Interest Rates, Exchange Rates and Financial Deepening in Selected Asian Economies

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This article presents an empirical investigation of the impact of real interest rates and real exchange rates on financial deepening in four Asian countries, South Korea, Malaysia, Thailand, and Indonesia. The financial deepening ratio (proxied by the ratio of broad money to GDP) generally increases with higher real interest rates and with real currency depreciation. Foreign assets seem to have become important in the East Asian countries (except Malaysia), suggesting that at least some of the assets coming to the banking system in response to higher interest rates could be at the expense of foreign assets held by domestic residents. This implies that higher real interest rates are likely to increase investment ratios in these economies. These results support a policy of interest rate liberalization, although this ought to be done in a controlled and gradual fashion to minimize the potential for financial distress.

I. Introduction

A well functioning financial system can play an important role in economic development by facilitating capital formation, which in turn promotes economic growth.[1] A higher rate of growth is, in turn, a necessary condition for alleviating poverty in a market economy where major wealth or income redistribution may be difficult to achieve (Jain and Tendulkar 1990).

Financial sector development or "deepening" involves the design and implementation of policies to intensify the degree of monetization of the economy through increased access to financial institutions, their transparent and efficient functioning, and ensuring reasonable rates of return in real terms. The banking sector tends to dominate the financial system in most developing countries and is, therefore, the focus of this article.

Until the early 1970s, it was generally believed that low interest rates on bank loans and deposits would promote investment spending and growth — a notion consistent with the Keynesian and neoclassical analyses where the interest rate is part of the cost of capital (see Keynes 1936 and Jorgenson 1967, respectively). McKinnon (1973) and Shaw (1973) challenged this conventional wisdom. They argued that higher interest rates increased the amount people are willing to hold as financial assets by decreasing the holdings of non-financial assets such as cash, gold, commodities, and land. An additional channel through which the same effect might materialize would be by increasing the holdings of domestic assets relative to foreign assets. The domestic financial system would consequently be able to extend more loans to investors, hence raising the equilibrium rate of investment.[2] This is further enhanced if the cost of intermediation by banks is kept low by having a competitive banking structure and minimal taxation on financial intermediation. Thus, McKinnon-Shaw argued strongly in favour of "financial liberalization".

Motivated at least partly by their work, many developing countries have undertaken financial liberalization, though the timing, pace and sequencing have varied quite significantly. The outcome of these reforms has been mixed at best. While financial liberalization produced improved economic performance in some countries, it also led to financial distress and crises in many others.[3] This mixed outcome has led to a reassessment of the case for financial liberalization.

The "neo-structuralist" economists have argued that higher bank interest rates lead to higher bank deposits simply due to the transfer of funds away from alternative asset holdings (Taylor 1983), such as the informal credit markets (Edwards 1988; van Wijnbergen 1982) or share markets. They also argued that some of these, such as the informal credit markets, might be a more efficient means of financing investment since institutions in these markets are essentially unregulated and do not need to hold reserves (as banks do). Thus, according to the neo-structuralists, raising interest rates on bank deposits would *decrease*, rather than *increase*, the rate of capital formation in the economy. However, Kapur (1992) and Bencivenga and Smith (1992) have shown that the argument about the greater efficiency of the informal sector due to the lack of a formal reserve requirement is not valid if the central bank makes proper use of the banks' reserves, thereby ensuring that the reserves do not bear a social cost. This implies that as long as a part of the additional assets entering the banking sector are from non-financial or foreign assets, raising bank interest rates (to market clearing level) would be desirable.[4]

In this article we estimate econometrically the main factors affecting the financial deepening in four Asian economies, namely, South Korea, Malaysia, Thailand, and Indonesia. The choice of the countries was based on: their exemplary investment and growth rates from the mid-sixties to the mid-nineties that has evoked considerable interest in their development experiences, and the financial crisis of 1997–98 which has evoked interest in them for somewhat different reasons; and their having experienced a wide range of real interest rates and real exchange rate variations, which makes it possible to analyse the impact of these variables. The four countries are considered simultaneously in the expectation that the lessons that emerge will carry greater conviction than single country case studies can provide.

