in footnote 2 above.

Given t_b , the amount of foreign currency that can now be obtained for Q_t of the domestic currency is,

$$Z_t = \frac{Q_t}{E_t(1+t_b)}$$

The total return obtainable in the domestic currency is (of holding Z_t),

$$\frac{Z_t E'_t}{(1+t_s)} = Q'_t$$

The proportional return then is

$$\begin{aligned} \frac{Q'_t - Q_t}{Q_t} &= \left\{ \frac{Q_t \cdot E'_t}{E_t(1+t_b)(1+t_s)} - Q_t \right\} / Q_t \\ &= \frac{\theta E'_t - E_t}{E_t} \end{aligned}$$

where $\theta = \frac{1}{(1+t_b)(1+t_s)} < 1$ for any positive t_b , t_s . θ may also be defined

as $\theta = \frac{1}{1+t_b+t_s}$ for small values of t_b , t_s such that the term $t_b \cdot t_s$ may be ignored.

Reformulating the expression $\frac{\theta E'_t - E_t}{E_t}$ yields

$$= \frac{\theta E'_t - \theta E_t + \theta E_t - E_t}{E_t} = \theta e - (1-\theta) \quad (1)$$

The return on holding the foreign currency now is $\theta e - (1 - \theta)$

With regard to foreign bonds additional transactions costs must be borne, i.e., the cost of transferring the foreign currency abroad and the cost of repatriating the foreign currency. Let t_t be the composite unit transactions costs involved in such transfers. In this case also, the amount of foreign currency available for Q_t amounts of domestic currency is

$$\frac{Q_t}{E_t(1+t_b)} = Z_t$$

Investment in foreign bonds requires the incurring of the transaction cost t_t . The total expected return in domestic terms now is,

$$\frac{Z_t(1+i_f)}{(1+t_t)} \cdot \frac{E'_t}{(1+t_s)} = Q'_t$$

The proportional return can now be expressed as

$$\frac{\delta(1+i_f)E'_t}{E_t} - 1$$

where $\delta = \frac{1}{(1+t_b)(1+t_s)(1+t_t)} = \frac{1}{1+t_b+t_s+t_t}$ by employing the same reasoning as before.

Modifying the above expression yields,

$$\begin{aligned} \frac{\delta E'_t + \delta i_f E'_t - E_t}{E_t} &= \frac{\delta i_f E'_t - \delta i E_t + \delta i_f E_t + \delta E'_t - E_t}{E_t} \\ &= \delta i_f e + \delta i_f + \delta e - (1 - \delta) = \delta \{i_f + (1+i_f)e\} - (1 - \delta) \end{aligned}$$

ignoring the expression $\delta i_f e$ yields the final return on holding foreign bonds

$$= \delta(i_f + e) - (1 - \delta) \quad (2)$$

In principle, both of these returns (1) and (2) can now take on positive

negative or zero values. Should negative returns accrue, these assets will not be considered as alternatives to domestic money. The return on foreign currency will become relevant in the demand for money equation if

$$(11) \quad \theta e - (1-\theta) \geq 0$$

which may be rewritten as

$$(12) \quad e \geq \frac{1-\theta}{\theta}$$

where $\frac{1-\theta}{\theta} = t_b + t_s$. That is, if the expected depreciation rate is less than the transactions cost incurred in obtaining the foreign currency, then the return variable e will be irrelevant as a determinant of the demand for domestic money.

Similarly, the magnitude of $(i_f + e)$ compared to the transactions costs of foreign bonds transactions determines whether foreign bonds are a viable alternative to holding domestic money. In particular if,

$$(3) \quad (i_f + e) \geq \frac{1-\delta}{\delta}$$

where $\frac{1-\delta}{\delta} = t_b + t_s + t_t$, the nominal return $(i_f + e)$ will exceed the transactions cost and foreign bond holdings become feasible.

CHAPTER III

SOME FEATURES OF THE ASSET MARKETS IN ASIAN DEVELOPING COUNTRIES

In this chapter, we examine some features of the Asian developing countries, that are relevant for discussions of the demand for money in these countries. In particular, we examine the nature of the domestic asset markets as well as the interlinkages between the domestic and foreign asset markets.

I. General Characteristics of the Asian Developing Countries

The Asian developing countries display wide divergences in their economic characteristics. Differences exist in their inflationary experiences, rate of growth of output and the extent to which they are open. It was not possible to examine all the Asian countries within the confines of this thesis. Hence, six countries were chosen so as to represent the widest possible array of Asian experiences.

Table 1 illustrates the inflationary experiences in these countries. Similar statistics are also presented for U.S.A. and Canada for comparative purposes. Inflation rates in India, Malaysia and Thailand are seen to be relatively low and comparable to those in the developed countries. Indonesia experienced the highest and the most variable inflation rate over the period investigated while Korea and the Philippines also experienced high inflation rates.

The same pattern of divergent experiences are also observed in the annual growth rate of output in these countries (see Table 2). For example, in the 1976-79 period, the range included figures of 4.44 percent for India and 19.79 percent of Korea. Indonesia and Korea exhibit the highest growth rates, Malaysia and Thailand are in the intermediate range while India and

TABLE 1: Annual Inflation Rates in Asian Developing and Some Developed Countries

Regions	Years		
	1966-1970	1971-1975	1976-1979
<u>Asian developing countries:</u>			
a. Low inflation countries:			
India ¹	6.96	12.54	5.18
Malaysia ²	1.34	7.45	3.94
Thailand ¹	4.02	12.70	7.62
b. High inflation countries:			
Indonesia ²	259.06	20.24	14.93
Korea ¹	7.88	19.58	12.90
Philippines ¹	10.04	20.53	9.73
<u>Developed countries:</u>			
U.S.A. ¹	2.21	9.50	8.36
Canada ¹	3.81	7.38	8.40

Notes:

1. The price indexes used here are wholesale price indexes (WPI). More aggregate indexes such as a GNP price deflator were not available for the Asian countries.

2. Here the price indexes used are the Consumer Price Indexes (CPI). WPI was not available for these two countries.

Source: International Financial Statistics, International Monetary Fund, Various issues.

TABLE 2: Average Annual Real Growth Rates in Asian Developing and
Some Developed Countries.

Regions	Years		
	1966-1970	1971-1975	1976-1979
<u>Asian developing countries:</u>			
a. Low inflation countries:			
India	3.92	.69	4.44
Malaysia	5.28	5.95	14.94
Thailand	6.21	4.66	8.51
b. High inflation countries:			
Indonesia	18.42	10.71	11.39
Korea	19.83	10.40	19.79
Philippines	2.31	2.17	8.25
<u>Developed countries</u>			
U.S.A.	5.31	4.45	2.63
Canada	5.33	6.73	4.07

Source: International Financial Statistics, International Monetary Fund,
Various issues.

the Philippines exhibit the lowest growth rates over the period examined.

These countries, also, reported differing extent of trade with other countries. Table 3 reports the extent of these trade flows.¹ These figures provide an estimation of the openness of these economies with respect to external transactions. Similar to the pattern in the developed countries, the Asian countries are observed to have increased their international trade over time. The relative impact of these flows on total economic activity are the highest for Malaysia and lowest for India. In terms of all Asian countries, India represents an example of the most closed economy while Malaysia and Korea - during the 1976-79 period - represent examples of highly open economies. The other three countries fall in the intermediate range.

II. The Nature of the Domestic Asset Markets

For simplicity, domestic assets are grouped into two broad categories - domestic financial assets and domestic physical assets. The domestic financial assets are defined to include domestic bank deposits, stocks and bonds, etc. and the domestic physical assets are defined to include land, gold, durable goods, etc.

a. The domestic financial assets markets

Traditional discussions of the demand for money in the Asian developing countries have emphasized two characteristics of the domestic financial assets markets in these countries,

- (i) The domestic financial markets are shallow. Few alternatives exist and the size of the stock and bond issues are quantitatively small.
- (ii) The return on the financial assets that are available are subject

TABLE 3: Extent of Foreign Trade in Asian Developing and some
Developed Countries (as a Proportion of GNP)

Regions	Years		
	1966-1970	1971-1975	1976-1979
<u>Asian developing countries:</u>			
a. Low inflation countries			
India	.106	.107	.153
Malaysia	.887	.842	1.059
Thailand	.396	.412	.492
b. High inflation countries:			
Indonesia	.283	.417	.448
Korea	.356	.568	.702
Philippines	.345	.414	.428
<u>Developed countries:</u>			
U.S.A.	.101	.137	.179
Canada	.426	.464	.510

Notes:

1. Foreign trade is defined as the sum of the values of exports and imports.

Source: International Financial Statistics, International Monetary Fund, Various issues.

to official controls. The administratively fixed nominal interest rates display little variability over time.

It is asserted that these conditions make it exceedingly difficult to detect any systematic empirical relationship between money holdings and interest rates. In this section we present some evidence on conditions (i) and (ii).

(i) The size of the domestic financial assets markets

Whether domestic markets are shallow must be examined with respect to the size of the country. Table 4² presents the market values of outstanding securities as a percentage of GNP and money supply for the developing economies as well as the developed countries. The table indicates that the relative size of the capital markets is significantly smaller for the developing economies (even relative to their much smaller GNPs). In the developed countries, the market value of all securities is equivalent to the GNP and about double that of money supply, while in the Asian developing countries, the market value of securities is approximately one-sixth of GNP and less than two-thirds of the composite money supply.

However, it could be argued that Asian financial markets have developed in recent years. Table 5 provides evidence on new security issues. While the markets were still thin - given the initial stocks - some Asian countries, particularly Korea and Thailand, have new securities issues whose growth (relative to GNP) compare favorably with the developed countries.

It should be pointed out that sixty to eighty percent of the new security issues in these countries were issues of new government securities. The remainder were issued by a few institutions. In addition, the major purchasers of these new securities were the government, government agencies and

TABLE 4: Selected Countries: Stock Market Relationships, 1971¹

	Ratio of Market Value of Securities to	
	GNP	Money and Quasi-Money
Developed countries ²	102.36	217.62
Less developed countries ³	13.80	52.06
Asia	17.44	60.67

Notes:

1. Or the latest year available.

2. Includes Australia, Canada, Japan, South Africa, United States and 14 European countries.

3. Includes 5 countries from Africa and Middle East (Israel, Kenya, Lebanon, Morocco, Nigeria and Turkey), 9 Latin American countries (Argentina, Brazil, Chile, Colombia, Jamaica, Mexico, Peru, Uruguay, Venezuela) and 8 Asian countries (Ceylon, China, India, Indonesia, Korea, Malaysia, Philippines and Thailand).

Source: Tale 5, Wai and Patrick, 1973.

TABLE 5: New Securities Issues¹ in Selected Countries 1966-71 (as percentage of GNP)

Regions	Years					
	1966	1967	1968	1969	1970	1971
<u>Asia</u>						
India ²	2.8	1.4	NA ³	NA	NA	NA
Malaysia	4.1	5.3	5.5	4.5	3.8	6.2
Thailand	4.7	3.1	3.5	5.5	5.2	5.6
Korea	1.7	3.5	3.5	6.5	5.7	4.9
<u>Developed Countries</u>						
U.S.A.	2.5	4.9	4.8	3.5	5.6	5.7
Selected ⁴	4.6	5.4	5.6	4.8	5.4	6.7
All ⁵	5.0	5.3	5.8	5.2	5.3	6.7

Notes:

1. Sum total of shares, bonds and debt certificates.
2. As percentage of Gross Domestic Product (GDP).
3. NA - symbol for not available.
4. Selected countries include Belgium, Netherlands, Switzerland (the 'high' percentage countries); Canada, Sweden United States (the 'medium' percentage countries); and France, Norway and the United Kingdom (the 'low' percentage countries).
5. Total of 16 countries. In addition to the 9 selected countries, these include Denmark, Finland, Germany, Italy, Japan, Portugal and Spain.

Source: Table 1, Wait and Patrick, 1973.

private financial institutions. This fact - illustrated in Table 6 - suggests that private households (column 8) do not participate in a significant way in the financial asset markets. Korea appears to be the only exception. In Korea, a substantial proportion of the new issues were bought by private households. Caution must also be exercised in interpreting the purchases by the private financial institutions. Some of these purchases were induced by the central banks in that the private financial institutions are required to hold government securities as part of their legal reserve requirements. The foreign ownership of domestic securities was insignificant.

The evidence, thus, generally corroborates the traditional presumption of shallow capital markets³ (condition 1 above). The available spectrum of financial asset is narrow, particularly when compared to the developed economies. This is reinforced by the fact that the major participants in these markets are quasi-public institutions. Financial assets are seen to play a rather unimportant role in the asset portfolios of private wealth owning units. The major exception, as we have seen, is Korea. The Korean financial markets had exhibited significant growth during the period examined. As well, it is characterised by substantial private participation.

(ii) Interest rate policies

Two aspects of the administratively fixed interest rates are particularly relevant from the perspective of demand for money. First, with administered rates, the observable interest rates will not represent the true opportunity cost measure. Second, because these rates are fixed they will display little variability over time.