We also explore the source of additional funds coming to the banking sector. In the absence of data on informal sector variables, we try to examine whether some of the financial assets entering the banking sector might be coming from foreign assets held by nationals. To this end, we estimate the financial deepening ratio (defined as the ratio of broad money, M2, to GDP) as a function of real interest rates, real exchange rates and other variables.

There exists an extensive literature on the determinants of financial deepening.[5] However, few of these studies have attempted to simultaneously incorporate the effects of real interest rates and real exchange rates in evaluating the validity of the McKinnon–Shaw or the neo-structuralist hypotheses for the four Asian countries.

In this article, we use the co-integration procedures. For enhanced reliability, two separate procedures are used for most estimations: the error correction mechanism (ECM) procedure recently proposed by Banerjee et al. (1998), and the dynamic OLS procedure of Stock and Watson (1993). Banerjee et al. showed that the ECM procedure provided a more reliable test of co-integration as well as an unbiased estimate of the long-run relation when the explanatory variables are weakly exogenous of the parameters of interest. The dynamic OLS procedure has been shown to provide unbiased and asymptotically efficient estimates of the long-run relation, even in the presence of endogenous regressors.

The plan for the rest of the article is as follows. In Section II we present a brief discussion of various explanatory variables that might affect financial deepening, and specify the functional form to be estimated. We then discuss the unit roots test on the variables of interest and describe the econometric procedures used in the article in Section III. In Section IV, we discuss the results of our estimation of the financial deepening function. Some concluding remarks are made in Section V. A brief description of sources of data and some details of the econometric estimations are provided in the Appendix.

II. Specification of the Financial Deepening Function

McKinnon (1973) and Shaw (1973) suggested that the demand for real money balances proxied by m2 (i.e. M2/P, where M2 is nominal broad money and P is a price index – GDP deflator with the base year value set to 1) is an increasing function of the real interest rate (R_d) on bank time deposits and real GDP, y:

$$m2 = M2/P = F(y, R_d) \qquad (1)$$

where the real interest rate (R_d) is defined as the nominal interest rate on bank deposits (I_d) minus the expected inflation rate (π^e):

$$R_d = I_d - \pi^e \qquad (2)$$

In the absence of any systematic data on expected inflation rate, π^e, it is proxied here by the actual inflation rate over the following year (derived using the GDP deflator). This is broadly consistent with the rational expectations hypothesis. All variables are expressed in per cent.

There is increasing evidence that the real exchange rate (RER) also affects the demand for money. RER is defined as:

$$RER = X.P^f/P, \qquad (3)$$

where X is the exchange rate (number of domestic currency units per dollar); P is the domestic price level (the GDP deflator); and P^f is the foreign price level (proxied here by the United States GDP deflator, since the United States is the most important trading partner of the countries being studied). Arango and Nadiri (1981) have argued that real currency depreciation increases the value of foreign securities held by domestic residents. If this increase is perceived as an increase in wealth, the demand for money may increase. The demand for money could also increase if the depreciation of the real exchange rate reduces the expectation of further depreciation, thus diminishing the attractiveness of holding foreign assets.

Making use of the Cobb-Douglas functional form, which is common in the money demand literature (see, for example, Goldfeld and Sichel 1990), and extending it to include the variable RER, we are able to express m2 in the following form:

$$m2 = Ay^{\alpha}RER^{\beta}e^{Rd} \qquad (4)$$

In the literature, the homogeneity condition is often imposed on money demand ($\alpha = 1$). However, this is a restrictive assumption; it seems preferable to work with the more general formulation where α is empirically determined. Since the focus of this article is on financial deepening, dividing by y on both sides and taking logs, we get:

$$\ln (m2/y) = a_o + a_1 \ln y + a_2 \ln RER + a_3 R_d \qquad (5)$$

where M2 is nominal broad money. Y is nominal GDP, $a_1 = \alpha - 1$, $a_2 = \beta$, and $a_o = \ln A$, with ln denoting natural logarithm.[6] If a_3 is found to be significant and positive, it would provide evidence in favour of the McKinnon–Shaw assertions that higher interest rates lead to greater demand for bank assets. If a_2 is found to be significant, it would imply that foreign holdings are a significant determinant of demand for domestic bank assets, suggesting that some of the additional bank deposits following an increase in domestic real interest rates might come from a reduced holding of foreign assets.

III. Brief Description of the Econometric Procedures Used

In accordance with the practice in modern time series analysis, to estimate the financial deepening and investment functions, we first tested all relevant variables for stationarity to decide upon the appropriate econometric procedures to be used. We used the augmented Dickey Fuller (ADF) test (described below) for this purpose. Most of the variables, with the exception of real interest rates (R_d), were found to be non-stationary for most countries. However, all non-stationary variables were stationary after first differencing, i.e. they were integrated of order 1 (denoted I(1)).

The co-integration methodology is therefore appropriate here. Given the limited number of observations (25 to 35 annual observations), we used single equation procedures. For added reliability two separate co-integration estimation techniques for individual countries will be carried out: the ECM procedure proposed by Banerjee et al. (1998) and the dynamic OLS (DOLS) procedure of Saikonnen (1991) and Stock and Watson (1993). We briefly describe below the ADF test and the ECM and DOLS procedures, and some of their main advantages and limitations.

1. *The Augmented Dickey Fuller (ADF) Test*

This test is based on the following regression:

$$\Delta X_t = \alpha + \beta X_{t-1} + \Sigma_1^J \gamma_j \Delta X_{t-j} + \varepsilon_t \qquad (6)$$

where Δ is the difference operator and ε_t is the white noise error term. The null hypothesis is that X_t is a non-stationary series and is rejected when β is significantly negative. The critical values for the t statistics for β have non-standard distributions (for example, see Davidson and Mackinnon 1993 for the critical values). A trend term is also included in the above regression if a variable has trend. The optimal J is usually chosen to minimize the Akaike criterion, subject to a maximum value (approximately $T^{1/3}$ where T is the number of observations — set to 3 in our estimations). The detailed results of the ADF test for the variables of interest here for the four countries being studied are reported in Table 1.

2. *The ECM Test of Banerjee et al. (1998)*

This test procedure provides a more reliable test of co-integration than the static OLS procedure, and simultaneously yields less biased estimates of the long-run relationship among the variables — weak exogeneity of the regressors for the parameters of interest being a sufficient condition for the procedure to provide asymptotically efficient estimates. Let Y (a scalar) and X (a k-dimensional vector in general) be I(1) processes that are co-integrated. Then, in the static OLS (first step of Engle and Granger 1987), the Dickey Fuller test of co-integration is based on the t-statistic of the coefficient of β in the regression:

$$\Delta Y - \lambda^{s\prime}\Delta X = \beta(Y_{-1} - \lambda^{s\prime}X_{-1}) + e_1 \qquad (7)$$

where λ^s is a k-dimensional vector of coefficients of X, estimated by the static OLS and a prime (′) on a vector denotes its transpose. Banerjee et al. (1998) point out that the ECM regression:

$$\Delta Y = \alpha'\Delta X + \beta(Y_{-1} - \lambda' X_{-1}) + e_2 \qquad (8)$$

is the more general form of equation (7) that does not impose the potentially invalid *common factor restriction,* $\alpha = \lambda$, and is, therefore, likely to yield more accurate results. More generally, when X may be only weakly exogenous to the parameters of interest, Banerjee et al. recommend estimating the following (unrestricted) ECM regression by OLS:

$$\gamma(L)\Delta Y_t = \alpha(L)'\Delta X_t + \beta Y_{t-1} + \theta' X_{t-1} + \Sigma_1^s a_j' \Delta X_{t+j} + \varepsilon_t \qquad (9)$$

where $\gamma(L)$ and $\alpha(L)$ are polynomials in the lag operator, L. When β exceeds the critical values (provided in Banerjee et al. 1998), the null hypothesis of non-co-integration is rejected. In this procedure, the long-run relationship, $Y = \lambda^{e\prime}X$, is also simultaneously estimated. The vector of coefficients ($\lambda^{e\prime}$) of X by this ECM procedure are given by,

$$\lambda^e = \theta^e/\beta. \qquad (10)$$

In finite samples, the long-run estimates, λ^e, obtained by this method often has considerably less bias than the estimates, λ^s, obtained by static OLS (Inder 1993, Banerjee et al. 1998). Further, inference on the significance of the coefficients is facilitated by the fact that the t-statistics of the coefficients obtained by the ECM procedure, λ^e,

TABLE 1

Results of the Augmented Dickey Fuller (ADF) Tests for Unit Roots in Various Variables of Interest

Variables	*Korea*			*Malaysia*			*Thailand*			*Indonesia*		
	Level	*First Diff.*	*Order*[4]	*Level*	*First Diff.*	*Order*	*Level*	*First Diff.*	*Order*	*Level*	*First Diff.*	*Order*
Log y	−1.996(t)[2]	−5.801*	I(1)	−2.088(t)	−4.512*	I(1)	−1.966(t)	−3.735*	I(1)	−1.421(t)	−4.461*	I(1)
Log M2Y	0.726	−4.971*	I(1)	0.757	−6.031*	I(1)	−0.548	−4.717*	I(1)	0.432	−5.007*	I(1)
Log RER	−1.603	−3.447*	I(1)	−1.094	−4.594*	I(1)	−2.159	−3.984*	I(1)	−1.626	−3.189*	I(1)
R_d	−3.107*	−7.773*	I(0)	−4.527*	−7.482*	I(0)	−4.646*	−6.754*	I(0)	−3.860*	−6.126*	I(0)

NOTES:

1. y denotes real GDP, M2/Y denotes ratio of broad money to GDP, and RER denotes real exchange rate (see equation (6)), TOT denotes an index of term of trade and R_d denotes real interest rates on deposits.
2. * denotes that the null hypotheses that the variable concerned is non-stationary can be rejected at 5 per cent significance level. Asymptotic cutoff values for 5 per cent significance level are −2.86 when the trend term is not included and −3.41 when the trend term is included (see Davidson and Mackinnon 1993, p. 708).
3. (t) denotes that the trend term was significant and included.
4. Order denotes the "Order of Integration" of the variable, on the basis of the ADF tests. All variables were found to be integrated of order one (denoted I(1)) or zero (denoted I(0)).

have asymptotic normal distribution if the explanatory variables are weakly exogenous (unlike the case of static OLS coefficients, λ^s).

Note that in all the estimations reported below, the ECM procedure involved up to second order lag in and first order in leads of dynamic terms (see equation (9)) — a higher order was usually not feasible given that we usually had 25 to 35 annual observations available for each country. The insignificant terms were dropped.

3. The Dynamic OLS (or DOLS)

This test procedure developed by Saikonnen (1991) and Stock and Watson (1993) has the advantage that the endogeneity of any of the regressors has no effect, asymptotically, on the robustness of the estimates. In addition, statistical inference on the parameters of the co-integrating vector is facilitated by the fact that the t-statistics of the estimated co-efficient have asymptotic normal distributions, even with endogenous regressors (Stock and Watson 1993). The procedure also allows for direct estimation of a mixture of I(1) and I(0) variables. It is asymptotically equivalent to the maximum likelihood estimator of Johansen (1988) and has been shown to perform well in finite samples (Stock and Watson 1993). This is important for us given limited data availability for each country. The procedure incorporates the lags and leads of the first differences of the I(1) variables. Thus, estimation of the long run relation between Y and X is carried out with a regression of the type:

$$Y = \lambda^{d\prime}X + \Sigma^{n}_{-n}a_i\Delta X_{t-i} \qquad (11)$$

where λ^d denotes the vector of long-run coefficients of X using the dynamic OLS procedure.