To the extent that administratively fixed rates impose effective ceilings,

TABLE 6: Domestic Purchases¹ of New Issues of Securities in Selected Countries (in percentage)

Country	Years	Ratio bought by					
		Govt.	CB	GE	PF	PB	PH
India	1966-67	2.82	53.48	-5.03	59.19	-.57	-10.24
Malaysia ²	1970-71	61.06	.43	3.63	34.99	0.00	0.00
Thailand ²	1970-71	7.21	46.88	0.00	44.67	---	---
Korea	1970-71	30.14	-.28	0.00	12.32	10.98	46.85

Notes:

1. General notes for symbols:

Govt. = Central Government
 CB = Central bank
 GE = Government enterprise
 PF = Private financial institutions
 PH = Private household

Components do not always equal 1 because of errors and omissions.

2. Government securities only.

Source: Table 3, Wai and Patrick, 1973.

an excess demand for domestic funds will be created due to reduced domestic supply and increased domestic demands. The induced shortage of domestic funds will then require an alternative allocative mechanism. Most Asian countries follow a policy of credit controls to distribute available funds. This allocation typically takes place on the basis of the quality collateral, political pressure, name, loan size and covert benefits to loan officers. Since the potential recipient of such funds will spend resources to acquire the above characteristics, the true opportunity cost of these loans become higher. Hence use of official interest rates to represent the opportunity costs of such funds will not be appropriate.

In addition, the administratively fixed nominal interest rates display very little variation over time. To the extent that these rates do not respond to changes in other economic variables such as changes in the inflation rates, one would not expect to observe the systematic response to these interest rates on the part of the individuals that is found in the developed countries. An examination of the variability of nominal interest rates are presented in Table 7. The Asian country examples were chosen on the basis of data availability. They also represent alternative sets of interest rate policies. India and Malaysia represent countries with policies that have traditionally maintained interest rates at low levels. As Table 7 indicates, the variability of nominal interest rates in these countries are low (relative to the U.S. rates).

Korea, on the other hand, represents countries where high interest rate policies were followed. Table 7 suggests that the variability of the observed nominal interest rates in Korea is comparable to that of the U.S. rates. The relatively high variability in Korea resulted from the policy of liberalization of interest rates that has been followed since 1965.

TABLE 7: Comparative Rates of Interest in Selected Asian Countries and the U.S., 1961-79¹
(in percentage per annum)

Country	Interest Rate	1961-1965	1965-1970	1971-1975	1975-1979	1961-1979	Coefficient of Variation 1961-1979
<u>Asia</u>							
India	CB ² yield	4.11-5.32	5.00-5.40	5.64-6.34	6.29-6.45	4.11-6.45	.12
Malaysia	Fixed ³ Deposits	4-5	5-6 ⁴			4-6 ⁵	.16
	Savings deposits	2.50-3	3-3.5 ⁵			2.5-3.5 ⁵	.14
Korea	12 months time deposits	15-15	22.8-26.4	12.6-21.3	14.4-18.6	14.4-26.4	.25
	Savings ⁶ deposits	16.8-16.8	22.8-30 ⁴			16.8-30 ⁵	.28
<u>Developed economies</u>							
U.S.A.	CB ² yield medium term	3.47-4.22	4.77-7.02	5.66-7.82	6.71-9.71	3.47-9.71	.29
	90 day finance company papers	2.68-4.27	4.89-7.23	4.52-8.62	5.22-10.54	2.68-10.54	.39

NOTES: 1. Or whichever year was available.

2. CB means government bonds.

3. For details on these rates, see Chandra Varkar (1971).

4. These rates refer to the period 1966-69.

5. These rates refer to the period 1961-69.

6. Savings deposits of the National Savings Association.

Source: International Financial Statistics, International Monetary Fund, various issues; Longterm Economic Growth, 1860-1970, U.S. Department of Commerce, 1973; Business Statistics, The Biennial supplement to the Survey of Current Business, U.S. Dept. of Commerce, various issues;

In general, our examination of the domestic financial markets in the Asian developing economies bears out the traditional assumptions made with respect to these markets. The financial markets were seen to be shallow and private participation was minimal. The prevalent interest rates did not display a lot of variability and may not have reflected the true opportunity cost of these assets. Korea, again, appeared to be an exception to the general rule. Its financial markets displayed significant growth during the period examined and private participation in these markets is seen to be significant. Due to the liberalization of Korea's interest rate policies, interest rates also display considerable variation.

b. Domestic physical asset markets

As the above discussion has suggested, domestic physical assets may often have been the only attractive domestic alternative to money in the Asian developing countries. Strictly speaking physical assets are important money alternatives in both developed and developing countries. However, given the state of domestic financial markets, physical (real) assets take on added significance in developing countries.

As described in Chapter II, the nominal return to holding physical assets consists of a real return (r) and an adjustment for the expected rate of inflation of the general price level (π_d). Given the relative absence of arbitrary constraints on transactions in these assets their yields ($r + \pi_d$), will reflect what is foregone by domestic residents when holding domestic money. In practice, the yield on physical assets is often calculated by considering π_d alone. The reason for this is operational. Most often data on r is not readily available.

Given the above, experiences of inflation become important in discussing

domestic physical assets markets. In the high inflation countries, movements in π_d will dominate changes in $(r+\pi_d)$. This will not necessarily be the case in the low inflation countries. Table 1 reported the inflationary experiences in our sample of countries. It was seen that Indonesia, Korea and the Philippines were the (relatively) high inflation countries while India, Malaysia and Thailand represented the low inflation countries. On prior grounds then π_d might be expected to work best as a proxy for the domestic opportunity cost variable in Indonesia, Korea and the Philippines and less well as an approximation in the case of India, Malaysia and Thailand.

III. Foreign Exchange Markets

In discussing assets markets in Asian developing economies, it has generally been assumed that there are no linkages between the domestic and foreign asset markets. Implicitly, the reason for this assumption lies in the presence of effective restrictions on foreign exchange transactions and capital flows. In this section we reexamine this assumption.

For our sample of countries, detailed information on the types of controls and restrictions on international trade and capital flows is provided in Tables 8(a) - 8(f). Tables 8(a)-8(c) report the restrictions in the low inflation countries. Tables 8(d)-8(f) does the same for the high inflation countries. In four of the six countries, namely, India, Thailand, Korea and Philippines, a general package of these controls is seen to include: (i) prohibition of investment in foreign bonds and securities; (ii) mandatory approval required for other foreign transactions such as payments of insurance premiums, travelling abroad, etc.; (iii) repatriation of all foreign exchange earnings by domestic residents to the central banks or its regulated agencies. Only Malaysia and Indonesia break the general

TABLE 8: Trade and Foreign Exchange Restrictions in the Selected Asian Countries

Table 8(a): India

Years	Exchange Rate Regime	Imports	Exports	Invisibles	Capital
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Table 8(a): India

1961	Fixed	All imports require individual licenses. Required foreign exchange released on presentation of license	Most exports free of controls and restrictions. Proceeds must be surrendered.	Payments for invisibles require approval. Proceeds must be surrendered.	Domestic residents not permitted to buy foreign bonds and securities.
------	-------	--	---	---	---

1971 Fixed

"

"

"

1980 Pegged

"

"

"

Table 8(b): Malaysia

1961	Fixed	Permitted freely. Foreign exchange made available for all permitted imports	Exports outside the sorting area require approvals of exchange control authorities. Proceeds to be sold to authorized banks.	Payments to residents in sterling area made freely. Other countries are generally authorized. Proceeds to be surrendered	No restriction of movement of capital profits and divided within the sterling area
------	-------	---	--	--	--

1971 Fixed

As above

As above

As above

Investment by

nationals outside the sterling area require approval of exchange control authorities

1980 Pegged

"

"

Payments to all country require approval of exchange control. Proceeds to be surrendered

Inward investment require prior approval. Permission freely given to direct and portfolio investment by Malaysian residents in countries other

Table 8 cont'd.

Exchange		Imports	Exports	Invisibles	Capital
Years	Rate Regime				

Table 8(c): Thailand

1961	Flexible	Mostly free Licenses required for 72 listed commodities and not usually granted	Generally free. Proceeds must be sold to authorized agents	Payments require authorization. Limits on travel allowance. Proceed must be sold to authorized agents.	All outward transfers subject to approval. Personal capital exports restricted
1971	Flexible	"	"	"	"
1980	Pegged	"	"	As above and individuals allowed to buy or sell foreign exchange (U.S.\$250 a month)	

Table 8(d): Indonesia

1961	Pegged	All imports require license	All exports require licenses. Proceeds must be surrendered	Payments subject to either a general or special license. Surrender proceeds.	Residents may trade in registered foreign security in the Djakarta markets.
1971	Fixed	"	With the exception of a few, most commodities can be freely exported. Proceeds must be surrendered	No restrictions. Not subject to controls. Proceeds need not be surrendered.	"
1980	Pegged	Imports require registration. Imports of certain goods for authorized importers and state enterprises.	Exports of certain commodities are subject to quotas. All others free. Proceeds (with the exception Petroleum, certain mining co.) must be surrendered	"	Citizens may freely transfer and negotiate imports and exports of securities denominated in local or foreign currencies.

Table 8 cont'd

Table 8(e) Korea

Exchange

Years	Exchange Rate	Imports	Exports	Invisibles	Capital
1961	Fixed	Requires licenses. Automatic approval for essential consumer goods not domestically produced. Registered importer must export at least \$0.2 mil. worth of domestic goods to maintain status.	Licenses are automatically granted. Can use export proceeds to import goods. Proceeds must be surrendered to authority or exchange for equivalent foreign exchange certificates.	Payments require approval. Proceeds must be surrendered for or exchange for equivalent foreign exchange certificates.	All capital remittances require approval
1971		"	"	"	"
1980	Pegged	As above, but to maintain status must export U.S. \$1 mill. a year.	As above. Proceeds may also be deposited in foreign exchange accounts.	"	"

Table 8(f): Philippines

1961	Flexible	Subject to classificatory controls. Generally foreign exchange may be purchased at free market rates without restriction.	Not restricted in general. Proceeds must be surrendered (25% at the official rate, 75% at the free market rate)	Payments subject to control. Proceeds must be surrendered.	All receipts must be surrendered at the free market rate. Foreign assets held by resident (prior to Dec. 7, 1949) subject to approval and declaration. Earnings and other acquisition of foreign assets must be remitted and surrendered. Transfers of capital not permitted
1971	Flexible	"	"	"	"
1980	Flexible	"	"	"	"

Source: Exchange Arrangements and Exchange Restrictions, International Monetary Fund, Various Issues.

pattern. In both of these countries, domestic residents are allowed to transact in foreign assets.

However, presence of these controls do not mean that private transactions in foreign current cannot take place. The presence of unofficial conduits through which such external transactions take place are well documented. Evasions of controls on placements of foreign currency obtained through trade include the practices of overinvoicing of imports, underinvoicing of exports and smuggling (Bhagwati, 1978). Direct transactions in foreign currency as well as the acquisition of assets abroad can also take place through the black market for foreign exchange (Blejer, 1978; Dornbusch, 1983).

While direct evidence on the magnitude of such transactions is not available for all countries, indirect evidence and research for specific countries shows that they are likely to be significant. Consider, for example, just the practices of over and underinvoicing within India. Nayak (1977, 1979) estimated the extent of underinvoicing of exports and overinvoicing of imports for India with respect to nine trading partners (constituting 50 percent of the official trade) and found that underinvoicing of exports ranged from 5.62 to 8.39 percent of total exports while overinvoicing of imports ranged from .03 to 4.74 percent of total imports during 1962-69. Pitre (1978) found that the value of smuggled goods into India ranged from 2.63 to 14.35 percent of the total value of imports during 1961-74. The Kaul Committee Report - a study on the problem of under and overinvoicing in legal trade and smuggling for India - estimated the total demand for unauthorized foreign exchange in India to be 2400 million rupees in 1969.

Although similar figures do not exist for the other countries in our study, it is possible to conjecture about the extent of evasive practices by

looking at their trade flows. Table 3 suggests that India was the most 'closed' with respect to trade flows during the 1961-79 period. If incentives to evade controls are the same in all the countries, it seems likely that the amount involved in underinvoicing exports, overinvoicing imports will amount to even larger sums in the three countries - Korea, Thailand and Philippines - that face the same controls as India.

A second important channel through which transactions in foreign currencies often take place is through the so-called black markets for foreign exchange. These markets trade currency directly. It is also possible to acquire deposits abroad via these markets (Dornbusch et al., 1983). While these markets are illegal, they are not clandestine. Indeed, they often act as parallel markets in that they are officially (tacitly) tolerated. The conspicuous nature of these markets also suggest that the costs involved in transacting in these markets are relatively low.

To illustrate the widespread nature of the black markets for foreign exchange in the Asian countries, we reprint below a series of quotes from various issues of the Pick's currency yearbook (dates in parenthesis are the dates of publication).

India (1978)

Black market activities continued on a large scale during 1975, celebrating their thirty-fourth year of uninterrupted existence. Such dealings have to be divided into transactions connected with illegal gold imports and into dealings of purely monetary nature, linked to simple unlicensed capital transfers abroad for financial and commercial purposes.