Note that in all the estimations reported below, the dynamic OLS procedure involved up to second order of lags and leads in dynamic terms — a higher order was usually not feasible given that we usually had 25 to 35 annual observations available for each country. The insignificant dynamic terms were dropped.

IV. Empirical Results

In this section we describe the empirical results from our estimations. The long-run financial deepening (ratio M2/Y of broad money to GDP) relation estimated using the ECM and DOLS procedures is:

$$\ln M2/Y = a_0 + a_1 \ln y + a_2 \ln RER + a_3 R_d \qquad (5)$$

The results for the long-run relation for each of the four countries are shown in Table 2 (detailed estimations, including the dynamic terms, using the ECM and DOLS procedures are shown in the Appendix). We see from Table 2 that the ECM test rejects the null hypothesis of non-cointegration at a 5 per cent significance level for the estimated relation for Korea and Malaysia, at 10 per cent level for Indonesia, and about 20 per cent level for Thailand. The ECM estimations satisfy various diagnostic tests including Ramsey's Reset test of functional form specification and normality of residuals (see Appendix). Further, the coefficients for the explanatory variables obtained using the ECM and the DOLS procedures are similar considering their standard errors. These results corroborate the weak exogeneity of the explanatory variables.

The long-run elasticity of the financial deepening ratio with respect to real GDP (co-efficient of ln y) is positive and in the range of 0.25 to 0.80. This suggests that in rapidly growing developing countries, the demand for broad money is likely to increase more than proportionately with GDP.

The elasticity with respect to the real exchange rate (ln RER) is also positive for all the three countries (Korea, Thailand, and Indonesia) for which this variable is significant. Since a higher RER implies real depreciation of the domestic currency, this means that currency depreciation led to increased money demand and thereby financial deepening in Korea, Thailand, and Indonesia over the period of analysis (mid-1960s to mid-1990s). A real depreciation did not have a significant effect in the case of Malaysia. It is worth noting here that the estimations in the

TABLE 2

Estimation of Financial Deepening Function for Korea, Malaysia, Thailand, and Indonesia

Variables	*Korea*		*Malaysia*		*Thailand*		*Indonesia*	
	ECM	*DOLS*	*ECM*	*DOLS*	*ECM*	*DOLS*	*ECM*	*DOLS*
Constant	−12.183	−11.08	−15.979	−15.803	−15.039	−14.654	−24.047	−28.889
	(−4.04)**	(−7.78)**	(−32.55)**	(−46.123)**	(−12.93)**	(−24.626)**	(−8.73)**	(−29.49)**
Log y	0.295	0.274	0.626	0.62	0.431	0.427	0.569	0.766
	(4.74)**	(8.98)**	(30.94)**	(44.03)**	(9.41)**	(19.14)**	(5.54)**	(23.10)**
Log RER	0.327	0.232	—	—	0.775	0.657	0.584	0.324
	(1.62)	(2.77)**			(5.48)**	(7.75)**	(3.95)**	(5.09)**
R_d	0.0163	0.00845	0.0078	−0.0014	0.016	0.0179	0.012	0.00644
	(3.57)*	(5.51)**	(2.19)*	(−0.47)	(2.43)*	(4.98)**	(2.68)**	(3.39)**
R^2	0.886	0.958	0.562	0.984	0.763	0.995	0.763	0.993
SE of Reg.	0.032	0.0282	0.0482	0.0553	0.0265	0.0275	0.0428	0.0454
Durbin-Watson Stats.	2.713	2.331	2.123	1.365	2.154	1.407	2.294	1.649
ECM Test of Cointegration	−5.364*	—	−4.138*	—	−3.103	—	−3.658#	—
Sample (Annual)	1968–96	1969–95	1961–95	1961–95	1971–96	1973–95	1971–96	1972–95

NOTES:

1. y is real GDP, R_d is real interest rate on bank deposits, RER is the real exchange rate.
2. t-statistics of coefficients are given in parentheses.
3. ** denotes significant 1% level, * denotes significance at 5% level and # denotes significance at 10% level. Asymptotic Critical Values are 2.57 and 1.96 and 1.645 respectively for the t-statistics and −4.46 and −3.74 and −3.42 respectively for the ECM test (from Banerjee et al. 1998).

case of Thailand, Indonesia, and Korea fail to reject the null hypothesis of non-co-integration if ln RER is not included in the estimation. This suggests that these economies are at least partly open, and that the impact of foreign portfolios cannot be ignored.

Finally, the results also show that the long-run semi-elasticity of the financial deepening ratio with respect to the real interest rates on bank deposits are positive for all the four countries (except an insignificant co-efficient for Malaysia using the DOLS procedure). Further, the coefficients are in the range of 0.01 ± 0.006 which implies that a 1 per cent increase in the real interest rates increases the financial deepening ratio by about 1 per cent (recall that M2/Y is a fraction while R_d is measured in per cent). Additionally, the semi-elasticity with respect to the real interest rates is large enough to have policy relevance. These results imply that higher real interest rates on bank deposits significantly increase the demand for bank deposits.

Does the intensification of financial deepening in response to an increase in the real interest rate occur at least partly at the expense of foreign assets? Given that reliable data on domestic and foreign assets held by residents is not available, it is difficult to provide empirical proof. However, our empirical results for the real exchange rate (RER) and real interest rates do suggest that this should be the case. Any rational economic agent who adjusts his domestic asset holdings in response to exchange rate depreciation would, *ceteris paribus*, also be expected to do so in response to higher domestic real interest rates. Hence, higher real interest rates also ought to increase the investment rate in the economy. Given these arguments, our results provide some, albeit tentative, support to the McKinnon–Shaw hypothesis.

V. Concluding Remarks

In this article we have undertaken an empirical investigation of the impact that real interest rates and real exchange rates have on financial deepening in four Asian countries. We found that the financial deepening ratio, proxied by M2/GDP, generally increased with higher real interest rates and with real currency depreciation. Foreign assets seem to have become important in the East Asian countries, as the financial deepening relations did not co-integrate, except for Malaysia, unless the real exchange rate variable was included. These results suggest that at least some of the assets coming into the banking system in response to higher interest rates could be at the expense of foreign assets held by domestic residents. As discussed in the introductory section, this implies that higher real interest rates are likely to increase the investment ratios in these economies. These results support the policy of interest rate liberalization (to market clearing levels) strongly advocated by McKinnon (1973) and Shaw (1973). The challenge is to raise interest rates in a controlled and gradual fashion while avoiding excessive build up of non-performing loans and resulting financial crashes that have all too often accompanied such efforts.

APPENDIX

A.1 Data Sources

The data on Broad Money (M2) and the exchange rates are taken from IMF, *International Financial Statistics* (CD version, 1998). Data on gross domestic product (GDP) in current and constant prices are taken from World Development Indicators (CD version, 1998). Data on interest rates on bank deposits (one-year fixed deposits) for most countries are taken from SEACEN Research and Training Centre, Malaysia, *SEACEN Financial Statistics*, 1991 and 1993. In the case of Korea, these are supplemented by data from Yearbooks of Statistics, for various years, and for Malaysia from *Money and Banking in Malaysia*, 35th ed., published by Bank Negara Malaysia.