Malaysia (1980)

Black markets in Malay/Malaysian dollars have been in existence since September 1959....

Thailand (1980)

An unauthorized free market principally dealing in unauthorized payments into and out of Thailand has persisted for several years.

Korea (1978)

...in Seoul's black market which is located in the shadow of Seoul's city hall and whose operators are mostly little old ladies holding satchels filled with \$100 (U.S.) bank notes.

Indonesia (1980)

Black market activities have persisted since the early 1940's ...gold, silver and U.S. dollar smuggling took place almost daily.

Philippines (1980)

Black market or open market dealings in foreign currencies, gold and other precious metals have existed since foreign exchange controls were established in 1949....all evaders of currency legislation unfortunately were right, as the holders of hard currency bank notes from January 1969 until the end of 1976, yielded a non-taxable profit of 78 percent.

The same publication (1980) reports that, during 1977-78 black market transactions in U.S. dollars or swiss francs in India averaged about Rs 90-100 million per month and dealings in bank notes averaged about \$1 million (U.S.) a month. The volume of illegal currency transactions for Indonesia was more than 2 billion rupees a year during 1950-60. Monthly volumes of such transactions in the Philippines averaged about 15-25 million pesos prior to 1968 with annual volume rising to 500 million pesos in 1968. Estimates for Thailand amount to several million baht a year.

The above evidence suggests that the picture of the highly isolated asset markets of the Asian developing economies formalized in the assumptions of traditional analysis is misleading at best. Linkages exist between the domestic and foreign economies through which transactions in foreign exchange can and do take place. While these transactions contravene the official controls on private capital flows and restrictions on foreign exchange, the highly visible nature of the transactions suggests that the costs of doing so are by no means prohibitive.

: Access to foreign exchange has important implications for the portfolio

decisions of residents of these countries. Through over and underinvoicing of imports and exports and the black markets, domestic residents may acquire foreign exchange and thus hold foreign assets such as the foreign currency itself or foreign bonds as alternatives to domestic assets. In this way, direct portfolio substitution may occur. With these linkages available, the returns on foreign assets become relevant opportunity costs in the demand for money function. Indeed, in discussing the demand for foreign exchange in black markets, portfolio considerations are often suggested to be the only reason (Dornbusch et al., 1983; Blejer, 1976).

IV. Summary

The task of this chapter was to examine features of asset markets in the Asian developing countries that are pertinent to the discussion of demand for money formulations in these countries. Six Asian countries formed our sample. The conclusions that emerge from the above discussion are as follows,

(1) With regard to domestic assets, the domestic financial markets are seen to be thin. Presence of administratively fixed ceilings on nominal interest rates have meant that the returns on available financial assets display little sensitivity to changing economic circumstances. They also underestimate the true opportunity cost of funds in these countries.

In our sample of six countries, five followed the above pattern. Korea proved to be the exception in that its financial markets experienced rapid growth which was marked by considerable public participation. Nominal interest rates in Korea displayed as much variability as those in the U.S. Returns on domestic financial assets may thus represent a viable alternative asset to holding domestic money in Korea.

For all other countries, domestic physical assets represent the main viable domestic alternative to trading money. The markets for these assets are relatively free of government control and their yields presumably reflect the true opportunity costs. As argued in Section II(b), however, the use of π_d to represent such yields may only be appropriate in high inflation countries such as Indonesia, Korea and the Philippines. It might be less useful as a proxy for the opportunity cost variable in India, Malaysia and Thailand - the relatively low inflation countries.

(ii) Interlinkages exist between the domestic and foreign asset markets through illegal channels such as the black markets for foreign exchange. This means that decisions in domestic asset markets may be affected by changes in foreign asset markets, i.e., the opportunity costs of holding foreign assets relative to domestic money may be significant determinants of the demand for domestic money.

All countries in our sample demonstrate substantial black market activities as well as other conduits for transaction in foreign exchange. Direct evidence for India - the least 'open' of the six countries - suggests that the sums transacted may not be insignificant. It is likely that other countries which are more 'open' may have greater activities in the illegal foreign exchange markets. In Malaysia and Indonesia, domestic residents are allowed to transact in foreign assets. However, as evidence suggests, there are linkages to foreign asset markets via the illegal foreign exchange markets in these countries, as well.

FOOTNOTES TO CHAPTER III

Table 3 in the text reports the total value of foreign trade (as a proportion of GNP). The values of exports and imports are reported below.

Table 1: Value of Exports in Asian Developing Countries and Some Developed Countries (as a Proportion of GNP)

Regions	Years		
	1966-70	1971-75	1975-79
<u>Asian developing countries</u>			
Low inflation countries:			
India	.040	.050	.075
Malaysia	.465	.433	.562
Thailand	.182	.190	.222
High inflation countries:			
Indonesia	.110	.212	.276
Korea	.124	.245	.338
Philippines	.165	.199	.188
<u>Developed countries</u>			
U.S.A.	.050	.067	.084
Canada	.218	.232	.255

Source: International Financial Statistics, International Monetary Fund, various issues.

Table 2: Value of Imports in Asian Developing and Some Developed Countries

Regions	Years		
	1966-70	1971-75	1975-79
<u>Asian developing countries</u>			
Low inflation countries:			
India	.060	.057	.078
Malaysia	.422	.409	.497
Thailand	.214	.222	.270
High inflation countries:			
Indonesia	.173	.205	.202
Korea	.232	.323	.372
Philippines	.180	.215	.240
<u>Developed countries</u>			
U.S.A.	.051	.070	.137
Canada	.208	.232	.255

Source: International Financial Statistics, International Monetary Fund, various issues.

2. Tables 4 to 6 are reprinted from the excellent survey on the operation of stock markets in less developed countries by Wai and Patrick (1973). However, it was not possible to obtain data for all six of our sample countries. Tables 4-7, therefore, report data which were available.
3. One reason for the underdeveloped state of the capital markets is found in the restrictive financial policies undertaken by the governments in these countries (McKinnon, 1973; Shaw, 1973; Fry, 1978(b)). Particularly significant are the official controls imposed on the yields of existing financial assets. Historically most of these countries have maintained limits on the nominal interest rates paid on bank deposits and charged on loans. These limits are either imposed by direct government rules or are maintained through various selective and discretionary financial procedures (see Bhatt, 1974; Pandharkær and Narasimham, 1966; Chandravarkar, 1971; Johnson, 1974; Patel, 1974; Khatkhate and Villeneuve, 1978).

In several cases, the imposition of ceilings on nominal interest rates have meant that the real interest rates paid on the bank deposits have been negative (Fry, 1978b). In such a case, the actual amount of investible funds forthcoming will be low given the low deposit rates. Also given associations of risk with low interest rates, ceilings on loan rate encourages banks to substitute safe loans for risky loans, so that even the limited supply of funds will not be channelled to the socially most productive opportunities. This leads to an atrophy of the domestic financial markets and is said to constitute a situation of financial repression.

CHAPTER IV

DATA CONSIDERATIONS AND MEASUREMENT PROBLEMS

As discussed in Chapter II, the possibility that domestic and foreign asset markets might be linked in Asian developing economies suggests the following 'open economy' long run demand for money function,

$$(1) \log m_{dt} = \beta_0 + \beta_1 \log y_{dt} + \beta_2(r_t + \pi_{dt}) + \beta_3(i_{ft} + e_t) + \beta_4 e_t$$

where the additional subscript t refers to the time period for which this observation is applicable. The hypothesized signs of the coefficients are,

$$(2) \beta_1 > 0; \beta_2, \beta_3, \beta_4 < 0.$$

In this chapter, we consider various empirical problems such as the availability of data and errors in measurement of variables that arise in estimating the above demand for money function. Table 1 presents the definition of all the relevant variables. The data sources are listed in Appendix 1.

I. Monetary Variables

The monetary statistics of our Asian developing economies present us with two definitions of the aggregate monetary variables (M) - narrow money (M1) consisting of currency in circulation plus demand deposits held by the private sector and broad money (M2) defined to include narrow money plus time and savings deposits held by the private sector. Without having a strong theoretical reason for excluding one, we decided to present both money demand equations in our results. This allows us to establish the general consistency of our findings across alternative definitions of the monetary aggregate.

TABLE 1: Definitions of Variables

Variables	Definitions	Symbols
Money	Narrow Money	M1
	Broad Money	M2
Scale Variable	Real gross domestic product	Y_d
Domestic Opportunity Cost	Real return on domestic assets (r) plus Inflationary expectations (π_d) (Price index used: WPI, CPI)	$r + \pi_d$

Foreign Opportunity Costs:		
Return on foreign currency holdings	Expectation of depreciation of black market exchange rate (EBM)	e
Return on foreign bond holdings	Foreign nominal interest rates represented by 90 day U.S. Finance Company Rates, (i_f) plus Expectation of depreciation of black market exchange rate (e)	$i_f + e$

II. Scale Variable

Because of the absence of data on financial and real wealth, the only scale variable used in our regressions is real income (y_d), measured as gross domestic product (GDP) at constant prices (1975 = 100). Since real GDP is available, only on a yearly basis, the annual observations had to be transformed into quarterly figures. Following a procedure introduced by M. Khan,¹ a simple interpolation method was used to convert the annual data into quarterly observations.

III. Domestic Opportunity Cost Variable

For most of our countries, nominal interest rates were not available or were unreliable because of legal restrictions. The exception was the nominal interest rates for Korea (Ch. II; Section I(b)). Moreover, as data on the real return of domestic physical assets was not available, the nominal returns on such assets was approximated by π_d , the domestic inflationary expectation variable.

Generation of π_d as well as the deflating of the monetary variable to measure real balances required the use of a price variable. Data on a general price variable, such as a GNP deflator, was not available for our sample of countries. For some countries - Indonesia and Malaysia - only the consumer price index (CPI) was available. For the other countries - India, Thailand, Korea and the Philippines - the wholesale price index (WPI) was also available. Where both WPI and CPI data could be found, we decided to use the WPI as the price variable. The reason for this preference was that CPI gives larger weights to food and (house) rent components where prices are most heavily controlled.²

Formation of Inflationary Expectations (π_d)

Inflationary expectations were not directly observable and had to be estimated. Alternative theories of expectations were considered to derive a measure of π_d .

To illustrate the issues involved in forming expectations (of a variable X), consider the following equation,

$$(3) \quad X_{t+1} = Z_t \gamma_t + U_t$$

X_{t+1} is the actual value of the variable X at time $t+1$. Z_t is a set of explanatory variables known at time t , γ_t is a vector of coefficients and U_t is the random error term which is assumed to have a zero mean and whose variation is assumed to be unrelated to any information available at time t . An optimal forecast for X_{t+1} is a forecast that minimizes the forecast error and can be found by simply taking the expectation of (3) conditional on the information at time t ,

$$(4) \quad X_{t+1}^e = Z_t \gamma_t$$

where X_{t+1}^e is the optimal forecast of X_{t+1} at time t .

The rational expectations approach suggests that the expected value of X_{t+1} at time t equals X_{t+1}^e . To empirically implement this approach, two related issues are raised. First, X_{t+1}^e may be defined for any i . The question of whether $i = 1$ or a greater number depends on the purpose at hand. In the money demand context, if π_d and e represent one-period rate of return, then $i = 1$ is appropriate. In our empirical work, we follow the general convention in forming expectations about time $t+1$ at time t , i.e., we assume $i = 1$.

Second, the information set to be included in Z_t must be specified.

This depends upon the model and the availability of information on these variables at time t . We made the following alternative assumptions.

A. Auto-Regressive expectations: Z_t may be assumed to contain information about the variable X only. Here, current expectations are formed by modifying previous expectations in the light of actual experiences about the variable. Z_t then becomes a vector containing only the past values of X and,

$$(5) \quad X_{t+1}^e = \sum_{i=1}^n \gamma_i X_{t-i}$$

where γ_i 's are the respective weights attached to each lagged value of X in forming X_{t+1}^e . Equation (5) is similar to the adaptive expectations approach.³

B. Full-Information Rational expectations: The use of the above formulation suggests that an arbitrary constraint has been placed on the information used by individuals. Past information about variables other than X may be available and to the extent it is pertinent will also be included in the information set. Thus, Z_t may include past information about variables other than X such that,

$$(6) \quad X_{t+1}^e = \sum_{i=1}^N \gamma_i X_{t-i} + \sum_{i=1}^N \tau_i R_{t-i}$$

where R 's are other potentially relevant variables. The measure in (6) may be referred to as Full-Information Rational expectations measure.

In our econometric work, both of the above measures of π_d were used. The methodology used to obtain these measures was as follows:

Step 1

The variable was first regressed on its own lagged values. Denoting the actual inflation rates as P_t , the following regression equation was estimated,

$$(7) \quad P_t = a_0 + \sum_{i=1}^N a_i P_{t-i}, \quad i = 1, \dots, 4 (=N)$$

The predicted values emerging from this regression represented the autoregressive measure of inflationary expectations (π_{dt}^1). Note that as π_{dt}^1 represents a one-period ahead forecast,

$$(8) \quad \pi_{dt}^1 = \hat{P}_{t+1}$$

where $\hat{P}_{t+1}$ is the predicted value of P_{t+1} from (7).