A.2 Full Equations and Diagnostic Tests for ECM Estimations of Table 1

Korea

$$\Delta LM2Y = \underset{(1.507)}{-5.554} - \underset{(0.084)}{0.455} \ln M2Y(-1) + \underset{(0.034)}{0.134} \ln y + \underset{(0.001)}{0.007} R_d(-1) + \underset{(0.0864)}{0.149} LRER(-1)$$
$$- \underset{(0.0327)}{0.098} FLIB - \underset{(0.249)}{0.570} \Delta \ln y - \underset{(0.263)}{0.970} \Delta \ln y(-1) - \underset{(0.213)}{0.695} \Delta \ln y(-2)$$
$$- \underset{(0.0012)}{0.004} \Delta R_d(-1) - \underset{(0.145)}{0.370} \Delta LRER(-1)$$

$R^2 = 0.886$; $F(10,18) = 14.094$; $SE = 0.032$; $DW = 2.713$ LM1-$F(1,17) = 4.173$;
RESET- $F(1,17) = 3.742$; NORMALITY-$(\chi^2(2)) = 0.274$.

Malaysia

$$\Delta LM2Y = \underset{(2.446)}{-10.158} - \underset{(0.153)}{0.635} \ln M2Y(-1) + \underset{(0.0956)}{0.397} \ln y(-1) + \underset{(0.0016)}{0.0049} R_d(-1)$$
$$+ \underset{(0.338)}{(-0.0674)} \Delta \ln y(-1) + \underset{(0.141)}{0.286} \Delta \ln M2Y(-1)$$

$R^2 = 0.562$; $F(5,29) = 7.470$; $SE = 0.0482$; $DW = 2.123$ LM1-$F(1,28) = 0.310$;
RESET- $F(1,28) = 2.131$; NORMALITY-$(\chi^2(2))$=0.0746.

Thailand

$$\Delta LM2Y = \underset{(2.241)}{-5.818} - \underset{(0.124)}{0.386} \ln M2Y(-1) + \underset{(0.068)}{0.116} \ln y(-1) + \underset{(0.0010)}{0.006} R_d(-1) + \underset{(0.100)}{0.300} LRER(-1)$$

$R^2 = 0.763$; $F(4, 21) = 16.911$; $SE = 0.0265$; $DW = 2.154$; LM1-$F(1,20) = 0.303$;
RESET- $F(1,20) = 0.569$; NORMALITY-$(\chi^2(2)) = 1.022$.

Indonesia

$$\Delta LM2Y = \underset{(2.946)}{-8.093} - \underset{(0.091)}{0.336} \ln M2Y(-1) + \underset{(0.081)}{0.191} \ln y + \underset{(0.0007)}{0.004} R_d(-1)$$
$$+ \underset{(0.50)}{0.196} LRER(-1) - \underset{(0.1232)}{0.3006} \Delta \ln M2Y(-2)$$

$R^2 = 0.76304$; $F(5,20) = 12.880$; $SE = 0.042811$; $DW = 2.2945$; LM1-$F(1,19) = 0.915$;
RESET- $F(1,19) = 0.079$; NORMALITY-$(\chi^2(2)) = 0.954$.

A.3 Detailed Dynamic OLS (DOLS) Estimations for Table 1

Korea

$$LM2Y = \underset{(1.412)}{-11.080} + \underset{(0.0305)}{0.274} \ln y + \underset{(0.0015)}{0.008} R_d + \underset{(0.083)}{0.232} LRER - \underset{(0.033)}{0.172} FLIB - \underset{(0.205)}{0.746} \Delta \ln y - \underset{(0.253)}{1.232} \Delta \ln y(-1)$$
$$- \underset{(0.227)}{0.979} \Delta \ln y(-2) - \underset{(0.0013)}{0.008} \Delta R_d - \underset{(0.0012)}{0.009} \Delta R_d(-1) - \underset{(0.0011)}{0.002} \Delta R_d(-2) - \underset{(0.155)}{0.417} \Delta LRER(-1)$$

$R^2 = 0.958$; $SE = 0.0282$; $DW = 2.331$; $LM1 - F(1,14) = 0.707$.