Step 2

The second stage involved adding to the regression (Equation 7) other potentially relevant variables. This stage allowed us to derive the full information rational expectations measure (π_{dt}^2).

Operationalizing the π_{dt}^2 measure requires the use of all relevant variables that may be included in the information set. Here a difficulty arises, because on theoretical grounds it is virtually impossible to exclude any information available at time t . In order to limit the number of additional variables (other than the one to be predicted) in the regression equation, we followed the procedure suggested by Mishkin (1982a, 1982b). His suggestion circumvents the theoretical issues by establishing a criterion based on the predictive content of the information provided by these (additional) variables within a forecasting equation. The Mishkin procedure utilised here to generate the inflationary expectation variable

is as follows:

First, the variable P_t is regressed on its four past values (to ensure white noise residuals). Then in order, the past four values of the rates of growth of narrow (or broad) nominal money supply ($M_{t-1}, \dots, M_{t-4}$, $M = M_1, M_2$), real income ($\dot{y}_{t-1}, \dots, \dot{y}_{t-4}$), depreciation rate of the black market exchange rate ($E_{t-1}, \dots, E_{t-4}$), the U.S. inflation rates ($P_{t-1}^{US}, \dots, P_{t-4}^{US}$) as a proxy for the world inflation rate and levels of U.S. nominal interest rates ($i_{t-1}^{US}, \dots, i_{t-4}^{US}$) as a proxy for world interest rates were added to the regression. The list of variables were chosen on prior hypothesizing about their predictive content. Given the prior sequence in which the additional variables are introduced, the four lagged variables of each variable are retained only if they are jointly significant at the 5 percent level or higher. As Mishkin (1982a) points out, one advantage of this procedure is that it imposes a discipline on the part of the researcher from searching for an equation that leads to results that confirms his priors. Table 2 lists, for each country, all the variables that were retained in the final inflation equation. Further details on the selection of these variables are presented in Appendix II. As the table shows, the final regression equation generally includes, in addition to lagged inflation rates, lagged values of the rate of growth of narrow money (M_1) or the rate of growth of real income ($\dot{y}$). Foreign variables are also seen to affect inflation in Korea, Indonesia and the Philippines. It is to be noted that,

$$(9) \pi_{dt}^2 = \hat{P}_{t+1}$$

from the more general regression equations (formed, for each country, by using the variables listed in Table 2 as the independent variables).

TABLE 2: List of Variables Used in Forming Predictions about Domestic Inflation Rates

<u>Country</u>	<u>Variables Used in Forming π_d</u>
India	P_{t-1}, M_{1t-1}
Indonesia	P_{t-1}, i_{t-1}^{US}
Korea	$P_{t-1}, \dot{y}_{t-1}, P_{t-1}^{US}$
Malaysia	P_{t-1}, M_{1t-1}
Philippines	$P_{t-1}, \dot{y}_{t-1}, P_{t-1}^{US}$
Thailand	P_{t-1}, M_{1t-1}

Note: $i = 1, \dots, 4$.

IV. Foreign Opportunity Costs

Two foreign opportunity cost variables are considered here - the return on foreign currency holdings as measured by expectations of depreciation of exchange rates (e) and the return on foreign bond holdings as measured by the sum of the foreign nominal interest rates (i_f) and e . Estimation of these opportunity cost variables required a measure of i_f as well as e .

The Foreign Nominal Interest Rate (i_f)

Theoretically, the relevant foreign nominal interest rate could be different for each of the six Asian developing countries considered here. Residents in each country could consider foreign bonds denominated in different currencies as the proper alternatives for their domestic money balances. It was not possible to determine which particular foreign bonds were most appealing for individuals in each of the six countries. In the absence of this data, the U.S. 90 day finance company paper rate was used as a proxy for the foreign interest rate variable in the demand for money functions for all of the six Asian countries. The use of a U.S. interest rate as a proxy for all foreign interest rates implicitly assumes that changes in the U.S. rates will mirror changes in the relevant foreign interest rates. This may be justified by the fact that capital markets in developed countries are well integrated and that assets of different developed countries are likely to be good substitutes.

Expectation of Depreciation of Exchange Rates (e)

Because of the possibility that official exchange market controls could be circumvented by domestic residents through extra-legal markets,

the black market exchange rate (E^{BM}) was used as the appropriate foreign exchange rate. All exchange rates were defined as the domestic money price of the U.S. dollar.

In measuring the expected rate of depreciation of the black market exchange rate, e_t , we first followed the same procedure as in the case of inflationary expectations. First, the current values of the variable was regressed on its past values. As before, denoting the depreciation rates as E_t , the regression equation was,

$$(10) \quad E_t = b_0 + \sum_{i=1}^N b_i E_{t-i}, \quad i = 1, \dots, 4 (\neq N)$$

The predicted value of E_t from (10) are then the expected values arising under the autoregressive expectations hypothesis (e_t^1), i.e.,

$$(11) \quad e_t^1 = E_{t+1}$$

where e_t^1 is the expected value from equation (10).

Second, additional information - other than the past values of E_t - were introduced. Here E_t was regressed on its four past values as well as past four values of M ($M = M1, M2$), $\dot{y}$, $\dot{P}$, $\dot{P}^{US}$ and $\dot{i}^{US}$ in order. The final prediction equations using this method were derived in the same manner as in the inflationary expectations case. Table 3 lists all the variables by country that added to the explanatory powers of the exchange rate equations and thus were used in the final prediction equation. As in the case of π_d , further details on this methodology are presented in Appendix II.

The full-information rational expectations measure of e_t , defined as e_t^2 , exhibited different characteristics across our sample with the past values of the depreciation rates being the only significant determinant of

TABLE 3: Variables Used in Forming Predictions about Depreciations
of Black Market Exchange Rates

<u>Country</u>	<u>Variables used in forming e</u>
India	E_{t-1}, P_{t-1}^{US}
Indonesia	E_{t-1}, M_{t-1}
Korea	E_{t-1}
Malaysia	E_{t-1}, P_{t-1}
Philippines	E_{t-1}
Thailand	E_{t-1}, M_{t-1}

Note: $i = 1, \dots, 4.$

e_t^2 in Korea and Philippines. Past growth of the narrow money supply emerged as a significant explanatory variable in Indonesia and Thailand. In India, the foreign inflation rate was significant in determining e_t^2 and in Malaysia the domestic inflation rates were significant.

Although the above procedure uses a great amount of information, the prediction equations for exchange rate depreciation were generally disappointing. There are several reasons why this result should not be surprising. It is possible that the change in exchange rates may have been caused by unanticipated events. Then exchange rate movements will be dominated by 'news'. Also, information lags for a number of relevant variables may be much shorter than the quarterly lags employed here. Finally, the data used for the exchange rate variable was the black market exchange rate. In the absence of standardized reporting techniques, these rates may be subject to significant measurement errors.

The absence of a satisfactory (derived) measure of e led us to consider the proportional difference between the exchange rate in the black market (E^{BM}) and the official market (E^{off}), i.e., the black market premium as an alternative measure of e . Suppose, it is anticipated that an official devaluation will take place. The anticipation of depreciation of E^{off} will induce speculative purchases of foreign currency in the black market and hence an immediate depreciation of E^{BM} . Since the official rate is as yet unchanged, this leads to an increase in the black market premium. In this sense, the black market premium will reflect the anticipated rate of change in the exchange rate. The black market premium is measured as

$$(12) \quad e_t^3 = (\log E_t^{BM} - \log E_t^{off}).$$

e_t^3 may then be regarded as an approximation of the rate of return of the foreign currency in the black market.

FOOTNOTES TO CHAPTER IV

1. This procedure suggested by M. Khan, Advisor, Research Department, International Monetary Fund, is as follows.

If y_t is the annual figure for real GDP, the figures for each quarter are obtained as follows.

$$yQ1 = .25(y_{t-1} + .625\Delta y_t)$$

$$yQ2 = .25(y_{t-1} + .875\Delta y_t)$$

$$yQ3 = .25(y_t + .125\Delta y_t)$$

$$yQ4 = .25(y_t + .375\Delta y_t)$$

where yQ_i 's are the real income for each successive quarter and $\Delta y_t = y_t - y_{t-1}$.

2. The choice of the WPI, that is now general in the literature, has also been justified on the following grounds by McKinnon (1973, p. 97).

"The basic reason is that tangible physical capital that is inventories of commodities of all kinds is the principal alternative assets open to savers....In other words, pure services can not be held in asset portfolio and be subject to intertemporal allocationshence it is primarily the rate of change of commodity prices that wealth holders compare with nominal rates of interest on financial assets in deciding their stock of money and near-monies relative to their income and their holding of goods".

3. The adaptive expectations approach, as is generally understood, refers to a mechanism where the weights (γ_i 's) are constrained to be declining exponentially. (5) is a more general form where the γ_i 's are unconstrained (but where only N lags are admitted).

APPENDIX I: Data Sources and Definitions

Data Sources

- A. International Monetary Fund, International Financial Statistics, various issues.
- B. Pick's Currency Yearbook, various issues.
- C. The Conference Board of Canada.
- D. The Bank of Korea, Economics Statistics Yearbooks, various issues.

Description of Data

- 1. Narrow money - Currency outside banks and demand deposits held by public in the commercial banks, source A.
- 2. Broad money - Narrow money plus time and savings deposits held by public in the commercial banks, source A.
- 3. Real Income - GDP at constant 1975 prices, source A.
- 4. Prices - wholesale and consumer price index, source A.
- 5. Exchange rate - Black market exchange rate, source B.
- 6. Foreign interest rates - U.S. 90 day finance company paper rates, source C.
- 7. Korean interest rates - interest rates on deposits of deposit money banks, source D.

APPENDIX II: Formation of π_d and e in the Full Information Rational
Expectations Framework

We utilized the Mishkin procedure in obtaining the full information rational expectation measures of π_d - defined as π_{dt}^2 - and e - defined as e_t^2 . In this procedure, current values of the variables to be predicted - $\dot{P}_t$ and $\dot{E}_t$ respectively are, first, regressed on their four lagged values. Thus in the first step the regression equations were

$$(1) \dot{P}_t = a_0 + \sum_{i=1}^N a_i \dot{P}_{t-i}, \quad i = 1, \dots, 4 (=N)$$

$$(2) \dot{E}_t = b_0 + \sum_{i=1}^N b_i \dot{E}_{t-i}, \quad i = 1, \dots, 4 (=N)$$

Then in order, the past four values of the rates of growth of both narrow and broad money supply ($\dot{M}_{t-1}, \dots, \dot{M}_{t-4}$, $M = M1, M2$), real income ($\dot{y}_{t-1}, \dots, \dot{y}_{t-4}$) depreciation rates ($\dot{E}_{t-1}, \dots, \dot{E}_{t-4}$), the U.S. inflation rates ($\dot{P}_{t-1}^{US}, \dots, \dot{P}_{t-4}^{US}$) and levels of U.S. interest rates ($i_{t-1}^{US}, \dots, i_{t-4}^{US}$) were added to the inflation regression. The ordering for the exchange rate regression was the past four values of $\dot{M}$ ($M=M1, M2$), $\dot{y}$, $\dot{P}$, $\dot{P}^{US}$, i^{US} respectively. Thus the second set of regression for each country was,

$$(3) \dot{P}_t = k_0 + \sum_{i=1}^4 k_i \dot{P}_{t-i} + \sum_{i=1}^4 g_i \dot{M}_{1t-i}$$

$$(4) \dot{E}_t = h_0 + \sum_{i=1}^4 h_i \dot{E}_{t-i} + \sum_{i=1}^4 f_i \dot{M}_{1t-i}$$

To identify variables that improve the predictive content of equations such as (3) and (4), an F-test was performed to see whether the joint marginal

contribution of $\sum_{i=1}^4 \dot{M}_{1t-i}$ (in both (3) and (4)) was significant at the 5

percent level. If it was, the variable M_{1t} was retained. Similar tests were carried out for all other variables for both the inflation rate and depreciation rate equations. The resulting F values are listed in Tables I and II. On the basis of these tables, the variables found to be significant in explaining inflation rates and changes in exchange rates are reported in Table III.

The next step was to utilize the variables listed in Table 3 to derive the final prediction equations for P_t and E_t . The method was to employ the variables in a step-regression process. Regressions were performed to ensure that each additional variable added to the explanatory power. F-tests provided the clue to this. By gradual elimination process, the best predictive equations were deduced. The final form of the predictive equations contained the variables listed in Table IV (Table IV is reproduced in the text as Table II for P_t and Table III for E_t).