Malaysia

$$LM2Y = \underset{(0.342)}{-15.803} + \underset{(0.014)}{0.620} \ln y - \underset{(0.003)}{0.001} R_d - \underset{(0.525)}{0.847} \Delta \ln y - \underset{(0.002)}{0.003} \Delta R_d$$

$R^2 = 0.984$; $SE = 0.0553$; $DW = 1.365$; $LM1 - F(1,29) = 0.3.006$.

Thailand

$$\text{LM2Y} = -14.645 + 0.427 \ln y + 0.017\, R_d + 0.650\, \text{LRER} - 0.017\, \Delta R_d - 0.008\, \Delta R_d(-1)$$
$$\quad (0.594) \quad (0.022) \quad (0.003) \quad (0.083) \quad (0.003) \quad (0.0025)$$
$$- 0.948\, \Delta\text{LRER} - 0.796\, \Delta\text{LRER}(-1) - 0.324\, \Delta\text{LRER}(-2)$$
$$\quad (0.191) \quad (0.190) \quad (0.139)$$

$R^2 = 0.995$; $SE = 0.0275$; $DW = 1.407$; $LM1 - F(1,13) = 1.240$.

Indonesia

$$\text{LM2Y} = -28.889 + 0.766 \ln Y + 0.006\, R_d + 0.324\, \text{LRER} - 0.006\, R_d - 0.002\, \Delta R_d(-1)$$
$$\quad (0.979) \quad (0.033) \quad (0.001) \quad (0.063) \quad (0.0014) \quad (0.0012)$$
$$- 0.386\, \Delta\text{LRER} - 0.296\, \Delta\text{LRER}(-1) - 0.327\, \Delta\text{LRER}(-2)$$
$$\quad (0.100) \quad (0.1009) \quad (0.091)$$

$R^2 = 0.993$; $SE = 0.045$; $DW = 1.649$; $LM1 - F(1,14) = 0.381$.

A.4 Brief Description of the Diagnostic Tests Reported in Sections A.2 and A.3

R^2 is the fraction of the variance of the dependent variable explained by the model, F( ) is the F-statistics for the joint significance of the explanatory variables, SE is the standard error of the regression, *DW* is the Durbin Watson statistics, *LM*1 = Lagrange multiplier test (F-version) of residual serial correlation (1-year lags), *RESET* = Ramsey test for functional form mis-specification (square terms only); *Normality* = Jarque-Bera test for the normality of residuals: *ARCH* = Engle's autoregressive conditional heteroscedasticity test; *CHOW* = Chow test for parameter stability (the sample was split into equal halves).

NOTES

1. See, for example, King and Levine (1993), Levine and Renelt (1992), Fry (1995), and Roubini and Sala-i Martin (1992).
2. McKinnon–Shaw also argued that higher interest rates would increase savings. However, there is a large and growing body of empirical evidence which suggests that the response of the total savings rate to higher interest rates is either insignificant or too small to be of any policy relevance (see for example, Giovannini 1985 and Fry 1995).
3. See, for instance, Caprio and Klingebiel (1996), Diaz Alejandro (1985), Williamson and Mahar (1998), and World Bank (1993, 1989).
4. At least if done in a controlled and gradual manner to avoid the possibility of a financial crisis (see Agrawal et al. 2000, pp. 87–91; McKinnon 1993; Diaz Alejandro 1985).
5. See, for example, Fry (1998, 1995), Greene and Villenueva (1991), and Gonzales and Gerrardo (1988).
6. Bahmani-Oskooee and Pourheydarian (1990) have previously suggested this functional form.

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