TABLE 1: Inflationary Expectations - Estimated F-Values

Variables	India ¹	Indonesia ²	Korea ¹	Malaysia ²	Philippines ¹	Thailand ¹
P_{t-1}	2.46	1.99	5.15**	5.12**	13.95**	1.86
M_{1t-1}	4.83**	1.23	.57	8.30**	2.14	2.63* ⁴
M_{2t-1}	3	.75	3	2.20	-	-
$\dot{y}_{t-1}$	.961	1.38	3.38*	1.06	5.13**	.696
E_{t-1}	.121	1.08	.17	1.12	.54	.120
P_{t-1}	1.19	1.89	8.43**	19.23**	5.53**	.735
i_{t-1}	3.96**	3.05*	8.25**	5.07**	3.05*	.77

TABLE II: Exchange Rate (Depreciation Rate) Expectations - Estimated F-Values

Variables	F-Values				
	India ¹	Indonesia ²	Korea ¹	Malaysia ²	Philippines ¹ Thailand ¹
E_{t-1}	3.47*	1.06	4.76**	1.36	3.83* 5.28**
M_{1t-1}	1.81	4.22*	.56	1.52	.23 3.66*
M_{2t-1}	- .3	-	-	-	-
$\dot{y}_{t-1}$	.26	.23	.36	2.56	1.05 .95
$\dot{P}_{t-1}$	1.21	.50	.98	4.01**	1.05 .63
$\dot{P}_{t-1}^{US}$	3.11*	1.00	.36	3.59**	.39 .76
$\dot{P}_{t-1}^{US}$	.40	1.33	.68	4.83**	.59 2.63*

NOTES FOR TABLE I and II

1. The sample size for India, Korea, Philippines and Thailand was 60.

The critical values for F for these countries were,

	1%	5%
F(4,52)	3.70	2.55

2. The sample size for Indonesia and Malaysia was 40.

The critical F values were

	1%	5%
F(4,36)	3.89	2.63

3. Where no F values are given, it was not possible to obtain positive definite matrices in estimations of these equations.

4. * denotes significance at 5%.

**denotes significance at 1%.

TABLE III: Variables Significant in Explaining $\dot{P}_t$ and $\dot{E}_t$

Country	π_d	e
India	$\dot{P}_{t-1}^{1'}$, $\dot{M}_{1t-1}$ $\dot{i}_{t-1}^{US}$	$\dot{E}_{t-1}$, $\dot{P}_{t-1}^{US}$
Indonesia	$\dot{P}_{t-1}^{1'}$, $\dot{i}_{t-1}^{US}$	$\dot{E}_{t-1}^2$, $\dot{M}_{1t-1}$
Korea	$\dot{P}_{t-1}$, $\dot{y}_{t-1}$ $\dot{i}_{t-1}^{US}$, $\dot{P}_{t-1}^{US}$	$\dot{E}_{t-1}$
Malaysia	$\dot{P}_{t-1}$, $\dot{i}_{t-1}^{US}$ $\dot{M}_{1t-1}$, $\dot{P}_{t-1}^{US}$	$\dot{E}_{t-1}^2$, $\dot{P}_{t-1}$ $\dot{i}_{t-1}^{US}$, $\dot{P}_{t-1}^{US}$
Philippines	$\dot{P}_{t-1}$, $\dot{y}_{t-1}$ $\dot{i}_{t-1}^{US}$, $\dot{P}_{t-1}^{US}$	$\dot{E}_{t-1}$
Thailand	$\dot{P}_{t-1}^{1'}$, $\dot{M}_{1t-1}$ $\dot{y}_{t-1}$	$\dot{E}_{t-1}$, $\dot{M}_{1t-1}$ $\dot{i}_{t-1}^{US}$

Notes to Table 3

1,2. Although the past lagged values were not statistically significant in these cases, they were retained to ensure white noise residuals.

TABLE IV: Variables used in Forming Predictions About Domestic Inflation
Rates (π_d) and Depreciation Rates

Country	Variables Used in Forming	
	π_d	e
India	$\dot{P}_{t-i}, \dot{M}_{1t-i}$	$\dot{E}_{t-i}, \dot{P}_{t-i}^{US}$
Indonesia	$\dot{P}_{t-i}, \dot{i}_{t-i}^{US}$	$\dot{E}_{t-i}, \dot{M}_{1t-i}$
Korea	$\dot{P}_{t-i}, \dot{y}_{t-i}$ $\dot{P}_{t-i}^{US}$	$\dot{E}_{t-i}$
Malaysia	$\dot{P}_{t-i}, \dot{M}_{1t-i}$	$\dot{E}_{t-i}, \dot{P}_{t-i}$
Philippines	$\dot{P}_{t-i}, \dot{y}_{t-i}$ $\dot{P}_{t-i}^{US}$	$\dot{E}_{t-i}$
Thailand	$\dot{P}_{t-i}, \dot{M}_{1t-i}$	$\dot{E}_{t-i}, \dot{M}_{t-i}$

Note: $i = 1, \dots, 4$.

CHAPTER V

ESTIMATIONS OF THE DEMAND FOR MONEY EQUATIONS FOR SELECTED ASIAN COUNTRIES

In this chapter, we report the results of the estimations of the demand for money functions in the six selected Asian developing countries. Two basic empirical issues are addressed here: (i) are the returns on foreign assets important determinants of demand for money in these countries, and; (ii) what measure of inflationary expectations performs best as an opportunity cost variable in these countries' demand for money. A secondary question examined is whether the estimated demand for money functions are robust over alternative specifications:

I. The Estimated Basic Demand for Money Equation

In Ch. II, we specify the long run demand for money function for Asian developing countries as,

$$(1) \log m_{dt} = \beta_0 + \beta_1 \log y_{dt} + \beta_2(r_t + \pi_{dt}) + \beta_3(i_{ft} + e_t) + \beta_4 e_t$$

$$\beta_1 > 0; \beta_2, \beta_3, \beta_4 < 0.$$

However, data considerations discussed in Chapters III and IV, suggest two major concerns in the empirical estimation of the demand for money function

(1). They are:

(a) The unavailability of real interest rates (or alternatively, unconstrained nominal interest rate series).

(b) The lack of a satisfactory estimate of e_t .

To estimate the demand for money function (1), we made the following modifications.

(i) π_{dt} was used as a proxy for the return on domestic assets.

(ii) The effect of e_t was estimated separately from that of i_{ft} .

Using π_{dt} to represent the return on domestic assets and rearranging equation (1) may be written as,

$$(2) \log m_{dt} = \gamma_0 + \gamma_1 \log y_{dt} + \gamma_2 \pi_{dt} + \gamma_3 i_{ft} + \gamma_4 e_t;$$

where $\gamma_0 = \beta_0$, $\gamma_1 = \beta_1$, $\gamma_2 = \beta_2$, $\gamma_3 = \beta_3$, $\gamma_4 = (\beta_3 + \beta_4)$

γ_1 reflects the income elasticity of the demand for money and γ_2 the responsiveness of money demand to changes in π_{dt} . γ_3 measures the foreign bond substitution effects. γ_4 now incorporates both the direct effect (through currency substitution) and the indirect effect (through foreign bond substitution) of a change in e_t . A change in e_t will, as before, cause the domestic real balances to decline.

Finally, to account for the possibility of lags in the adjustment of actual to desired cash balances, we posit the following adjustment process,

$$(3) \log m_t - \log m_{t-1} = \lambda (\log m_{dt} - \log m_{t-1}),$$

where λ is the adjustment coefficient and $0 < \lambda < 1$.

In (3), the actual stock of domestic cash balances in any particular period (m_t) is assumed to adjust proportionately to the difference between the desired stock of domestic cash balances (m_{dt}) and the actual stock in the previous period (m_{t-1}).

Combining equations (2) and (3) yields the following reduced form,

$$(4) \log m_t = \delta_0 + \delta_1 \log y_{dt} + \delta_2 \pi_{dt} + \delta_3 i_{ft} + \delta_4 e_t + \delta_5 \log m_{t-1}$$

where $\delta_0 = \lambda \gamma_0$, $\delta_1 = \lambda \gamma_1$, $\delta_2 = \lambda \gamma_2$, $\delta_3 = \lambda \gamma_3$, $\delta_4 = \lambda \gamma_4$ and $\delta_5 = (1 - \lambda)$.

In this form, the δ_i 's ($i = 1, \dots, 5$) represent the short run coefficients from which the long run coefficients (γ 's) can be derived. Equation (4) represents the basic form of the demand for money estimated here. In the estimations, money supply is assumed to be exogenously determined.

II. The Basic Results

In this section, we first report the results of estimating equation (4). Table 1 presents all the definitions and symbols used in reporting these regression results and all subsequent regression results in this chapter.

The results of the estimation of equation (4) using narrow and broad money are shown in Tables 2 and 3. Each table show estimates of equation (4) for the six Asian countries. These countries are divided into two subgroups. India, Malaysia and Thailand represent the low inflation countries while Indonesia, Korea and the Philippines represent the high inflation countries. The equations were estimated for the period 1964 (IV) to 1979 (III) for India, Korea, Philippines and Thailand and for the period 1969(IV) to 1979)III) for Indonesia and Malaysia. The choice of sample periods was dictated by the availability of data. Quarterly data were used for estimation purposes. Previous studies have generally used annual data.² In our case, quarterly data was chosen because such data permits a better measurement of the adjustment process and of e_t and π_{dt} .

All the estimations reported in Tables 2 and 3 and all subsequent regressions in this chapter, utilised a Cochrane-Orcutt estimation procedure. This is the standard procedure utilised in estimating demand for money functions where a lagged dependent variable is present (Gordon, 1984). The Cochrane-Orcutt rho coefficient (ρ) as well as the R^2 and the standard error of the regression (SEE) are reported at the bottom of each column in the tables. The values in the parenthesis are the t-values for each respective parameter.

As the results indicate, good fits were obtained in all the estimated equations in Tables 2 and 3. Generally, the signs of the estimated parameters

TABLE 1: Definitions of Variables Used in the Regressions

Variable	Symbols
<u>Dependent Variable:</u> Real balances based on	
a. the narrow definition of money	m_t^1
b. the Broad definition of money	m_t^2
<u>Independent Variables:</u>	
a. <u>Scale variable:</u> Real GDP	y_{dt}
b. <u>Returns on domestic assets:</u>	
- Inflationary expectations:	
(i) Autoregressive Formulation	π_{dt}^1
(ii) Rational Expectation Formulation	π_{dt}^2
c. <u>Returns on foreign assets:</u>	
- Foreign nominal interest rates (U.S. 90 day finance company paper rates)	i_{ft}
- Expectation of exchange rate changes	$(\log E_t^{BM} - \log E_t^{off})$
Black market exchange rates	E_t^{BM}
Official exchange rates	E_t^{off}
d. Lagged Real balances based on	
(i) m_t^1	m_{t-1}^1
(ii) m_t^2	m_{t-1}^2

TABLE 2: Estimates of the Demand for Money Equations for Asian

Developing Countries

Dependent Variable: $\log m_t^1$

Expectation of Inflation Variable: π_{dt}^1

Expectation of Exchange Rate Changes Variable: $\log E_t^{BM} - \log E_t^O$

Countries

Independent Variables	Low Inflation Countries			High Inflation Countries		
	India	Malaysia	Thailand	Indonesia	Korea	Philippines
Constant	-.397 (-1.604)	-.541 (-1.484)	.636 (2.662)	-.508 (-.795)	-.017 (-.042)	.447 (.932)
$\log y_{dt}$	.180 (2.259)	.231 (1.581)	.166 (3.284)	.198 (1.316)	.048 (.451)	.027 (1.017)
π_{dt}^1	-.582 (-1.421)	-.212 (-.536)	-1.356 (-2.424)	-.482 (-1.467)	-1.408 (-3.356)	-1.197 (-5.641)
$\log E_t^{BM} - \log E_t^O$	.031 (.684)	-.293 (-1.071)	-.947 (-2.252)	-.226 (-.769)	-.009 (-.108)	.129 (1.386)
i_{ft}	-.005 (-1.751)	-.002 (-.609)	-.009 (-1.967)	-.004 (1.413)	.0005 (.105)	-.004 (-1.193)
$\log m_{t-1}$	.900 (16.205)	.821 (6.636)	.647 (5.836)	.972 (10.275)	.985 (14.989)	.948 (17.166)
R^2	.973	.997	.884	.992	.996	.913
SEE	.036	.017	.050	.034	.048	.034
ρ	.056	.568	.192	-.012	.262	.155

TABLE 3: Estimates of the Demand for Money Equations for Asian
Developing Countries

Dependent Variable: $\log m_t^2$

Expectation of Inflation Variable: π_{dt}^1

Expectation of Exchange Rate Changes Variable: $\log E_t^{BM} - \log E_t^{Off}$

Countries

Independent Variables	Low Inflation Countries			High Inflation Countries		
	India	Malaysia	Thailand	Indonesia	Korea	Philippine
Constant	-.414 (-1.900)	-.631 (-1.927)	-.097 (-1.217)	-.037 (-.575)	.305 (1.216)	.127 (.484)
$\log y_{dt}$	.158 (2.227)	.201 (1.936)	.467 (3.789)	.089 (.652)	.005 (.079)	.033 (1.530)
π_{dt}^1	-.953 (-3.008)	-1.234 (-5.510)	-1.076 (-2.628)	-.449 (-1.336)	-1.302 (-5.681)	-1.332 (-8.421)
$\log E_t^{BM} - \log E_t^{Off}$	.006 (.196)	-.135 (-.909)	-.447 (-1.528)	-.259 (-.876)	-.105 (-1.696)	.017 (.231)
i_{ft}	-.004 (-1.989)	-.003 (-1.829)	-.009 (-2.899)	-.005 (-1.476)	.0005 (.153)	-.004 (-1.587)
$\log m_{t-1}$	.937 (24.973)	.886 (13.364)	.605 (3.626)	.920 (14.508)	.967 (36.310)	.984 (35.36)
R^2	.991	.999	.991	.994	.999	.980
SEE	.028	.009	.036	.034	.028	.026
ρ	-.047	.669	.159	-.018	.514	.235

are consistent with predictions. The results are also seen to be highly sensitive to the inflation situation of a country.

Significance of the Foreign Opportunity Cost Variables

As suggested earlier, one of the basic issues addressed here is the significance of the returns on foreign assets in determining the demand for money in the Asian countries.

Of the two foreign opportunity cost variables, the exchange rate expectations variable ($\log E^{BM} - \log E^{off}$), was generally insignificant in the demand for money regressions in our sample of countries. The only exception is in the case of Thailand. The generally poor showing of this variable may reflect our inability to obtain a satisfactory measure of exchange rate expectations.³

The significance of the foreign nominal interest rate, i_{ft} , tends to depend on the inflationary experience of a country. It was found to be a significant explanatory variable in the low inflation countries (with the exception of Malaysia, for the case when m_t^1 is the dependent variable). The opposite was true for high inflation countries where it was not significant.

One explanation of this result may be that the foreign opportunity cost variable is subject to greater measurement error in the high inflation countries. Theoretical considerations suggest that the return to foreign bonds will consist of the foreign nominal interest rate, i_{ft} , and expectations about exchange rate depreciation (e_t). As it was not possible to derive a satisfactory measure for e_t , i_{ft} and e_t were introduced separately in the money demand equations.

The exclusion of e_t could bias the coefficient of the return on the

foreign bonds variable. This bias could be different between the low and high inflation countries. As Table 4 illustrates, the movements in actual black market exchange rates were on average significantly higher in the high inflation countries. As official exchange rates are fixed, the black market premiums are likely to be larger in the high inflation countries as well. This implies that exclusion of e_t in the measurement of returns on foreign bonds will mean a (relatively greater) underestimate of these returns in these countries. Also, this black market premium may be correlated with i_{ft} in that a rise in i_{ft} will increase the demand for foreign exchange leading to a depreciation of the domestic currency in the black market. Given the above it is plausible to argue that i_{ft} will be a more accurate representation of the theoretically 'proper' return on foreign bonds in the low inflation countries.

An alternative explanation can be offered in the case of the Korean results. As discussed in Ch. III, private individuals in Korea were quite active in the domestic financial markets and new domestic issues (of bonds, stocks, etc.) were comparable to that of the developed countries (Tables 7 and 8, Ch. III). Also, the domestic nominal interest rates were high (relative to inflation) and quite variable (Table 9, Ch. III). It is possible that in the Korean case, the holding of domestic financial assets is an attractive alternative to holding domestic money and domestic nominal interest rates represent a significant opportunity cost variable. Table 5 presents demand for money estimations for Korea where the domestic opportunity cost variable is represented by a domestic nominal interest rate variable, i_k . While this variable is significant in explaining variations in the demand for money, the foreign opportunity cost variables are still insignificant. However, it is plausible to argue that, in Korea,

TABLE 4: Movements in Actual Black Market Exchange Rates (Percentage Change)

	1964 (IV) - 1979(III) Mean	1969(IV) - 1979(III) Mean
<u>Low Inflation Countries</u>		
India	.354	-.181
Malaysia	NA	-.895
Thailand	-.044	-.079
<u>High Inflation Countries</u>		
Indonesia	NA	1.193
Korea	.746	1.421
Philippines	1.164	1.207

NA - Not available.

TABLE 5: Estimations of the Demand for Money Equations for Korea with domestic Interest Rates (i_k)

- 1964(IV) - 1979(III)

Dependent Variable	Constant	Log y_{dt}	i_k	log E ^{BM}		i_{ft}	log m_{t-1}	R^2	SEE	ρ
				log E	log E ^{Off}					
1 $\log m_t$	-1.189 (-1.792)	.430 (2.525)	-.008 (-2.019)	-.02 (-1.58)		.007 (1.182)	.696 (1.182)	.997	.049	.624
2 $\log m_t$	-.244 (-.282)	.347 (1.891)	-.004 (-2.445)	-.057 (-1.647)		.008 (1.682)	.693 (7.289)	.999	.034	.895

the presence of domestic financial assets may have reduced the incentive to hold foreign assets of the same type.

The Role of Inflationary Expectations

The other basic issue explored here is the role of inflationary expectations as an opportunity cost variable. In Tables 2 and 3, the formation of π_{dt} utilised is an autoregressive mechanism (defined as π_{dt}^1). This variable is seen to be a significant explanatory variable of the demand for money in Thailand, Korea and the Philippines. However, in the case of Indonesia, π_{dt}^1 does not exert a significant effect on the demand for money. The results for the cases of India and Malaysia are ambiguous in that π_{dt}^1 is an insignificant determinant for m_t^1 but significant for m_t^2 .

The above results may also reflect errors in measurement of domestic opportunity cost variables. The 'proper' measure of the domestic opportunity cost variable is the nominal return on domestic assets (i_d). i_d has two components - the real return (r_d) and the inflationary expectation (π_d). For most of these countries -- Korea being the exception -- data on i_d is not available. r_d is not available either. In the absence of i_d and r_d , we followed others in using π_d as an opportunity cost variable. As π_d is also unobservable, we generated it by using alternative hypothesis about the expectation generation process.

The use of π_d as an approximation of i_d has significant implications. For high inflation countries, variations in i_d will be dominated by variations in π_d (see for example Frenkel, 1977; Khan, 1977, 1980; Leiderman, 1981). Also, the presence of highly inflationary environments has often been accompanied by the imposition of financial controls which limit the availability of financial assets. In such a case, the relevant

substitution is between money and real goods (or real assets) and it is captured mostly by the π_d variable. However, this will not be the case for the low inflation countries. There, movements in i_d need not be dominated by changes in π_d and changes in r_d may form a significant proportion of nominal interest rates movements.

The above arguments imply that π_d will be a more accurate representation of the domestic opportunity cost in high inflation countries than in low inflation countries.

While this explanation may account for the ambiguous results obtained (in Tables 2 and 3) for India and Malaysia, it is not clear why the π_{dt}^1 variable was insignificant in the case of a high inflation country, namely, Indonesia. We explore this question further below.

The Role of Additional Information in Forming π_d

A second implication of the use of π_d as an opportunity cost variable concerns the use of information by individuals in forming these expectations. Individuals in all countries have an incentive to use as much information as possible to calculate π_d . This incentive will be greater for individuals in countries experiencing high inflation and particularly in countries where the average inflation rate is high and variation in it is large. Given the continuous experiences of high and variable inflation, individuals may use a more sophisticated process to generate π_d , i.e., they may use more information than only the past inflationary experience in forming expectations about future inflation.

In our sample of countries, Indonesia, Korea and Philippines represent the high inflation countries. Of these, Indonesia had experienced continuously high and variable inflation prior to the sample period (used

for estimation) as well as within the sample period. It is then likely that the π_d generation process in Indonesia will utilize more information than is contained in the π_{dt}^1 formation.

To test for this, we estimated the following demand for money function,

$$(5) \log m_t^1 = \theta_0 + \theta_1 \log y_{dt} + \theta_2 \pi_{dt}^1 + \theta_3 \left(\frac{2}{dt} - \pi_{dt}^1 \right) + \theta_4 (\log E^{BM} - \log E^{WH}) + \theta_5 i_{ft} + \theta_6 \log m_{t-1}^1$$

where $i = 1, 2$ and $\theta_1 > 0$; $\theta_2, \theta_3, \theta_4, \theta_5 < 0$.

In contrast to (4), (5) now contains an additional independent variable $(\pi_{dt}^2 - \pi_{dt}^1)$. This variable measures the contribution of additional information included in π_{dt}^2 . The inclusion of $(\pi_{dt}^2 - \pi_{dt}^1)$ facilitates direct testing, whether the additional information embedded in π_{dt}^2 is relevant in the demand for money regressions.

Tables 6 and 7 report the results of estimation of equation (5) for the six Asian countries. The estimated coefficient of the $(\pi_{dt}^2 - \pi_{dt}^1)$ variable contributes significantly to the explanation of the demand for money in Indonesia. For Indonesia, the π_{dt}^1 variable now becomes significant as well. The $(\pi_{dt}^2 - \pi_{dt}^1)$ variable is also seen to have the right impact (sign) and to improve the contribution of π_d in the demand for money regressions for the Philippines. For the other countries, this variable is either insignificant or displays the wrong sign. The evidence in Tables 6 and 7, thus corroborate the hypothesis that individuals in Indonesia use a more sophisticated process in generating π_d .

The estimates presented in Tables 2, 3, 6 and 7 also show that the impact of the scale variable, $\log y_{dt}$, on the demand for money is highly sensitive to the inflationary situation. $\log y_{dt}$ is a significant explanatory

TABLE 6: Estimates of the Demand for Money Equations for Asian Developing

Countries

Dependent Variable: $\log m_t^1$

Expectation of Inflation Variable $\pi_{dt}^1, (\pi_{dt}^2 - \pi_{dt}^1)$ Expectation of Exchange Rate Changes Variable $(\log E_t^{BM} - \log E_t^{Off})$

Countries

Independent Variables	Low Inflation Countries			High Inflation Countries		
	India	Malaysia	Thailand	Indonesia	Korea	Philippines
Constant	-.192 (-.726)	-.279 (-.996)	.634 (2.337)	.361 (.517)	-.036 (-.083)	.311 (.639)
$\log y_{dt}$	.205 (2.405)	.129 (1.020)	.166 (3.229)	-.023 (-.136)	.054 (.493)	.029 (1.095)
π_{dt}^1	-.505 (-1.501)	-.354 (.979)	-1.358 (-2.332)	-1.033 (-2.479)	-1.33 (-3.082)	-1.247 (-5.781)
$\pi_{dt}^2 - \pi_{dt}^1$	1.594 (6.246)	1.264 (3.697)	-.003 (-.868)	-.615 (-1.969)	.156 (.424)	-.269 (-1.048)
$\log E_t^{BM} - \log E_t^{Off}$	.026 (.553)	-.135 (-.542)	-.948 (-2.219)	-.099 (-.354)	-.005 (-.063)	.118 (1.273)
i_{ft}	-.006 (-2.041)	-.004 (-2.095)	-.009 (-1.924)	.0002 (.608)	.0003 (.086)	-.004 (-1.202)
$\log m_{t-1}$	.832 (13.58)	.905 (8.694)	.648 (5.370)	.985 (10.35)	.954 (14.441)	.962 (17.269)
R^2	.984	.998	.884	.993	.996	.914
SEE	.028	.015	.051	.034	.048	.034
	.400	.420	.192	-.105	.285	.142

TABLE 7: Estimates of the Demand for Money Equations for Asian Developing

<u>Countries</u>						
Dependent Variable: $\log m_t^2$						
Expectation of Inflation Variable: $\pi_{dt}^1, (\pi_{dt}^2 - \pi_{dt}^1)$			Expectation of Exchange Rate Changes Variable ($E_t^{BM} - E_t^{Off}$)			
<u>Countries</u>						
Independent Variables	<u>Low Inflation Countries</u>			<u>High Inflation Countries</u>		
	India	Malaysia	Thailand	Indonesia	Korea	Philippines
Constant	-.373 (-1.519)	-.681 (-2.209)	-.096 (-1.172)	.921 (1.443)	.309 (1.154)	.079 (.377)
$\log y_{dt}$	.196 (2.416)	.222 (2.247)	.468 (3.634)	-.131 (-.942)	.005 (.090)	.036 (1.722)
π_{dt}^1	-.935 (-3.060)	-.977 (-3.958)	-1.073 (-2.526)	-1.113 (-2.786)	-1.224 (-5.059)	-1.381 (-8.599)
$\pi_{dt}^2 - \pi_{dt}^1$	.964 (4.049)	.448 (2.006)	.010 (.035)	-.771 (-2.635)	.138 (.672)	-.255 (-1.350)
$\log E_t^{BM} - \log E_t^{Off}$	.0009 (.252)	-.064 (-.430)	-.447 (-1.512)	-.177 (-.669)	-.099 (-1.548)	.011 (.156)
i_{ft}	-.005 (-1.902)	-.004 (-2.522)	-.009 (-2.868)	.001 (.295)	.0006 (.175)	-.004 (-1.598)
$\log m_{t-1}$	.892 (20.11)	.873 (13.730)	.603 (5.278)	1.029 (.295)	.965 (33.976)	.986 (35.96)
R^2	.984	.999	.991	.995	.999	.980
SEE	.026	.009	.036	.032	.028	.025
ρ	.234	.641	.159	-.145	.546	.228

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MICROCOPY RESOLUTION TEST CHART
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variable in the low inflation countries (except in the case of Malaysia when m_t^1 is the dependent variable). This pattern is reversed for the high inflation countries where the current income variable was not found to be a significant explanatory variable. This result is consistent with previous studies (e.g., Frenkel, 1980) where it was argued that in highly inflationary situations, movements in variables such as π_d will dominate all other explanatory variables in explaining changes in the demand for money. In such a case, it is not unusual to find an insignificant effect of the income variable in the demand for money in the high inflation Asian countries.

In the Korean case, it is likely that (4) and (5) are not the proper specifications of the demand for money. Once the nominal interest rate is introduced as an independent variable (Table 5), the real income variable becomes a significant determinant of the demand for money.

III. Test for Robustness of the Coefficient of the Foreign Interest Rate Variable

One of the most interesting results that emerge from estimations presented in Section II, is the significance of the foreign interest rate variable, i_{ft} , as an explanatory variable in the demand functions in three out of the six Asian countries that were examined. This result contradicts the assumption generally made in the traditional literature that the demand for money in the Asian countries is inelastic with respect to return on foreign assets. Our results suggest that this is not the case and that changes in returns from foreign assets - as measured by i_{ft} - do affect the demand for money in India, Malaysia and Thailand.

However, it may be argued that the results presented in Section II

may be subject to specification bias and that the conclusions regarding the significance of i_{ft} in the demand for money equations may not hold for other specifications. In order to argue that the results are robust, it must be shown that the results - with regard to sign and significance of the parameters - hold over all alternative specifications of the demand for money equations.

In this section, we carry out a test for the robustness of the coefficient of i_{ft} . To do so, we follow the procedure used by Cooley and Leroy (1981). We chose to carry out the search for alternative specifications by examining equation (5) for India, Malaysia, Thailand, Indonesia and the Philippines. For Korea, the following money demand equation was employed for the specification search.

$$(6) \log m_t^i = \tau_0 + \tau_1 \log y_{dt} + \tau_2 i_{kt} + \tau_3 (\log E_t^{BM} - \log E_t^{off}) \\ + \tau_4 i_{ft} + \tau_5 \log m_{t-1}^i$$

where $i = 1, 2$.

Since our main interest is in testing the robustness of the coefficient of the variable, i_{ft} , we define i_{ft} as our focus variable. In finding alternative specifications of equations (5) and (6), i_{ft} was retained in all formulations. As well, the variables, $\log y_{dt}$ and $\log m_{t-1}^i$ were retained in all specifications to represent the scale variable and to allow for short run adjustments in the demand for money, respectively. Alternative specifications are then found by including or excluding the remaining independent variables, in each equation, in turn. An example of the alternative specifications of equation (5) is provided in Table 8. In all, 12 alternative specifications were estimated for each of the 5 countries - India, Malaysia, Thailand, Indonesia and the Philippines. For Korea, the number

TABLE 8: Examples of Alternative Specifications of Equation 5

Specification No.	Dependent Variable	Variables Retained in all Equations	'Other' Variables Included in the regression
1.	$\log m_{dt}^1$	$\log y_d^t, \log m_{t-1}^1, i_{ft}$	$\pi_{dt}^1, (\pi_{dt}^2 - \pi_{dt}^1), (\log E^{BM} - \log E^{Off})$
2.	"	"	$\pi_{dt}^1, (\pi_{dt}^2 - \pi_{dt}^1)$
3.	"	"	$\pi_{dt}^1, (\log E^{BM} - \log E^{Off})$
4.	"	"	π_{dt}^1
5.	"	"	$(\log E^{BM} - \log E^{Off})$
6.	"	"	None

(All six formulations are repeated for the dependent variable m_t^2 .)

of alternative specifications was 8.

Tests for the robustness of the estimated sign and significance of the coefficient of the focus variable i_{ft} are then performed by testing the sensitivity of the estimated focus coefficient to the inclusion or exclusion of the other variables in the regression. If the estimated coefficient remains significant and of the correct sign over all (or most) alternative specifications it may then be said that the influence of i_{ft} on the demand for money is robust.

In Table 9, we present the extreme values of the focus coefficient resulting from estimations of the alternative specifications - and their t-values. The coefficients of i_{ft} had the correct sign and were significant for the majority of the alternative specifications estimated for India, Thailand, Malaysia and the Philippines. It can thus be concluded, that in these countries, the return from foreign bonds does exert a significant influence over the demand for money.⁴

TABLE 9: Extreme Bounds of the Estimated Coefficients of i_{ft}

Country	No. of Alternative Formulations	Extreme bound of Coefficients and their t-values in brackets	No. of Formulations where the Coefficient was significant
India	12	-0.0042 to -0.009 (-1.989) (-2.508)	11 ¹
Indonesia	12	-0.00006 to .006 (-.0176) (.172)	5
Korea	8	All coefficients were insignificant.	
Malaysia	12	-0.0004 to -0.0041 (-.609) (-1.852)	4 ²
Philippines	12	-0.0024 to -0.0077 (-.815) (-1.708)	4 ³
Thailand	12	-0.008 to -0.011 (-1.631) (-1.919)	11 ¹

(* denotes significance at 95% level of confidence)

Notes:

1. All 12 formulations were significant at 90% level of confidence
2. 10 out of 12 formulations were significant at 90% level of confidence.
3. 8 out of 12 formulations were significant at 90% level of confidence.

FOOTNOTES TO CHAPTER V

1. Recent literature on the demand for money has raised questions about the Chow (1966) adjustment process used in the text. For example, Laidler (1982) suggests that, while this formulation is a sensible description of how an individual adjusts his cash position, it is not necessarily a satisfactory description of aggregate behavior.

Alternative adjustment formulations have been suggested by Goldberg (1976) where the adjustment is in nominal rather than real balances. Goldberg uses an adjustment equation where the changes in the nominal money balances (M) of the public are taken to be a fraction of the discrepancy between the nominal money balances demanded by the public, given the price level and money balances of the last period, i.e.,

$$\log M_t - \log M_{t-1} = \lambda(\log m_t^* P_t - \ln M_{t-1})$$

where m_t^* is the desired money balances.

Walters (1965), Laidler (1982), and Coats (1982) suggest that inflation is a monetary phenomenon and that the public adjusts its real balances through variations in the price level. This variation equates nominal money balances desired by the public to the nominal money balances given exogenously to it by the monetary authorities

$$\log P_t - \log P_{t-1} = \lambda(\log M_t - \log m_t^* P_{t-1})$$

Gordon (1984) argues that all the above formulations constrain the adjustments of real balances to all the determinants of real balances (y_{dt} , π_{dt} , etc.) to be identical. He then introduces the possibilities of different adjustment paths of real balances to different determinants of the demand for money.

While the problem of defining short run adjustments of real balances is highly interesting, a full description of these processes is outside the scope of this study and is left for further research.

2. See for example M. Khan et al. (1980).
3. This result, as well as the other results reported in the text, held consistently in all demand for money estimations that used the other definitions of e_t mentioned in Ch. IV.
4. A similar test for robustness was performed for the coefficient of $(\log E^{BM} - \log E^{off})$ for Thailand. The results reveal that this coefficient was significant at 95% level of confidence in only 2 out of 12 alternative specifications and 5 out of 12 cases at 90% level of confidence. The impact of e_t on the demand for money can thus be said to be non-robust in the case of Thailand.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The purpose of this thesis was to examine the determinants of the demand for money in Asian developing countries. In particular, it sought to analyse whether the demand for money in these countries was significantly influenced by rates of return on foreign assets. A secondary concern was to develop a better measure of the inflationary expectation variable which is considered an important domestic opportunity cost variable in these countries.

In postulating that foreign variables may be significant arguments in the demand for money, this thesis questioned the traditional formulations of the demand for money in these countries. In the traditional approach, official restrictions on all foreign exchange transactions and capital flows were assumed to close linkages between domestic and foreign asset markets. Individual's asset portfolios in the Asian countries were assumed to be restricted to domestic assets. In contrast, this thesis has argued there is considerable empirical evidence to suggest that alternatives to official foreign exchange markets exist and integration with external asset markets is more widespread than previously thought.

It offers, on *a priori* grounds, two reasons why returns on foreign assets may have particular significance in the demand for money in Asian developing countries. First, domestic residents in these countries will have the same portfolio diversification motivation as is generally assumed to be the case in the developed countries, i.e., they will demand foreign assets as part of their asset portfolio. It also asserts that the shallow nature of the domestic financial markets and official controls on the

nominal returns on the few financial assets that are available will create additional incentives to hold wealth in foreign assets. Second, the existence of controls on the returns on domestic financial assets meant that the reported interest rate series will not represent the actual returns from these assets. If external linkages (in the asset markets) exist, the foreign returns may then serve as a proxy for the actual return on the domestic financial assets in the demand for money formulation.

To examine the hypothesis that foreign return variables significantly affect the demand for money in Asian developing countries, we formed a demand for money function that included rates of return on foreign assets in its opportunity cost vector. In addition to the domestic income variable and the domestic return variable as proxied by the expectations of domestic inflation rates, returns from two foreign assets - foreign money and bonds - were also considered. This demand for money function was, then, estimated for six Asian countries. Of these, India, Malaysia and Thailand represented the low inflation countries and Indonesia, Korea and Philippines were examples of high inflation countries.

Estimation of these demand for money functions required the specification of two expectations variables - the expectations of inflation rates and of the change in exchange rates. We considered two alternative procedures to generate these variables. These were (i) an autoregressive process and (ii) a full information rational expectations process. As it was not possible to derive a satisfactory estimate of the expectations of changes in exchange rate from the above procedures, an alternative measurement based on the black market premium was proposed.

Estimations of the demand for money in the six Asian countries, yielded distinctly separate results for low inflation and the high inflation

countries. The main results were.

a. Contrary to the assumptions inherent in the traditional formulations, the demand for money in the low-inflation Asian countries -- India, Malaysia and Thailand -- are significantly responsive to changes in foreign interest rates. This result was seen to be robust over (almost) all alternative specifications of the demand for money in these countries.

None of the foreign return variables were significant explanatory variables in the demand for money functions in the high inflation countries - Indonesia, Korea and the Philippines.

b. The autoregressive measure of the expectation of domestic inflation rates - the return on domestic assets - served as significant opportunity cost variable in the demand for money functions in Thailand, Korea and the Philippines. It was not found to be as good a measure in India, Malaysia and Indonesia.

The full information rational expectations measure of the expected inflation rate was a significant explanatory variable in Indonesia - the country exhibiting (consistently) the highest inflation rates. This suggests that experiences of continuously high and variable inflation led individuals in Indonesia to use a more sophisticated process of generating inflationary expectation. However, this does not appear to be the case in all other countries considered here.

c. In the Korean case, domestic financial assets were found to be significant alternative assets to holding domestic money.

The evidence provided in this thesis has strong implications for the specification of demand for money functions in Asian developing economies. Previous studies of the demand for money in these countries had generally been specified in terms of a domestic income variable and a domestic opportunity cost variable (as proxied by the expectations of inflation).

Our results suggest that greater attention should be paid to the inflationary experiences of a country in forming the demand for money function. In particular, the opportunity cost vector is seen to be significantly different between the low inflation and the high inflation countries.

In the low inflation countries, returns from foreign assets, such as foreign bonds are a significant element of the opportunity cost vector. This is not the case in the high inflation countries. In these countries, the inflationary expectation variable turns out to be an important opportunity cost to holding domestic money. Also individuals in countries where high inflation rates are consistently observed, use more information in forming expectations than the simple autoregressive processes widely assumed in past studies. Disregarding the inflationary situations may, thus, lead to misspecification of the demand for money functions in the Asian developing countries.

Significant impacts of the foreign interest rates on the demand for money (in the low inflation countries) has important implications for the insulation properties of these economies. Foreign disturbances may now be transmitted through the demand for money as well. Ignoring this effect will then lead to incorrect conclusions about the impacts of external changes on the domestic economy.

Several topics worthy of further research emerge from this thesis. In this study, we have assumed a simple Chow adjustment procedure in specifying a short run demand for money function. Recently, some other adjustment procedures have been proposed (Goldberg, 1976; Laidler, 1982; Gordon, 1984). It would be of interest to apply these adjustment procedures to the demand for money formations in these countries.

Also, this thesis has assumed an exogeneous money supply process. However, some Asian countries such as Korea and the Philippines have borrowed heavily in the international capital markets. These borrowings will be influenced by foreign interest rates and may, in turn, influence the money supply reaction functions. Issues concerning the money supply process are beyond the scope of this thesis. However, further research elaborating this aspect would be of considerable interest.

More research is also needed on data gathering and measurement of key variables. It is desirable, for example, to obtain accurate measurements of the returns from domestic assets, expectations of change in exchange rates and a way to measure the transaction costs incurred in obtaining foreign exchange through the extralegal markets. Considerable work remains to be done in this area.

BIBLIOGRAPHY

- Adekunle, J.O., "The Demand for Money: Evidence from Developed and Less Developed Economies", IMF Staff Papers, July 1968.
- Aghevli, B.B., M.S. Khan, P.R. Narvekar and B.K. Shoot, "Monetary Policy in Selected Asian Countries", IMF Staff Papers, December 1979.
- Aghevli, B.B., "Exchange Rate Policies of Selected Asian Countries", Finance and Development, June 1982.
- Arango, S. and M.I. Nadiri, "Demand for Money in Open Economies", Journal of Monetary Economy, 1981.
- Bank of Korea Economics Statistics Yearbook, Various issues.
- Barro, R.J. and A.J. Santomero, "Household Money Holdings and the Demand Deposit Rates", Journal of Money, Credit and Banking, May 1972.
- Bhaduri, A., "On the Formation of Usurious Interest Rate in Backward Agricultural Countries", Cambridge Journal of Economics, December 1977.
- Bhagwati, J.N., Anatomy and Consequences of Exchange Control Regimes, National Bureau of Economics Research, Ballinger, Cambridge, 1978.
- Bhatt, V.V., "Some Aspects of Financial Policies and Central Banking in Developing Countries", World Development, Oct-Dec., 1974
- Blejer, M., "Black Market Exchange Rate Expectations and The Domestic Demand for Money: Some Empirical Results", Journal of Monetary Economics, 1978.
- Boothe, P., K. Clinton, A. Cote and D. Longworth, International Asset Substitutability - Theory and Evidence for Canada, Bank of Canada, February, 1985.
- Bordo, M.D. and E.U. Choudhri, "Currency Substitution and the Demand for Money: Some Evidence for Canada", Journal of Money, Credit and Banking, February 1982.
- Bottomley, A., "Interest Rate Determination in Underdeveloped Rural Areas", American Journal of Agricultural Economics, May 1975.
- Branson, W., "Portfolio Equilibrium and Monetary Policy with Foreign and Non-Traded Assets", in Recent Issues in International Economics, E. Classen and P. Salin (eds.), Amsterdam: North Holland, 1976.
- Branson, W., "Asset Markets and Relative Prices in Exchange Rate Determination", in Inflation and Employment in Open Economies, A. Luidbeck (ed.), Amsterdam: North Holland, 1979.
- Brittain, B., "International Currency Substitution and the Apparent Instability of Velocity in Some Western European Economies and in the United States", Journal of Money, Credit and Banking, May 1981.
- Bruno, M., "Stabilization and Stagflation in a Semi-Industrialized Economy", International Economic Policy: Theory and Evidence, R. Dornbusch and J. Frenkel (eds.), 1979.

- Campbell, C.D., "The Velocity of Money and the Rate of Inflation: Recent Experiences in South Korea and Brazil", in Varieties of Monetary Experience, D. Meiselman (ed.), University of Chicago Press, 1970.
- Chandravarkar, A.G., "Some Aspects of Interest Rate Policies in Less Developed Economies", IMF Staff Papers, March 1971.
- Chow, Gregory, "On the Long-Run and Short-Run Demand for Money", Journal of Political Economy, 74, April 1966.
- Coats, W.L. Jr., "Modelling the Short-Run Demand for Money with Exogenous Supply", Economic Inquiry 20, April 1982.
- Coats, W.L. and D.R. Khatkhate, "Money and Monetary Policies in Less Developed Countries: Survey of Issues and Evidence", in Money and Monetary Policy in Less Developed Countries: A Survey of Issues and Evidence, W.L. Coats Jr. and D.R. Khatkhate (eds.), Pergamon Press, 1980.
- Colley, T.F. and S.F. LeRoy, "Identification and Estimation of Money Demand", The American Economic Review, December 1981.
- Crockett, A.B. and S.M. Nsouli, "Exchange Rate Policies for Developing Countries", The Journal of Development Studies, January 1977.
- Cuddington, J.T., "Current Substitution, Capital Mobility and Money Demand", Journal of International Money and Finance, Vol. 2, No. 2, August 1983.
- Deaver, J.V., "The Chilean Inflation and the Demand for Money", in Varieties of Monetary Experience, D. Meiselman (ed.), University of Chicago Press, 1970.
- Diz, A.C., "Money and Prices in Argentina, 1953-61", in Varieties of Monetary Experience, D. Meiselman (ed.), University of Chicago Press, 1970.
- Dornbusch, Rudiger, "Capital Mobility, Flexible Exchange Rates and Macroeconomic Equilibrium", in Recent Issues in International Monetary Economics, E. Clarsen and P. Salin (eds.), Amsterdam: North Holland, 1976.
- Dornbusch, R. et al., "The Black Markets for Dollars in Brazil", The Quarterly Journal of Economics, February 1983.
- Feige, E.L. and D.K. Pearce, "The Substitutability of Money and Near Monies", Journal of Economic Literature, 1977.
- Frenkel, A.J., "Flexible Exchange Rates, Prices and the Role of News: Lessons from the 1970s", Journal of Political Economy, 1981.
- Friedman, M., "The Quantity Theory of Money: A Restatement", in Studies in the Quantity Theory of Money, University of Chicago Press, Chicago, 1956.

Friedman, M., "Time Perspective in Demand for Money", Scandinavian Journal of Economics, 1977.

Friedman, M. and A. Schwartz, "The Effect of Term Structure of Interest Rates on the Demand for Money in the United States", Journal of Political Economy, February 1982.

Fry, M.J., "Money and Capital or Financial Deepening in Economic Development", Journal of Money, Credit and Banking, November 1978(a).

Fry, M.J., "Monetary Policy and Domestic Saving in Developing ESCAP Countries", Economic Bulletin for Asia and the Pacific, June 1978(b).

Girton, L. and D. Henderson, "Central Bank Operations in Foreign and Domestic Assets under Fixed and Flexible Exchange Rates", Journal of Monetary Economics, 2, 1976, pp. 33-61.

Girton, L. and D. Roper, "Theory and Implications of Currency Substitution", Journal of Money, Credit and Banking, 13, 1981, pp. 12-30.

Goldfeld, S.M., "The Demand for Money Revisited", Brookings Papers on Economic Activity, 1973.

Goldfeld, S.M., "The Case of the Missing Money", Brookings Papers on Economic Activity 3, 1976.

Gordon, R.J., "The Short-Run Demand for Money: A Reconsideration", Journal of Money, Credit and Banking, Vol. 16, No. 4, November 1984.

Hamburger, M., "The Demand for Money in an Open Economy - Germany and the United Kingdom", Journal of Monetary Economics, 1977.

Harburger, A.C., "The Dynamics of Inflation in Chile", in Measurement in Economics: Essays in Mathematical Economics and Econometrics in the Memory of Yehuda Grunfeld, C.F. Christ et al. (eds.), Stanford University Press, 1963.

Heller, R.H. and M.S. Khan, "The Demand for Money and the Term Structure of Interest Rates", Journal of Political Economy, February 1979.

Helpman, E. and A. Razin, "Towards a Consistent Comparison of Alternative Exchange Rate Systems", Canadian Journal of Economics, August 1979, pp. 394-409.

Hertzel, R.L., "Estimating Money Demand Functions", Journal of Money, Credit and Banking, Vol. 16, No. 2, May 1984.

Hu, T.W., "Hyperinflation and the Dynamics of the Demand for Money, Taiwan 1945-1949", Journal of Political Economy, Jan.-Feb. 1971.

International Monetary Fund, International Financial Statistics, various issues, Washington, D.C.

Johnson, O.E.G., "Credit Controls as Instruments of Development Policy in the Light of Economic Theory", Journal of Money, Credit and Banking, February 1974.

Judd, J.P. and J.L. Scadding, "The Search for a Stable Money Demand Function: A Survey of the Post-1973 Literature", Journal of Economic Literature, September 1982.

Kareken, J. and N. Wallace, "On the Indeterminacy of Equilibrium Exchange Rates", Quarterly Journal of Economics, May 1981, pp. 207-222.

Kaul Committee, Report of the Study Team on Leakage of Foreign Exchange through Invoice Manipulation, Ministry of Finance, Government of India, 1971.

Khan, M., "Monetary Shocks and the Dynamics of Inflation", IMF Staff Papers, June 1980.

Khatkhate, D.R. and D.P. Villaneuva, "Operation of Selective Credit Policies in Less Developed Countries: Certain Critical Issues", World Development, July-August 1978.

King, D. T., B.H. Putnam, and D.S. Wilford, "A Currency Portfolio Approach to Exchange Rate Determination: Exchange Rate Stability and Independent of Monetary Policy", The Monetary Approach to International Adjustment, B.H. Putnam and D.S. Wilford (eds.), Praeger, New York, 1978.

Klein, B. "Competitive Interest Payments on Bank Deposits and the Long Run Demand for Money", American Economic Review, December 1974.

Laidler, D.E.W., The Demand for Money: Theories and Evidence, 2nd Edition, Dun-Donnelly Press, New York, 1977.

Laidler, David E., Monetarist Perspectives, Cambridge, Mass., Harvard University Press, 1982.

Leiderman, Leonardo, "The Demand for Money Under Rational Expectations of Inflation: FIML Estimates for Brazil", International Economic Review, Vol. 22, No. 3, October 1981.

McKinnon, R., Money and Capital in Economic Development, The Brookings Institution, Washington, D.C., 1973.

McKinnon, R.I., "Currency Substitution and Instability in the World Dollar Standard", The American Economic Review, June 1982.

Melitz, J., "Inflationary Expectations and the French Demand for Money, 1959-70", Manchester School, March 1976.

Miles, D.M., "Currency Substitution, Flexible Exchange Rates and Monetary Independent", American Economic Review, 1978.

- Mishkin, F.S., "Does Anticipated Monetary Policy Matter? An Econometric Investigation", Journal of Political Economy, 1982(a).
- Mishkin, F.S., "Does Anticipated Aggregate Demand Policy Matter", The American Economic Review, September, 1982(b).
- Mussa, M.L., "Empirical Regularities in the Behavior of Exchange Rates and Theories of the Foreign Exchange Market", in Policies for Employment Prices and Exchange Rates, K. Brunner and A.M. Meltzer (eds.), Carnegie Rochester Conference Series on Public Policy, Vol. II (Supplementary Series to Journal of Monetary Economics), 1979.
- Mussa, M., "Macroeconomic Interdependence and the Exchange Rate Regime" in International Economic Policy: Theory and Evidence, R. Dornbusch and J.A. Frenkel (eds.), The Johns Hopkins University Press, 1979.
- Nayak, S.S., "Illegal Transaction in External Trade and Payments in India: An Empirical Study", Economic and Political Weekly, No. 12, 1977.
- Nayak, S.S., "Illegal Transaction in Trade and Payments in India: A Reply", Economic and Political Weekly, No. 7, 1979.
- Patel, I.G., "Selective Credit Controls in Underdeveloped Economies", IMF Staff Papers, September 1954.
- Pendharkar, V.G. and M. Narasimham, "Recent Evolution of Monetary Policy in India", Reserve Bank of India Bulletin, April 1966; reprinted in Money and Monetary Policy in Less Developed Countries: A Survey of Issues and Evidences, W.L. Coats Jr., and D.R. Khatkhate (eds.), Pergamon Press, 1980.
- Pick, F., Pick's Currency Year book, New York (Various issues).
- Pitre, V., "Illegal Transactions in Trade and Payments: A Comment", Economic and Political Weekly, No. 28, 1978.
- Rahman, S.S. and F. Zandi, "Insulation Properties of a Small Open Economy Reconsidered", Department of Economics, Research Report #8474, Wilfred Laurier University, 1984.
- Salemi, M.K., "Expected Exchange Depreciation and the Demand for Money in Hyperinflation Germany", Journal of Money, Credit and Banking, November 1980.
- Shapiro, A.A., "Inflation, Lags and the Demand for Money", International Economic Review, February 1973.
- Shaw, E.S., Financial Deepening in Economic Development, Oxford University Press, New York, 1973.
- Tanzi, V. and M.I. Blejer, "Inflation, Interest Rate Policy and Currency Substitution in Developing Economies: A Discussion of Some Major Issues", World Development, September 1982 (Vol. 10, No. 9).
- Taylor, L., Macro Models For Developing Countries, McGraw-Hill, New York, 1979.
- Vogel, R.C., "The Dynamics of Inflation in Latin America, 1950-1969", American Economic Review, June 1974.

Wai, U.T., "Interest Rates Outside the Organized Money Markets in Underdeveloped Countries", IMF Staff Papers, November 1957.

Wai, U.T. and H.T. Patrick, "Stocks and Bond Issues and Capital Markets in Less Developed Countries", IMF Staff Papers, 1973.

Wai, U.T., "A Revisit to Interest Rates Outside the Organized Money Markets of Underdeveloped Countries", Banco Nazionale del Lavoro Quarterly Review, September 1977.

Walters, Alan A., "Professor Friedman on the Demand for Money", Journal of Political Economy 73 (October 1965).

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